

2020 Campus Master Plan



Research Space Meeting
January 21st, 2020

I n t r o d u c t i o n s



Who is in the Room?



What we hope to accomplish:

Identify...

1. Research space parameters to be captured within the Campus Master Plan
2. Data needs and potential next steps to support **UA's on-going** efforts to maximize the use and **impact of its research facilities**

AGENDA

Steering Committee

1. Master Plan Status Update
2. Quick Hit: National Precedents & Concepts
3. UA Research Space & Master Plan Parameters
4. Data Needs
5. Wrap Up

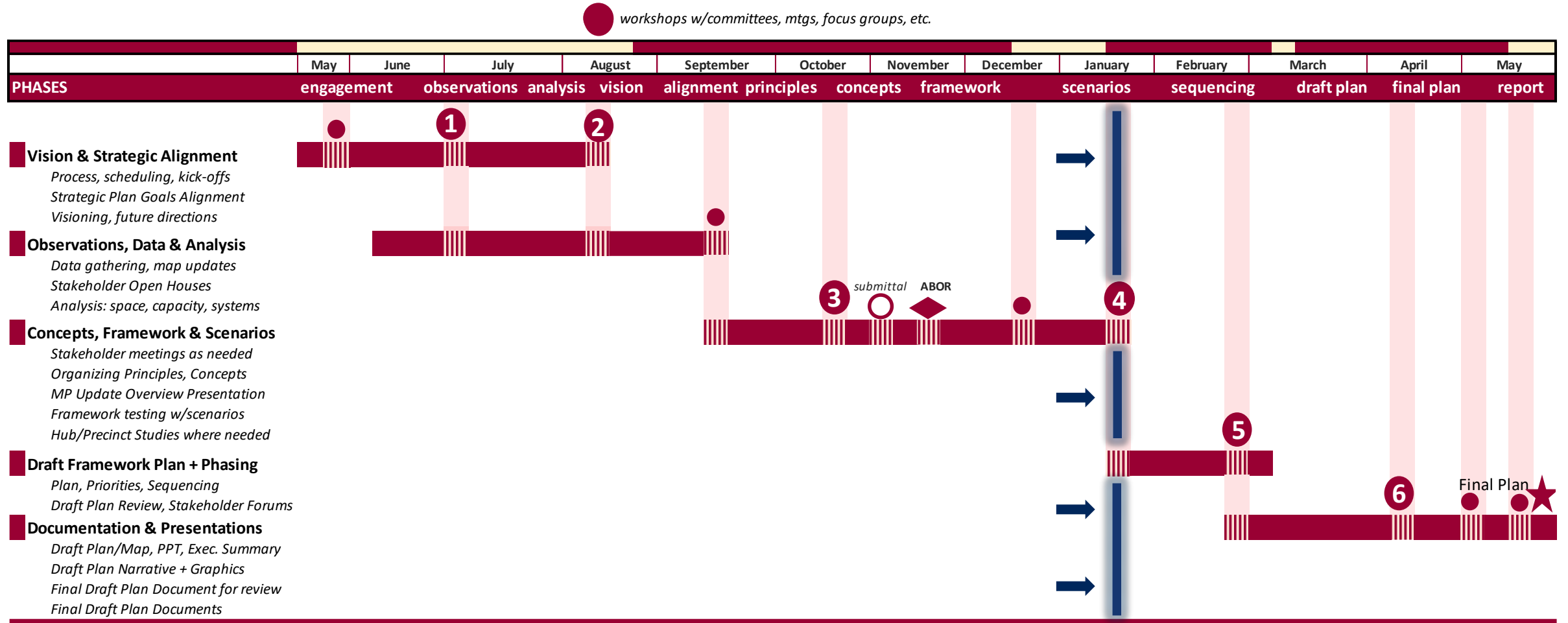


1. Master Plan Status Update

University of Arizona 2020 Campus Plan Update



2020 Campus Master Plan Schedule



Stakeholder Engagement



Comprehensive Workshops

- Leadership
- Faculty
- Staff



Focus Groups

- Topical Discussions

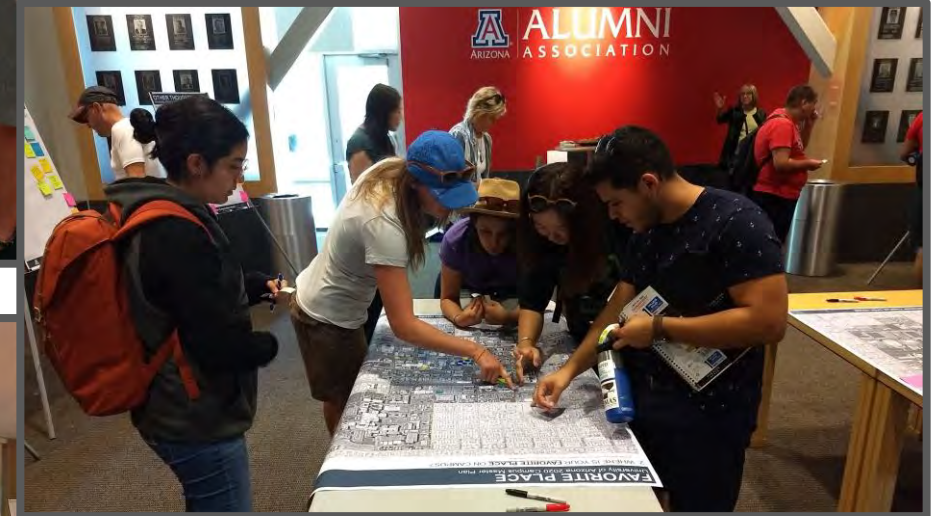


Students Engagement

- Open House



Neighborhood Engagement



Engagement to-date

20

Engagement Meetings

3 Workshops

18 Focus Groups
(part of 1 or more meetings)

4 Meetings
(Steering Committee/
Operations Committee)

1

Campus-wide Open House

4,000+ Dots
(1 Dot=1 comment)

200+ Participants

400 Cookies

360+ Web Site Comments

3

Neighborhood Meetings
(Open Houses & Report-back)

450+ Dots
(1 Dot=1 comment)

10 Neighborhood Associations

40+ Neighbors



1,128

Total Participants

Physical Campus Feedback

STRENGTHS

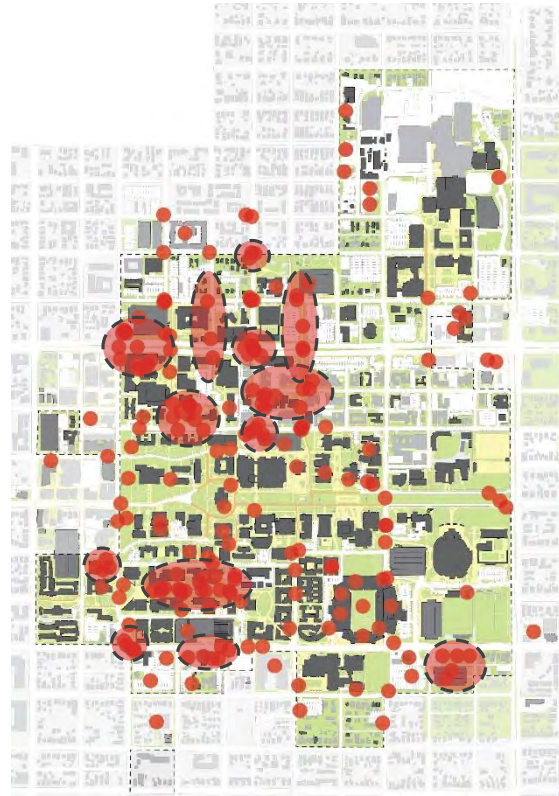


- West Gate – gateway and entry
- Old Main
- Research Facilities - ENR2/HSIB
- Main Mall
- Rec Center
- Community Garden



Successful places on campus

WEAKNESS

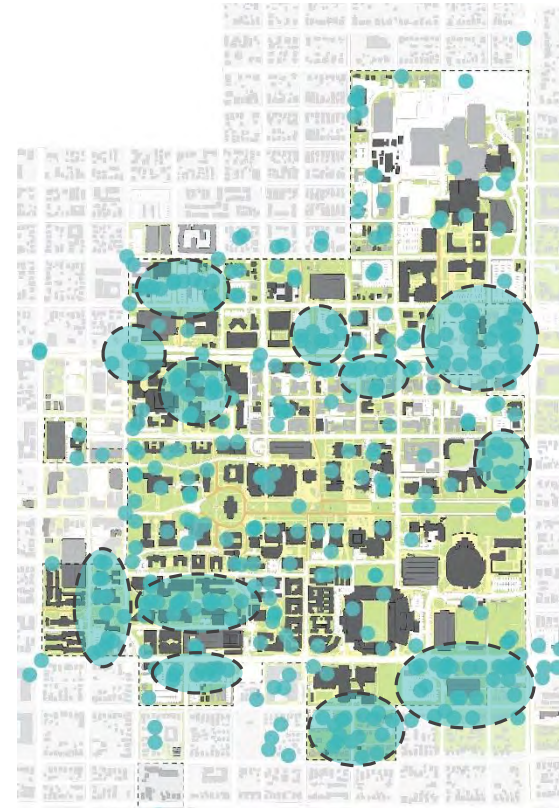


- Gateway and Intersections along Speedway Blvd. & 6th St.
- North-South Connectivity
- Density & Infill along Speedway Blvd. & 6th St.
- Southwest Campus Quad



Places for improvement

OPPORTUNITIES



- Underutilized Parking Lots
- Gateways and Housing
- Land Use Synergies along 6th St. & Speedway Blvd.
- Open Space Improvements in Southwest Campus
- Southern Edge Land Uses



Places with unrealized potential

THREATS



- Older Buildings on Campus
- Intersections and Bike/Ped pathways
- East Speedway Gateway
- Arizona Stadium – deferred maintenance



