MAKING THE MOST OF WHAT YOU HAVE:
Data to Optimize Space and Achieve Research Goals

AGENDA

Introductions
The Competitive Landscape of Research and Rankings
The Case for Space
Foundational Data
Dashboards & Opportunities

SMITHGROUP

SMITHGROUP: INTERDISCIPLINARY. INTEGRATED.

LEADERS IN CAMPUS PLANNING AND DESIGN

1,400
MULTI-DISCIPLINARY PROFESSIONALS

#3
TOP UNIVERSITY ARCHITECTURE FIRMS, BD+C 2020

700+
CAMPUSES GLOBALLY

40M
SF OF SCIENCE + TECHNOLOGY SPACES

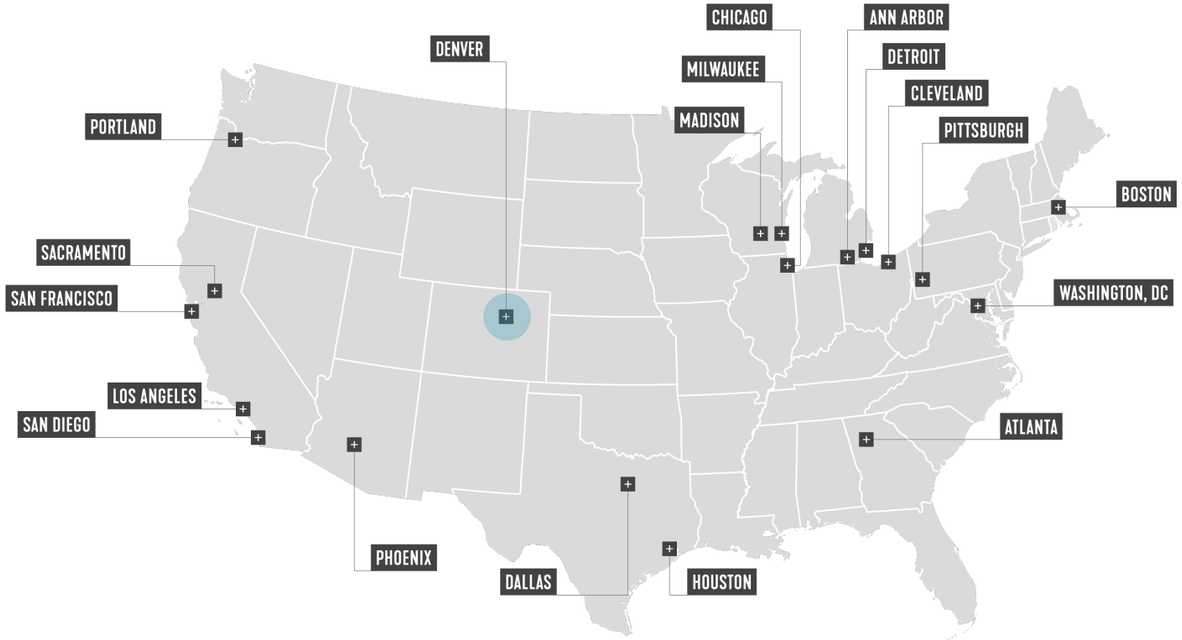
#6
MASTER PLANNING, WORLD ARCHITECTURE TOP 100, 2019

11
LAB OF THE YEAR HONORS R&D MAGAZINE

Anne Arundel Community College
Health and Life Sciences Building

CAMPUS STRATEGY AND ANALYTICS STUDIO

MEET OUR FIRM – INTERDISCIPLINARY, INTEGRATED



ARCHITECTS, PLANNERS, PHDs, & DATA ANALYSTS

- Understanding of the academy from the inside - worked on your side of the table
- Breadth & depth of higher education experience
- Expertise in data management and visualization

40+
YEARS IN HIGHER EDUCATION PLANNING

700+
COLLEGE & UNIVERSITY CLIENT PROJECTS

240
COMMUNITY COLLEGE CAMPUSES

10+
STATE SYSTEMS

WHAT DOES CS&A DO?

SPACE EFFICIENCY STUDIES

- Utilization Studies for Classrooms and Teaching Labs
- Utilization Studies for Non-Credit Activity Space
- Utilization Studies for Office Space
- Space Needs Analysis
- Space Reallocation and Migration Studies