Places that need to be addressed

Physical Campus Feedback Summary

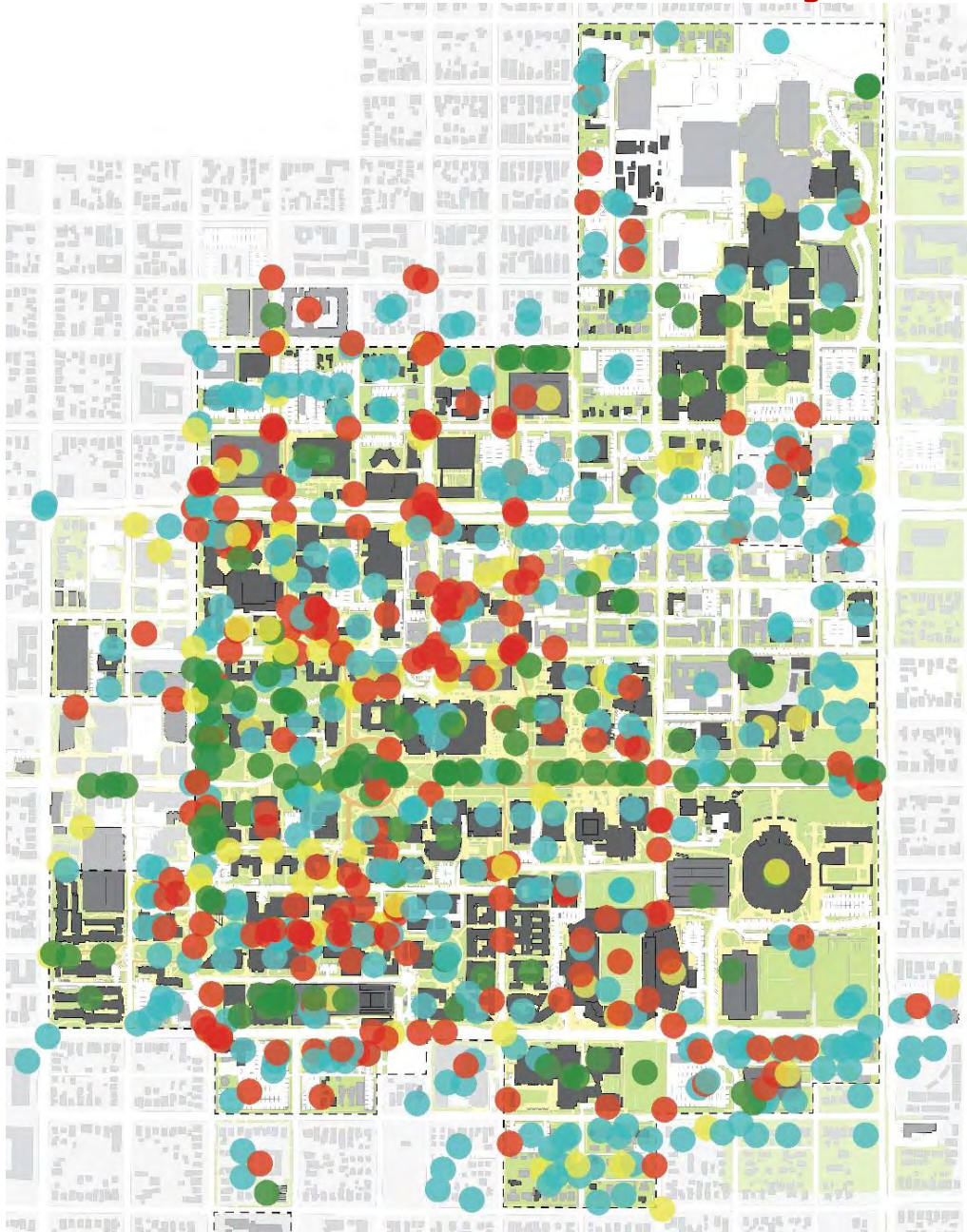
● 147

● 223

● 382

● 89

841 TOTAL DOTS



Overall Themes:

- Campus Connectivity and Mobility
- Campus Edges
- Student Housing
- Campus Gateways
- Space Type and Building Conditions
- Athletics & Rec Facilities
- Speedway Blvd– N/S Divide
- Student Success & Student Experience
- Campus Infrastructure
- Student Success Spaces

Master Plan Organization - Steering Committee

Three areas of Direction:

1. Framework:

Physical Campus Framework Advances to Support Capacity Opportunities

2. Integrated Planning Projects:

Integration of key upcoming projects and infrastructure

3. Strategic Asset Management:

Developing long-term views on key space resources and how their attributes affect experience and the built environment

A. Universal Support Topics:

Topics that support all three areas of direction including enrollment growth and profiles, program profiles and evolutions, campus carrying capacity, impact of new vs. renovation, broader PDC project, and physical infrastructure limitations



2. Quick Hit: Precedents & Concepts

University of Arizona 2020 Campus Plan Update

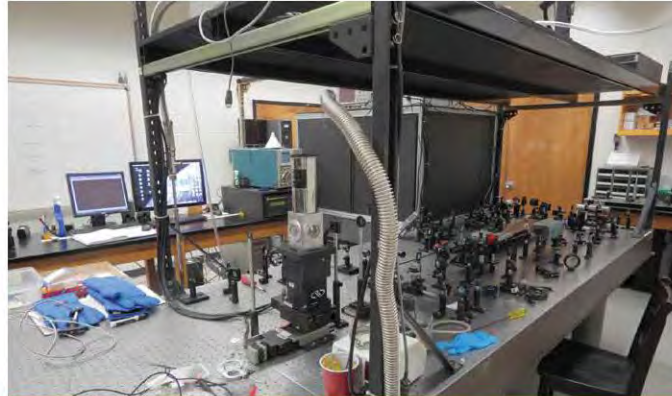


Lab Phenotypes: Illustrative Models

RESEARCH LAB TYPES



SPECIALTY / INDUSTRIAL LAB



DRY LAB



FLEXIBLE / TRANSITIONAL



WET LAB



COMPUTATIONAL LAB

GROUP SIZE ASSUMPTIONS

*Research groups would share a conference room, work room, and administrative assistant – all of which reside outside the phenotype

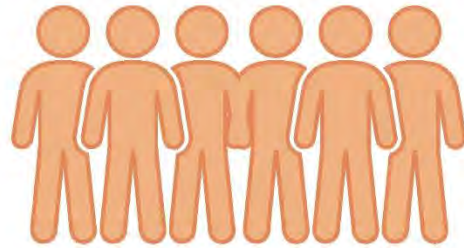
Principal Investigator



1



Grad + Post Docs



6

Average



Touchdown Space



0*



Administrative Assistant

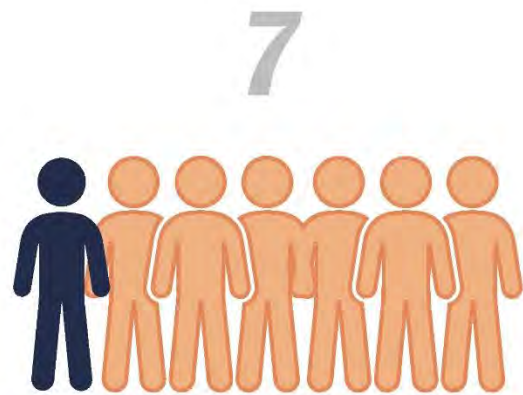


0*

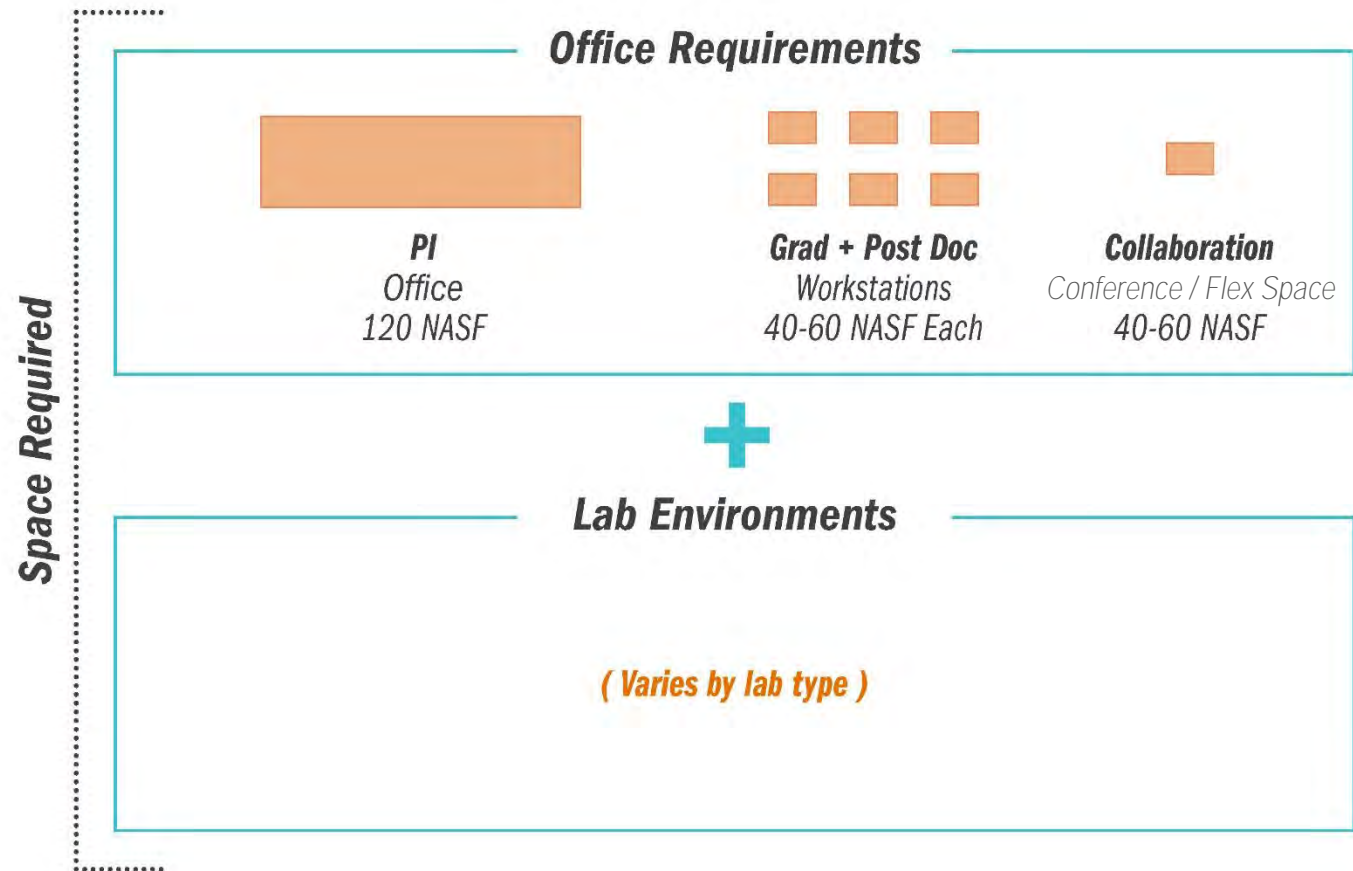
= 7

Average Group Size

PI GROUP SPACE REQUIREMENTS



Average Group Size



SPECIALTY / INDUSTRIAL LAB

Specialty/Industrial labs are flexible lab spaces with specific needs, such as volumetric requirements and vibration sensitivity as most of the equipment oscillates to some degree.

Examples include:

- Fluids
- Fabrication
- High Bay
- Structural

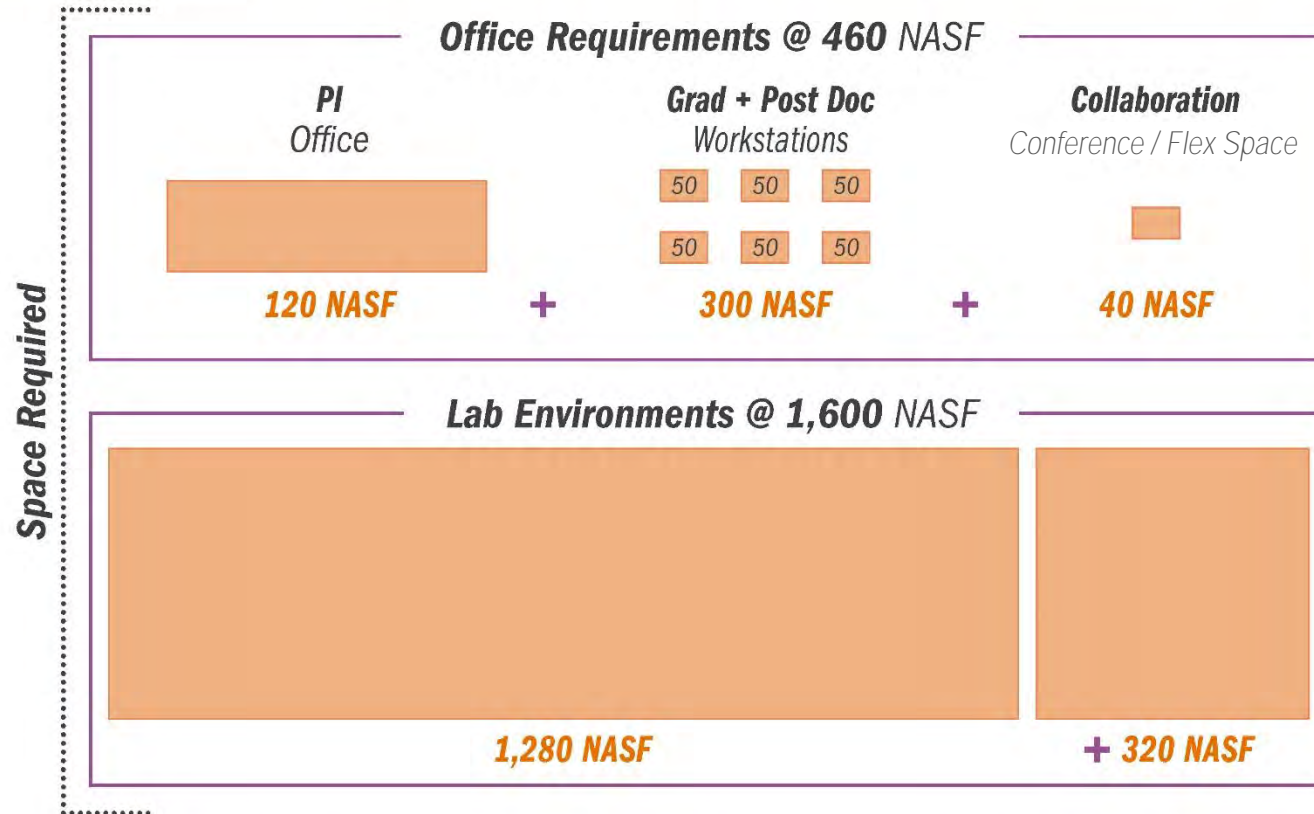
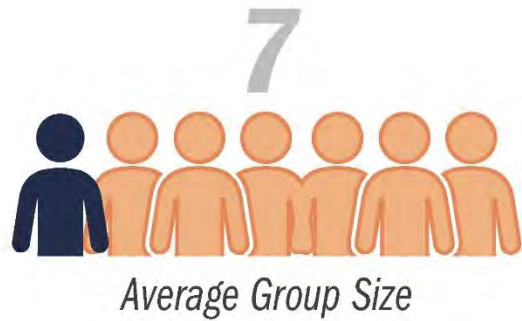


SPECIALTY / INDUSTRIAL LAB



SPECIALTY / INDUSTRIAL LAB

4:1 to lab support ratio



= 2,060 NASF

WET LAB

Wet labs include research space with benches and hoods.

Examples include:

- Biological Sciences
- Biochemistry
- Biomedical Engineering
- Materials
- Chemistry
- Chemical Engineering

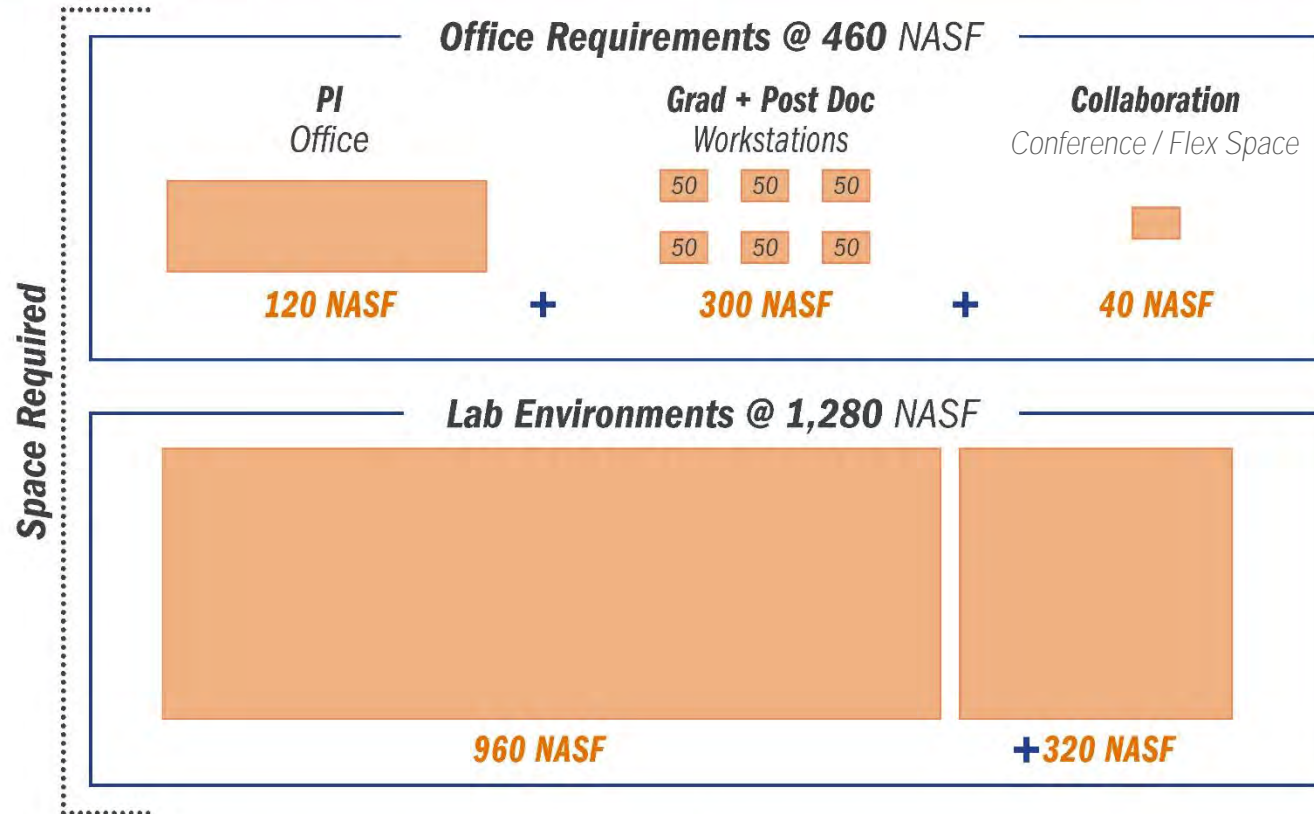
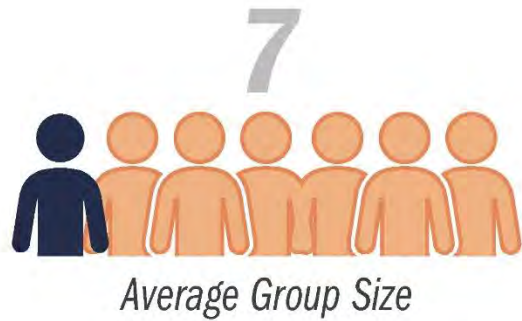


WET LAB



WET LAB

3:1 to lab support ratio



= 1,740 NASF

DRY LAB

Dry labs include flexible lab spaces to work with dry stored materials, electronics, and/or large instruments. They do not have major requirements like piped services but they may require accurate temperature and humidity control or dust control.

Examples include:

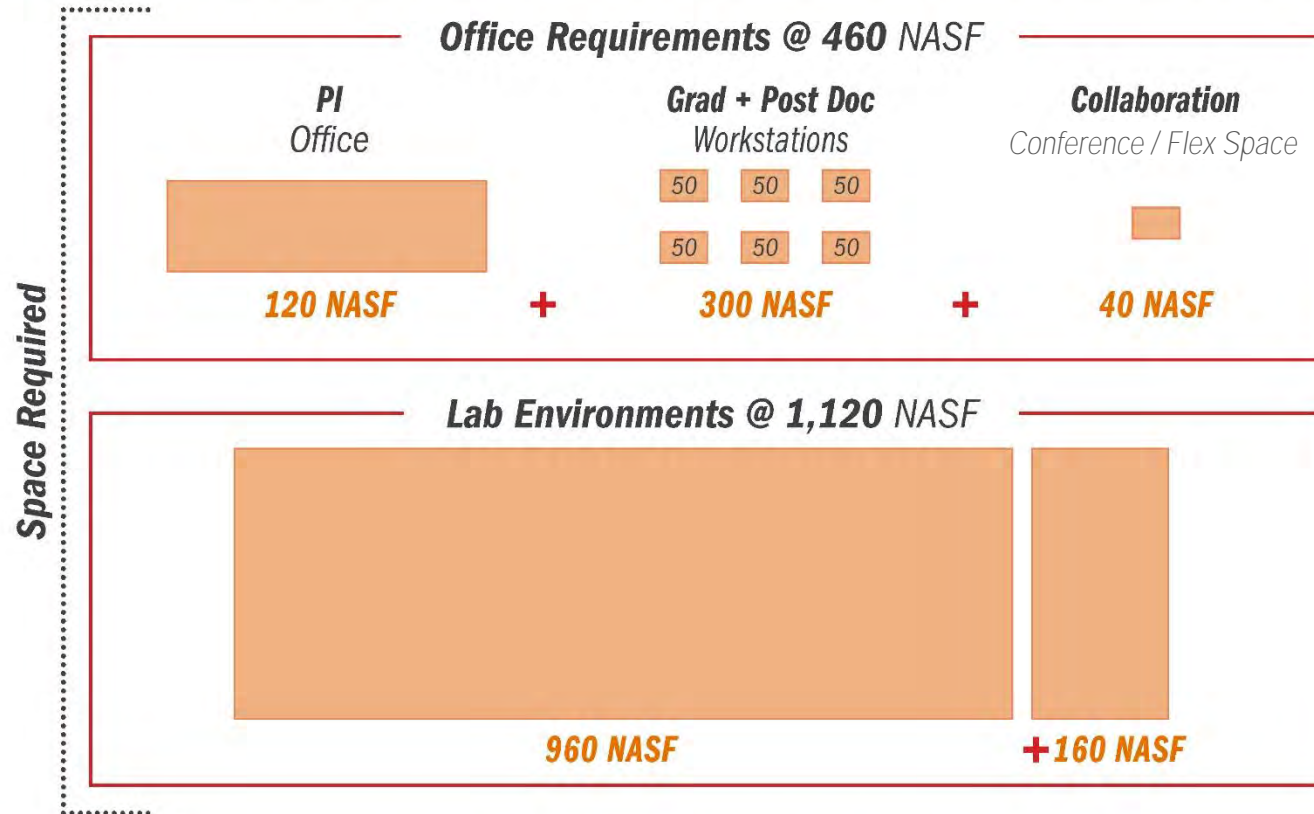
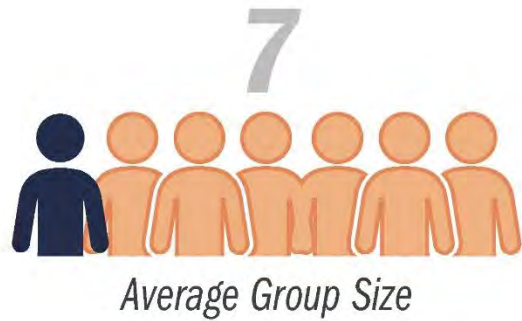
- Electronics
- Computer Engineering
- Robotics
- Optics
- VR/AR
- Maker Spaces
- Rapid Prototyping



DRY LAB



DRY LAB



= 1,580 NASF

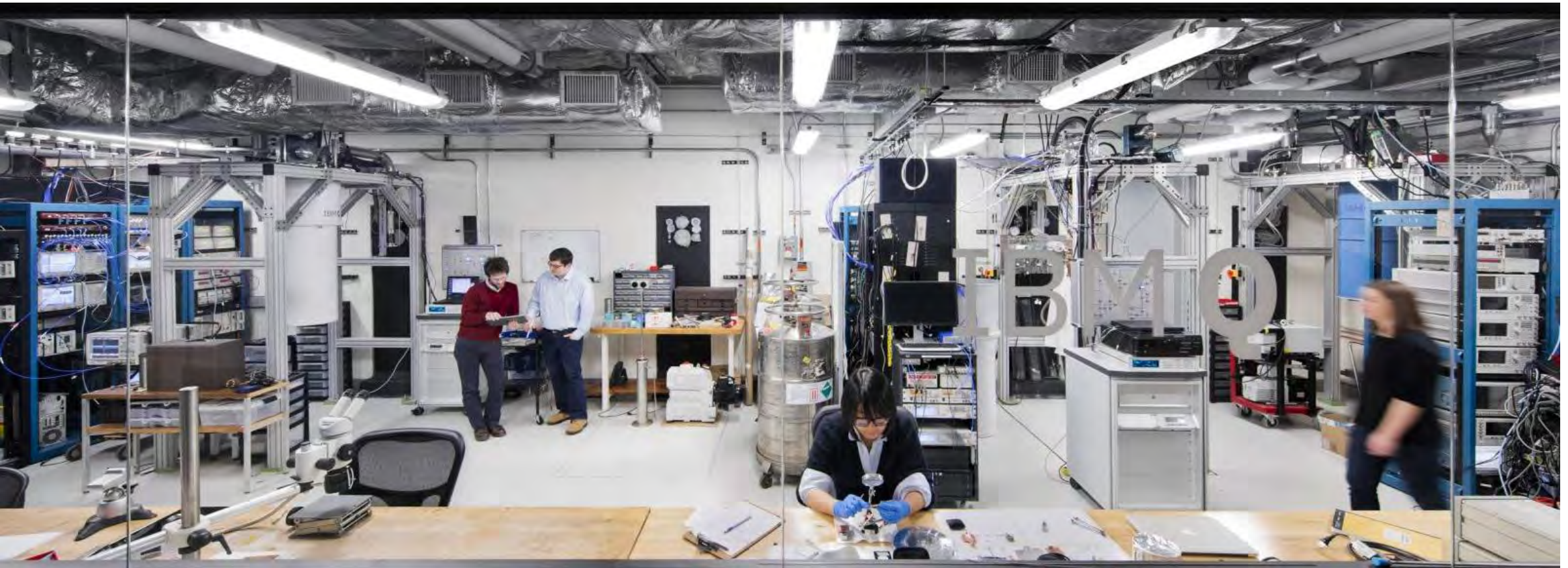
COMPUTATIONAL LAB

Computational labs are different than dry labs in that they are typically in an office setting. The type of research happening in these spaces include computational modeling and data analysis. There are various configurations (private office vs open office) and may or may not include some experimental/equipment components.

For this study, computational hybrid labs are those spaces that include lab space/specialty equipment, while computational labs are those without.

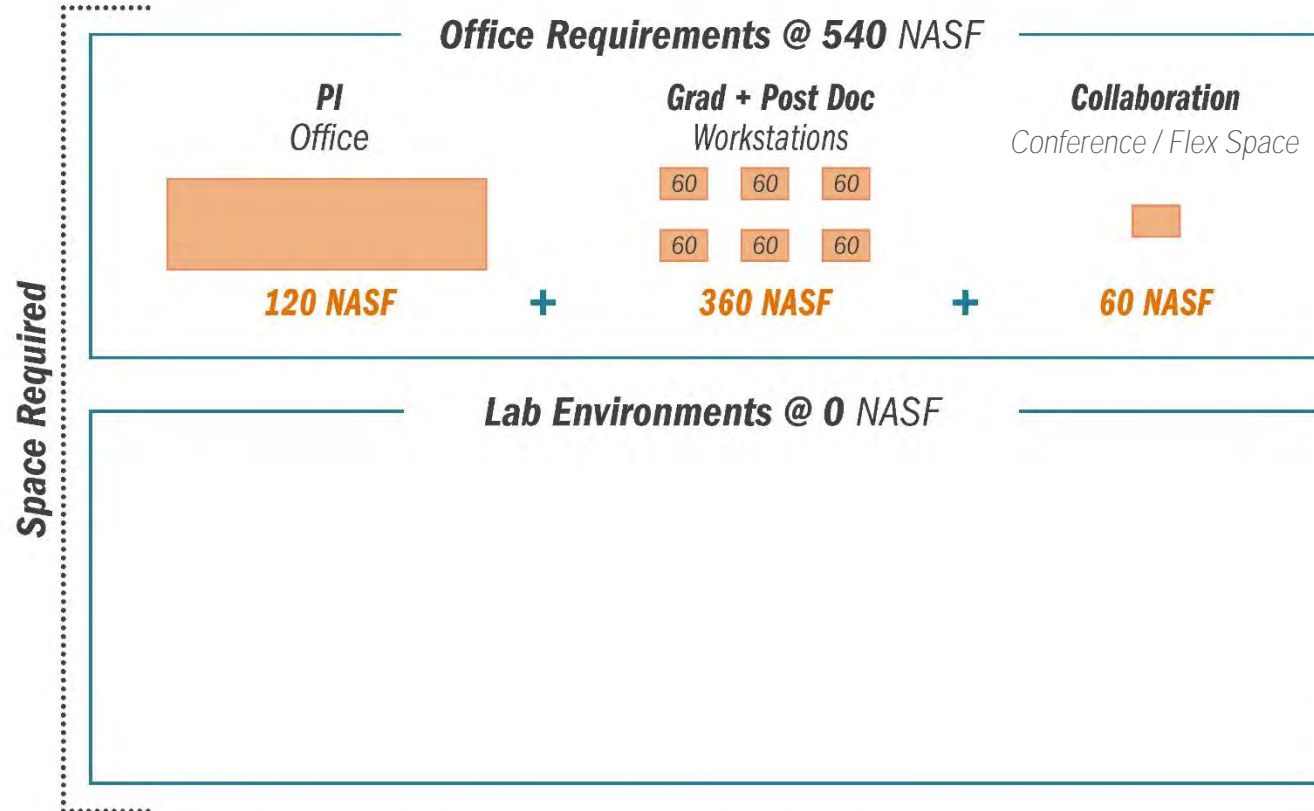


COMPUTATIONAL LAB



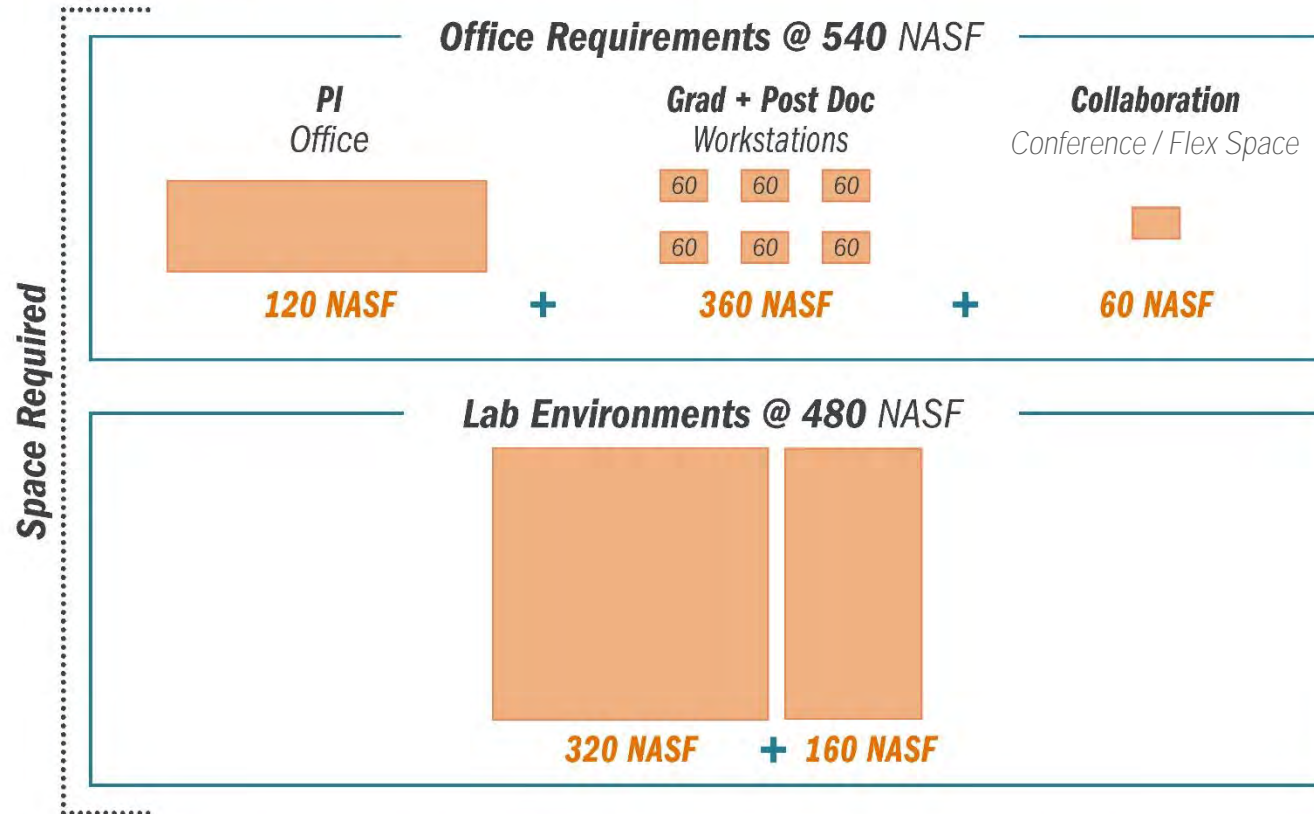
COMPUTATIONAL LAB HYBRID

WITHOUT LAB SPACE



= 540 NASF

COMPUTATIONAL LAB HYBRID WITH LAB SPACE



= 1,020 NASF

FLEXIBLE/TRANSITIONAL LAB

Flexible labs or transitional labs are designed with the recognition that lab technologies, staffing, and projects are constantly changing in order to maximize space efficiency and minimize future costs.

- Minimal fixed case-work
- Modular lab furniture
- Overhead ceiling mounted utility connections allow rapid reconfiguration
- Minimal space dividers to allow labs to expand/contract



FLEXIBLE/TRANSITIONAL LAB

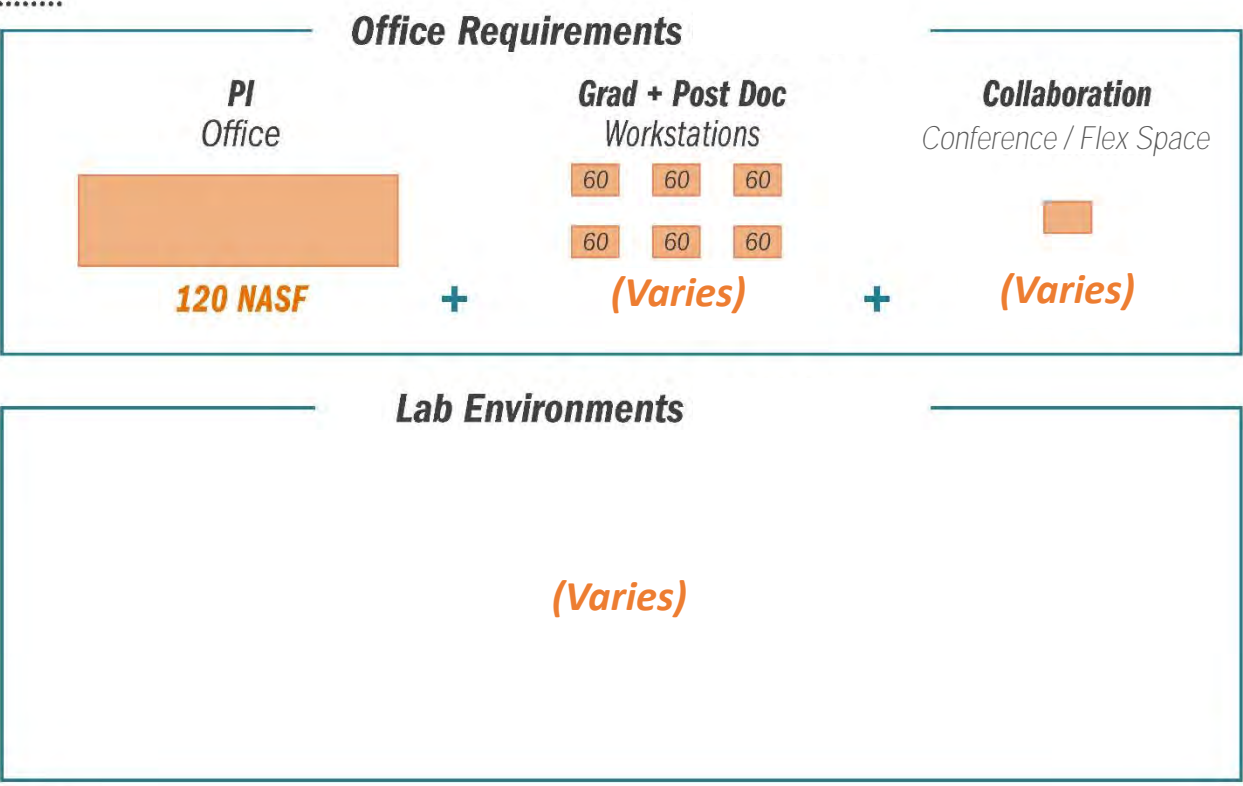


FLEXIBLE/TRANSITIONAL LAB

(Varies)

Average Group Size

Space Required



= Variable NASF



3. UA Research Space & Master Plan Parameters

University of Arizona 2020 Campus Plan Update



\$687 million

2018-2019 Research Expenditures

- #1 Arizona Public Institution
- #20 All US Public Institutions
- #35 Overall in US

Current Profile

Sponsored Award Highlights | FY 2019

2,251
Active Awards

62.24%
New Awards

25.72%
Multidisciplinary
Involvement

36.69%
Federal Sponsors

Top 5 Sponsors

- 1 National Institutes of Health
- 2 National Aeronautics and Space Administration
- 3 National Science Foundation
- 4 National Heart, Lung, and Blood Institute
- 5 Department of Defense

Sponsored Award Trends | FY 2015 - 2019

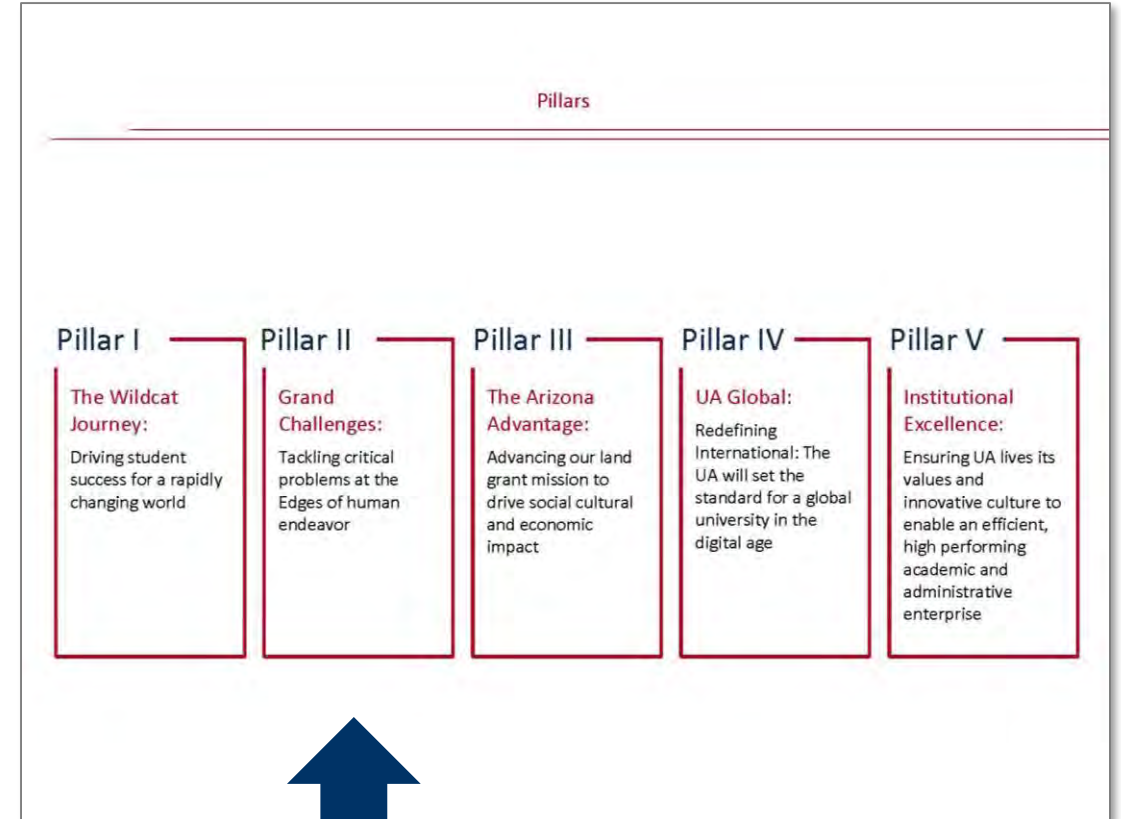
View awards by:

Activity Type ▼

	2015	2016	2017	2018	2019
Clinical Trial	88	89	165	188	164
Instruction	52	48	40	43	45
Other Sponsored Activity	280	302	291	314	319
Research	1,431	1,517	1,516	1,536	1,727
Grand Total	1,851	1,956	2,010	2,081	2,251



Strategic Plan Alignment



Strategic Plan: Goals

Funding

Top 25 ranked university in total R&D expenditures by increasing our current spend of \$622M to \$800M

Space University

#1 ranked in Space and Planetary Science and Technology in the world with research investments of \$100M a year

Health University

Top 25 ranked Health Science funding by 2030

Physical Sciences

Top 3 ranked Physical Sciences funding by 2025 by increasing our research investments from \$125M to \$160M

Social Sciences

Top 20 ranked Social Sciences funding by 2025 by increasing our research investments from \$23M to \$30M

Capabilities

90th percentile in research productivity across network science, machine learning, artificial intelligence, and digital computation

Talent

Recognized leader in attracting and retaining star faculty that represent academic excellence within their respective disciplines and also integrates **diverse and inclusive** backgrounds to research areas

Impact

10 signature partnerships with the public and private sector (Northrop Grumman, Gates Foundation) by 2025

Strategic Plan: Initiatives

2.1 Space Technology, Development, and Defense for the 4IR

2.1A The overall theme, vision, and initiatives will be enabled by:

- **“Arizona Space Center”**: Research center that maintains continuity of technical talent to operate world-class space missions and application research
- **Establish graduate programs** in the areas of space situational awareness, in situ resource utilization, space business and space law
- **Retain and attract 10+ key hires** to support the Arizona Space center and space research goals and augment UA’s commitment to excellence, diversity, and inclusion

2.1B Space Exploration and National Defense: Advance human and non-human space exploration (e.g., autonomous vehicles, 3D printing, health in space, hypersonics)

2.1C What’s out there? Understand the origins and existence of life in space (e.g., astrobiology, exoplanet search and characterization)

2.1D Defending our planet: Develop space technologies in service of monitoring and supporting Earth (e.g., automated space object data base management, remote sensing)

2.1E The Business of Space: Define the future of security, governance, and business models for space development (e.g., asteroid mining, rocket / payload technology)

2.2 Future Earth: Shaping a Resilient Natural and Built Environment

2.2A The overall theme, vision, and initiatives will be enabled by:

- **Building upon eminence in the field by strengthening the Institute of the Environment or Establishing a College of the Environment:** UA will have an innovative, bold and cross-cutting unit that serves, coordinates and promotes all environmentally-oriented people and programs on campus. This structure will also integrate and enhance key research labs within the institute such as Biosphere 2
- **Retain and attract 8+ key hires** to support the new unit and environmental research goals and augment UA’s commitment to excellence, diversity, and inclusion

2.2B Future Earth: Predict and plan for future Earth (e.g., Earth systems predictive modeling, link climate models to built environment models)

2.2C Adaptation to Variable Climates in a Changing World: Adapt and build resilience to extreme climates leveraging our strengths in the social, natural and physical sciences (e.g., water planning and policy, ecosystem carbon management)

2.2D Building a Changing World: Define design needs and solutions to create a sustainable, renewed, and purposefully deigned built environment in the 4IR (e.g. livable cities for the 4IR, built environment lifecycle, trillion sensor future and IoT in built environment, automated construction, cloud infrastructure)

Strategic Plan: Initiatives

2.3 Healthier Communities, Aging and the Brain, and Resilient Humans

2.3A Health, wellbeing, and quality care for all: Pursue health equity by scaling innovations in health care access, research and delivery (e.g. access to precision medicine for all, innovations to tackle substance misuse and addiction, One Health)

2.3B Aging for life: Dramatically improve health, happiness, and quality of life during our older years (e.g. neuroscience research to extend the cognitive healthspan, on-campus senior community and 'living lab' to set the new paradigm for healthy aging)

2.3C Unlock human resilience: Adapt the body's immune system and our behavioral, social and physiological protections (e.g. exploration of the immune microbe interface, preventative and therapeutic approaches for chronic diseases through precision nutrition, study and application of social and behavioral drivers of resilience)

2.4 Humans, Society, and Intelligent Systems

2.4A The overall theme, vision, and initiatives will be enabled by:

- **Establish "4th Industrial Revolution Institute"** that supports faculty and researchers from technology areas (including CoE, OSC, CoS) to work with their colleagues from across campus and disciplines
- **Retain and attract 9+ key hires** to support the 4th Industrial Revolution Institute and its cross-disciplinary research goals and augment UA's commitment to excellence, diversity, and inclusion

2.4B Technology for Humans and Intelligent Systems: Advance the technology of intelligent systems (e.g., connected and autonomous agents) and human engagement with these systems (e.g., AR/VR, motion tracking)

2.4C The State of the World in the 4IR: Explore implications and opportunities of the 4IR on individuals (e.g., finding meaning, advancing human potential) and societal and geopolitical relationships (e.g., multilingualism, poverty, inequality, border issues, humanics)

2.4D Digital Privacy and Cybersecurity 2.0: Define future for law, privacy and security in an increasingly digital world

2.4E Creative Competencies in the 4IR: Apply visual literacy, design thinking, creative expression and to solve emerging, critical human challenges

2.4F Digital Health: Develop an array of technologies and digital solutions that advance disease prevention, detection, and treatment while preserving long-term physical and mental well-being

Strategic Plan: Initiatives

2.5 College of Data, Computing, and Network Science

2.5A College of Data, Computing, and Network Science:

Launch a distinctive, world-leader that integrates network science with data and computing science, including artificial intelligence and machine learning. The college will support other Pillar 2 research grand challenges such as the future workforce, climate change, and precision healthcare for all. We will attract top research talent while training students to thrive in the 4IR

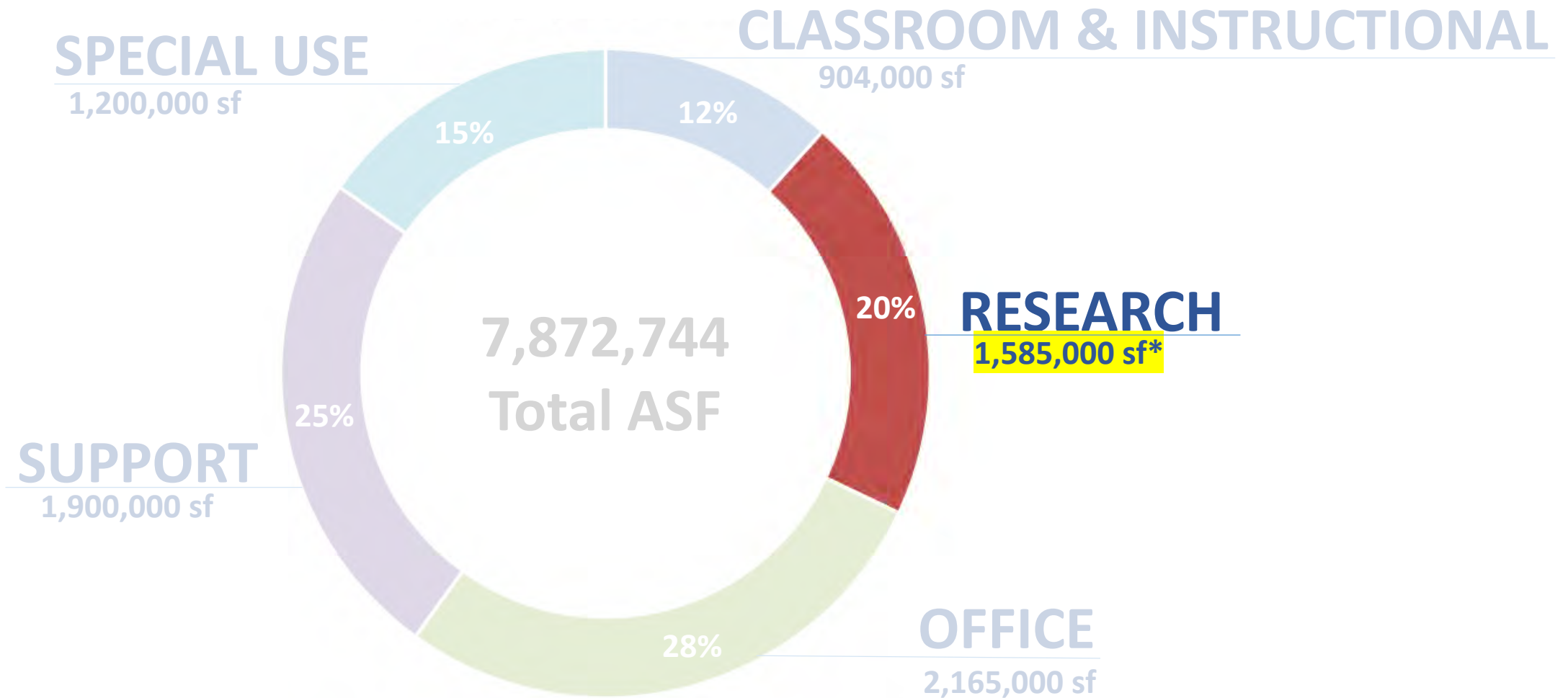
- Build upon existing research and faculty excellence by attracting star faculty and founding college dean; cultivate existing institutes (e.g. CyVerse, D7, TRIPODS) and build new centers of excellence
- Launch degree and certification programs, exposing students through real-world application and partnerships with industry leaders
- Explore a hybrid model for dual-appointments in industry and academia, allowing top talent to advance our application of data and technology while training a new generation of thinkers, researchers, and industry leaders

2.6 University-Wide Research Engine Enablers

2.6A Graduate Stipends for research: Expand the number of graduate students and increase stipend supporting university-wide research efforts

2.6B Expanding administrative support for research: expand the number of administrative staff that provide research support activities (e.g. RDS proposal writers or compliance officers for health related research)

University of Arizona – Campus-wide Space Assessment (October 2019)



Research Space Inventory Assessment (January 2020)



0081.00	250.00	Research/ Nonclass Lab	10	30492
0081.00	255.00	Research/ Nonclass Lab Service	10	2391
0087.01	250.00	Research/ Nonclass Lab	10	1036
0088.00	250.00	Research/ Nonclass Lab	10	45157
0088.00	255.00	Research/ Nonclass Lab Service	10	17850
0088.00	255.07	Research/ Nonclass Lab Service - Observation	10	620
0090.00	250.01	Research/ Nonclass Lab - Wet	10	20545
0090.00	255.00	Research/ Nonclass Lab Service	10	1887
0090.00	255.01	Research/ Nonclass Lab Service - Storage	10	549
0090.00	255.02	Research/ Nonclass Lab Service - Cold Storage	10	375
0090.00	255.11	Research/ Nonclass Lab Service - Wet	10	584
0090.00	255.12	Research/ Nonclass Lab Service - Dry	10	539

Extraction of all space coded as room types 250-256 from the UA master space inventory.

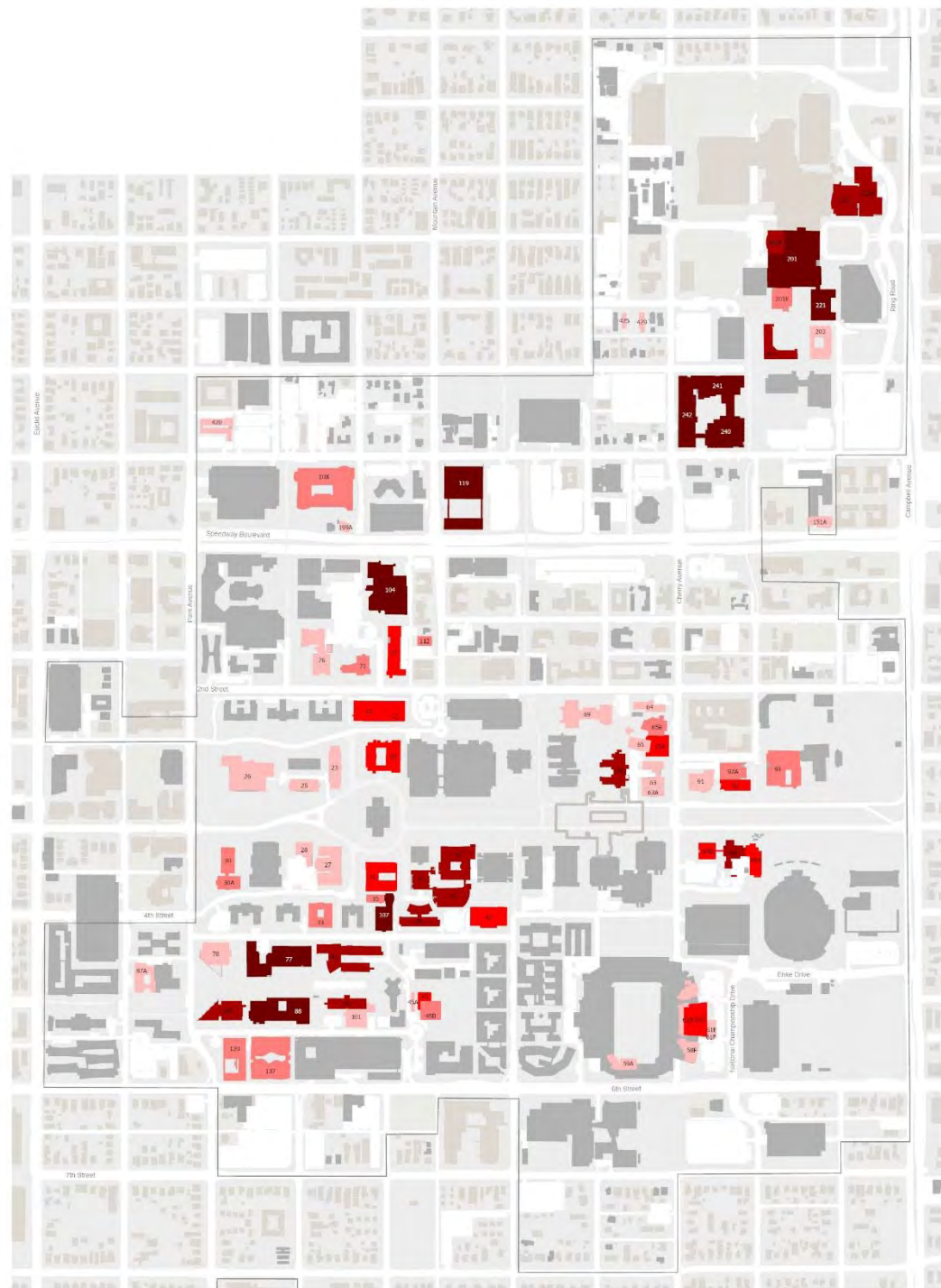
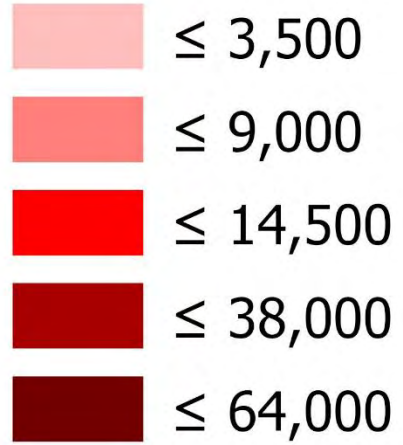
Includes lab and misc. non-lab support and service space

**Total Research Space
= 1,148,166 Sq. Ft.**

Collectively we need to work to understand why we are getting different values for the amount of research space on campus

UA – Research Assets

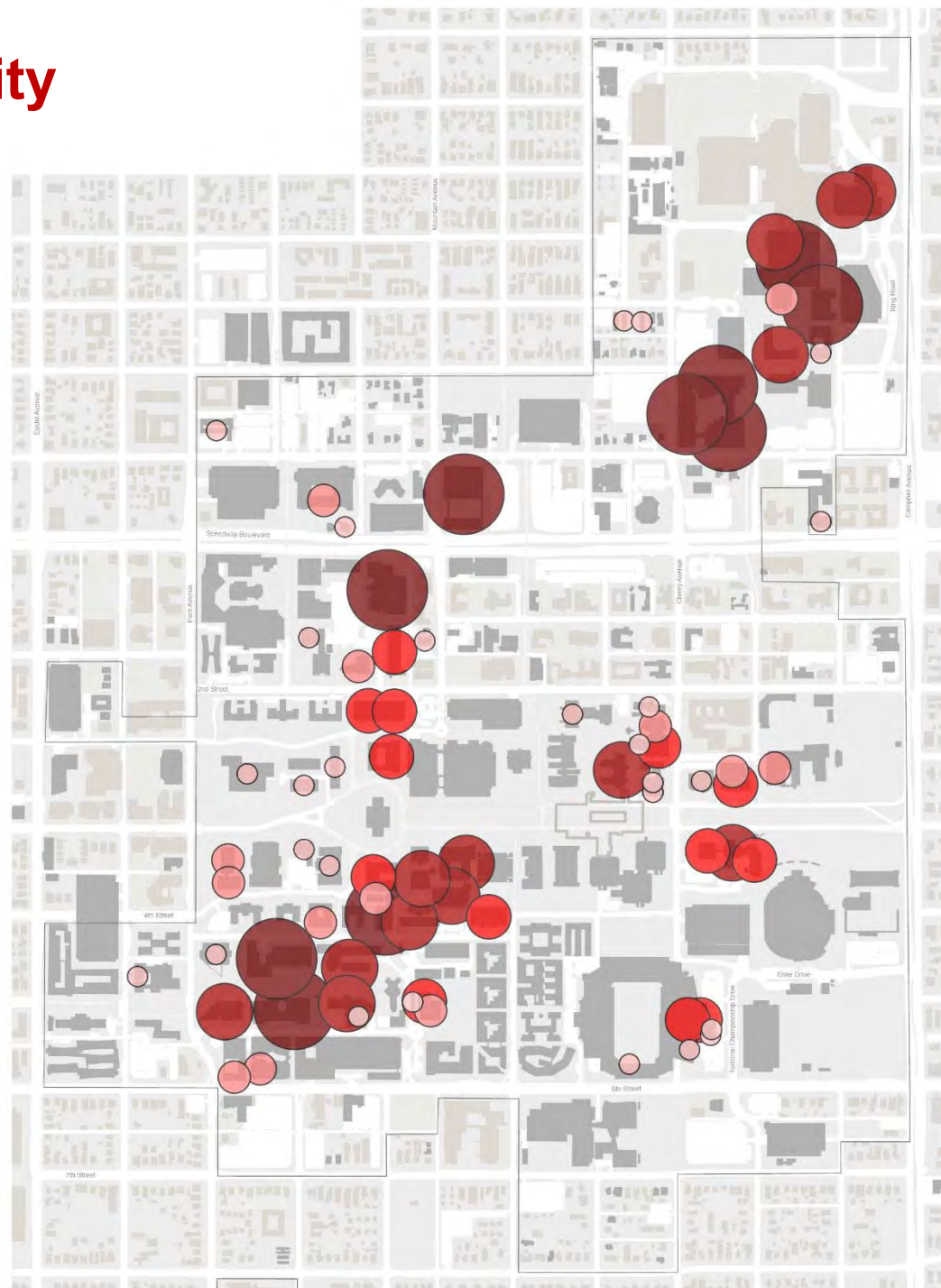
Total Research Space Area (ft²)



Research Space Density

Total Research Space Area (ft²)

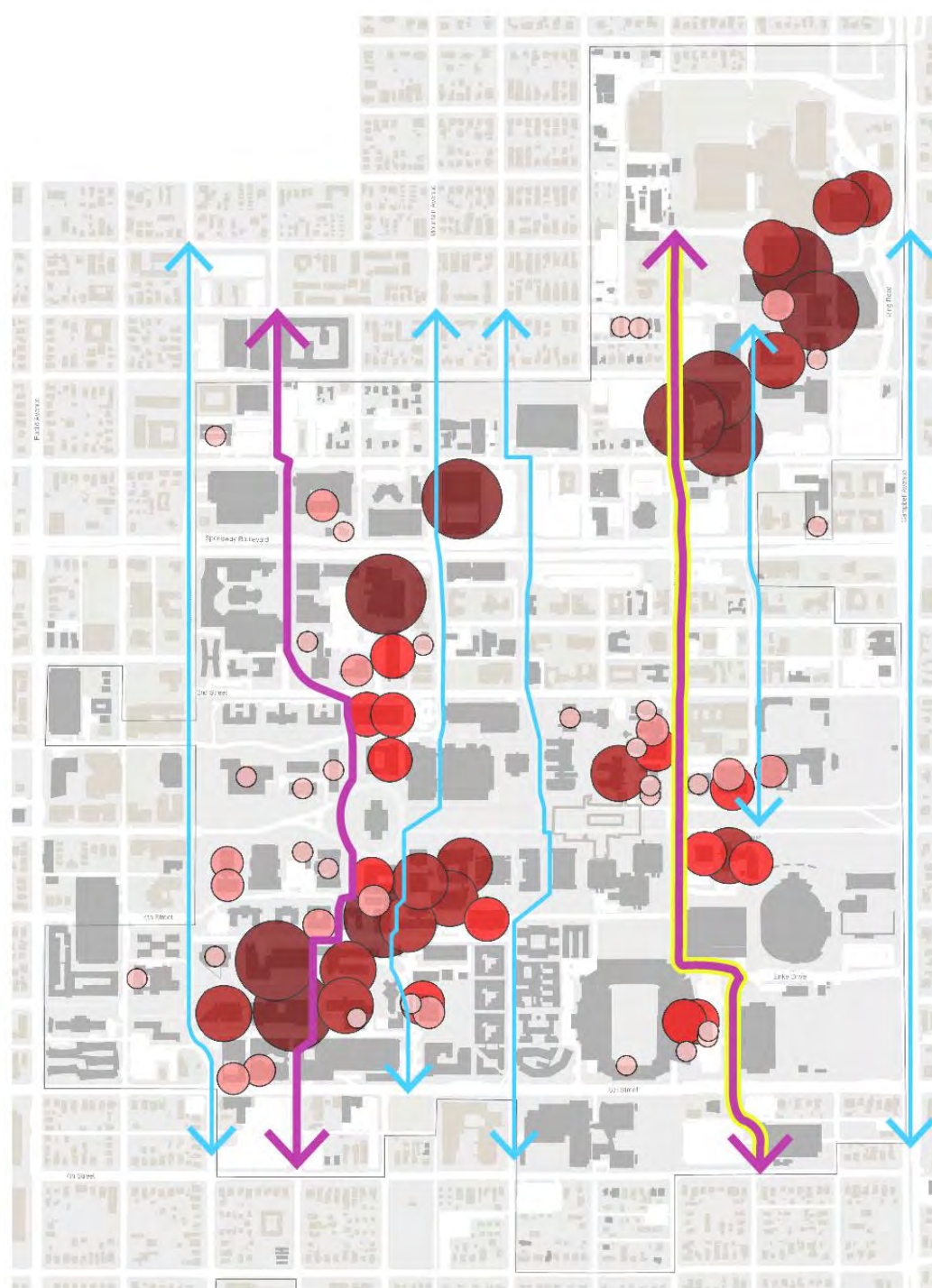
- $\leq 3,500$
- $\leq 9,000$
- $\leq 14,500$
- $\leq 38,000$
- $\leq 64,000$



Relationships

Total Research Space Area (ft²)

- $\leq 3,500$
- $\leq 9,000$
- $\leq 14,500$
- $\leq 38,000$
- $\leq 64,000$



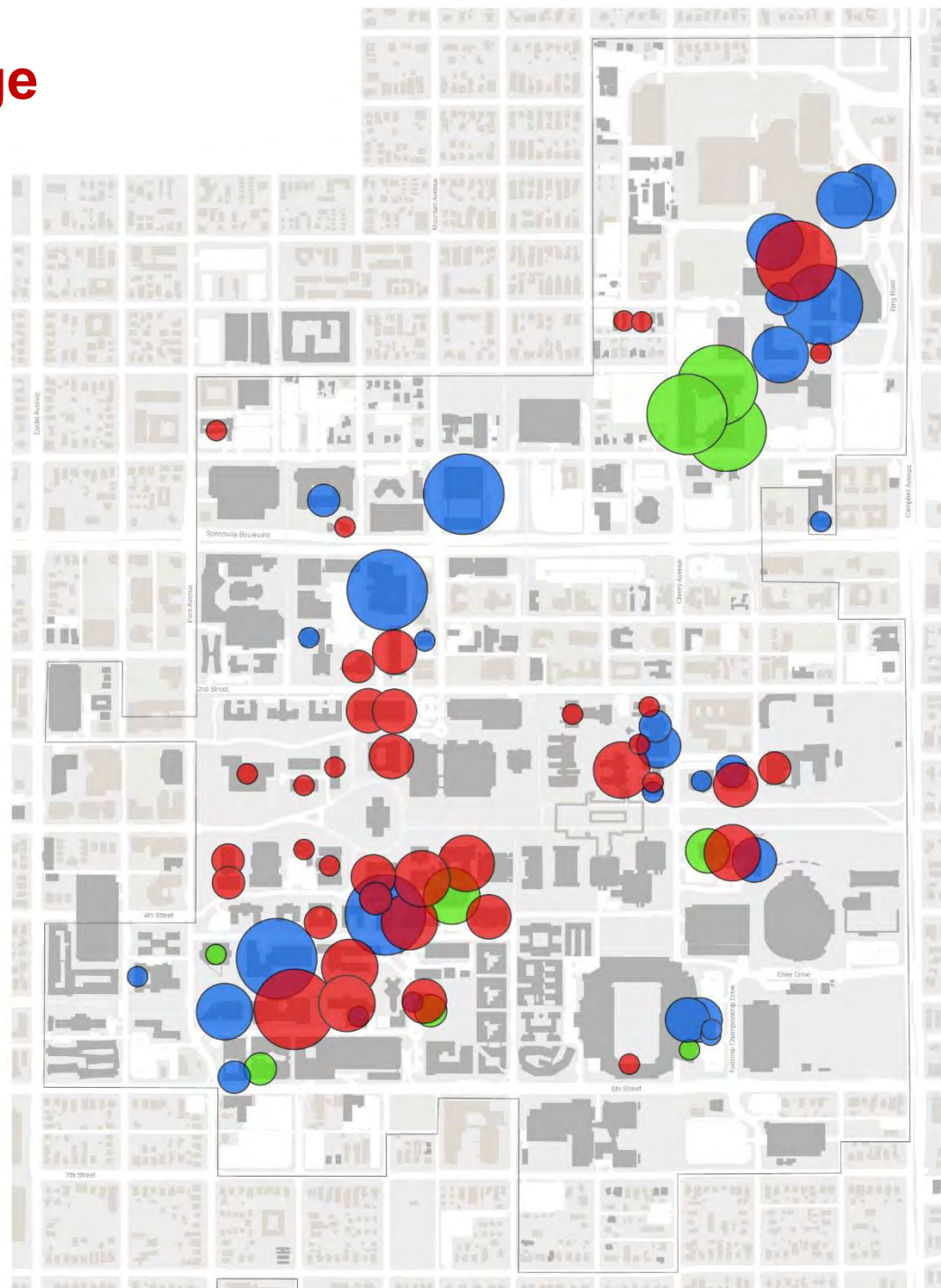
Research Space by Age

Total Research Space Area (ft²)

- ≤ 3,500
- ≤ 9,000
- ≤ 14,500
- ≤ 38,000
- ≤ 64,000

Building Age in Years

- ≤ 15
- 16 - 45
- ≥ 46



Existing Research Assets

Bldg. #	Building Name	Building Age (Year Built)	Reset Age (Major Reno)	Building FCI	Typical F-2-F Height	PI Count	GA Count	Programs	Lab Types	Total Research Space
0088.00	Biological Sciences West	1967								63,627
0240.00	Thomas W. Keating Bioresearch Building	2007								55,042
0241.00	Medical Research Building	2006								53,224
0077.00	Gould-Simpson	1985								52,892
0242.00	Bioscience Research Laboratories	2018								52,134
0107.00	Marley	1990								49,364
0104.00	Electrical And Computer Engineering	1986								45,336
0201.00	Arizona Health Sciences Center	1968								44,111
0094.00	Meinel Optical Sciences	1970								43,705
0119.00	Aerospace And Mechanical Engineering	1997								40,456
0221.00	Life Sciences North	1990								39,604
0041.00	Chemistry	1936								37,994
0044.00	Chemical Sciences Building	2006								35,290
0106.00	Life Sciences South	1990								34,670
0081.00	Physics-Atmospheric Sciences	1960								32,883
0038.00	Shantz	1962								31,048
0222.01	Sydney E. Salmon Building	1998								30,052
0061.02	Richard F Caris Mirror Lab	1986								28,408
0207.00	Skaggs Pharmaceutical Sciences Center	1980								28,378
0222.00	Leon Levy Cancer Center	1986								27,107
0090.00	Animal and Comparative Biomedical Sciences	1966								24,479
0201.02	Steele Children's Research Center	1991								23,245
0037.00	Carl S. Marvel Laboratories Of Chemistry	1973								21,736
0068.00	Psychology	1968								21,620
0064.00	Steward Observatory	1953								21,368

Excluded but Research Space >10,000SF = Garard P. Kuiper Space Sciences, Forbes, Civil Engineering, Harshbarger, Bio-Sciences East, Engineering, Tree Ring Archives, Mines and Metallurgy

Top 25 Research Buildings by Space (table above) = 940k SF = 82% of Research Space
45 other facilities = 208k SF = 18% of Research Space

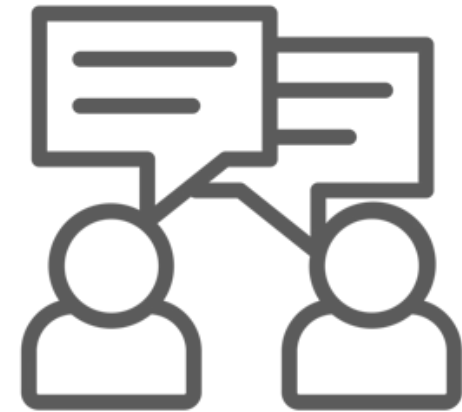
Data Needs to Finish Master Plan? (Discussion)

Bldg. #	Building Name	Building Age (Year Built)	Reset Age (Major Reno)	Building FCI	Typical F-2-F Height	PI Count	GA Count	Programs	Lab Types	Total Research Space
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UA Team continue to work on filling in blanks

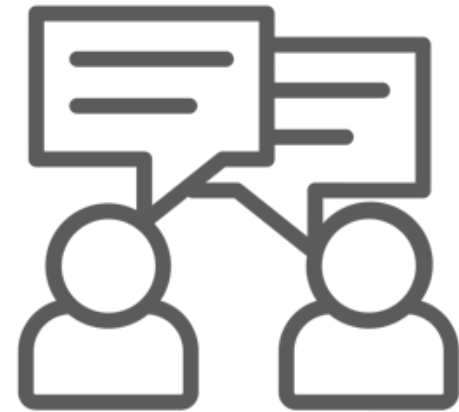
In addition to what is identified in the Strategic Plan, what areas or programs is research growth expected in the next 15 years?



Discussion Point

What types of space are
going to be needed over
the next 15 years?
30 years?

(dry, wet, computational, flex, specialty, etc.)



Discussion Point

How will support space needs change in the future?

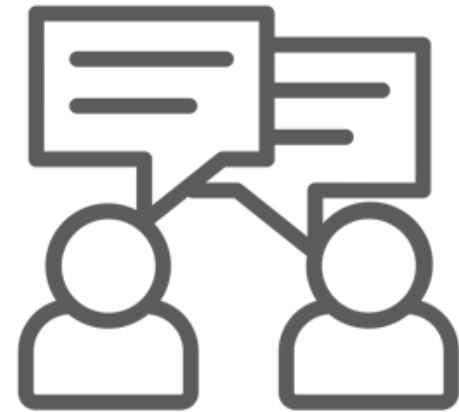
(Material Storage, Separate PI Officing, Collaboration Space, Display/exhibition Space, Servicing, Mechanical Space, etc.)



Discussion Point

Research Facility Model(s)?

- **Interdisciplinary Facilities?**
- **Collaboration Clusters?**
- **Larger vs. Smaller Facilities?**



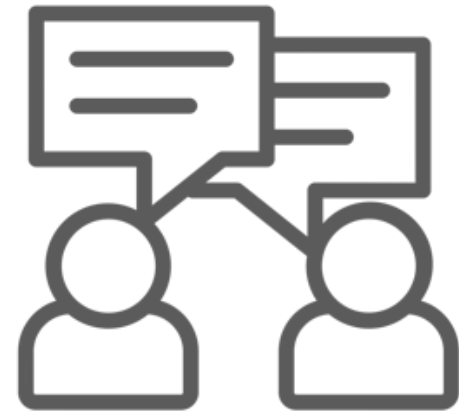
Discussion Point

Meeting future needs:

Renovation

vs.

New Construction



Discussion Point

Management:

Via RCM?



Discussion Point

Control of Space:

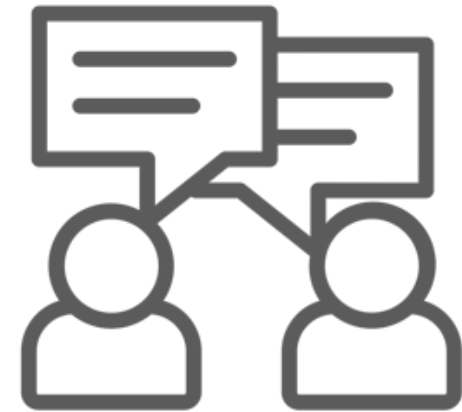
**Control of Labs
Vs.**

Core Resources?



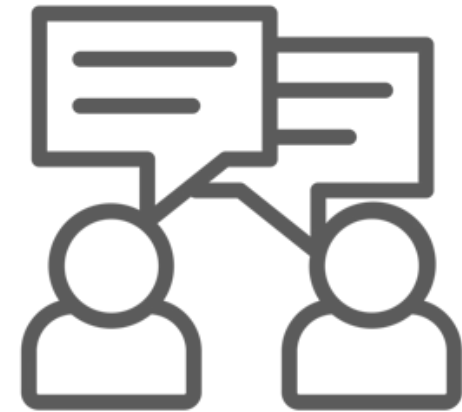
Discussion Point

**Where could/should future
research growth be located
on campus?**



Discussion Point

**How should research
integrate with
campus-wide resources?**



Discussion Point



4. Data Needs

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What we hope to accomplish:

Identify...

1. Research space parameters to be captured within the Campus Master Plan
2. Data needs and potential next steps to support **UA's on-going** efforts to maximize the use and **impact of its research facilities**

Data Needs to Finish Master Plan? (Discussion)

Bldg. #	Building Name	Building Age (Year Built)	Reset Age (Major Reno)	Building FCI	Typical F-2-F Height	PI Count	GA Count	Programs	Lab Types	Total Research Space
0088.00	Biological Sciences West	1967								63,627
0240.00	Thomas W. Keating Bioresearch Building	2007								55,042
0241.00	Medical Research Building	2006								53,224
0077.00	Gould-Simpson	1985								52,892
0242.00	Bioscience Research Laboratories	2018								52,134
0107.00	Marley	1990								49,364
0104.00	Electrical And Computer Engineering	1986								45,336
0201.00	Arizona Health Sciences Center	1968								44,111
0094.00	Meinel Optical Sciences	1970								43,705
0119.00	Aerospace And Mechanical Engineering	1997								40,456
0221.00	Life Sciences North	1990								39,604
0041.00	Chemistry	1936								37,994
0044.00	Chemical Sciences Building	2006								35,290
0106.00	Life Sciences South	1990								34,670
0081.00	Physics-Atmospheric Sciences	1960								32,883
0038.00	Shantz	1962								31,048
0222.01	Sydney E. Salmon Building	1998								30,052
0061.02	Richard F Caris Mirror Lab	1986								28,408
0207.00	Skaggs Pharmaceutical Sciences Center	1980								28,378
0222.00	Leon Levy Cancer Center	1986								27,107
0090.00	Animal and Comparative Biomedical Sciences	1966								24,479
0201.02	Steele Children's Research Center	1991								23,245
0037.00	Carl S. Marvel Laboratories Of Chemistry	1973								21,736
0068.00	Psychology	1968								21,620
0064.00	Steward Observatory	1953								21,368



UA Team continue to work on filling in blanks

Data Needs to Finish Master Plan? (Discussion)

Create set of standards for UA to conduct an internal assessment of...

1. Existing Appropriateness:

Does the current research function/format match the space and infrastructure?

2. Conversion Difficulty:

How easy or difficult would it be to renovate/convert the to meet current and future research needs? (i.e. should additional funds be invested in the space, or should the building/space be phased out and replaced as necessary?)

Example (UNT Health Science):

Research & Education Building (RES)		
Zone	Approx. NSF	
RES 1.1	7,982	Category II
RES 1.2	11,718	Category III
RES 2.1	9,636	Category I
RES 2.2	15,556	Category II
Subtotal	44,892	

Center for Biohealth (CBH)		
Zone	Approx. NSF	
CBH 1.1	4,696	Category I
CBH 2.1	2,551	Category III
CBH 2.2	3,739	Category III
Subtotal	10,986	

Interdisciplinary Research and Education Building (IREB)		
Zone	Approx. NSF	
IREB 3.1	14,120	Category I
IREB 3.2	5,500	Category II
IREB 3.3	3,900	Category II
IREB 4.1	14,120	Category I
IREB 4.2	5,500	Category II
IREB 4.3	3,900	Category II
Subtotal	47,040	

Conversion Difficulty Legend

Category I	Architectural impacts mainly
Category II	Architectural, Infrastructure impacts mainly
Category III	Architectural, Infrastructure, and potential Structural impacts



5. Next Steps

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NEXT STEPS

1. Data Requests (Coordinated through Rodney)
2. Workshop 04: Today & Tomorrow
 - Additional Focus Group Meetings
 - Synthesis of Feedback
3. Workshop 05: February 17th & 18th
 - Integration of today's conversations into broader Master Plan content
 - Likely follow-up meetings to expand and advance conversations that look place today
4. Late Spring 2020 – Final Plan



THANK YOU!

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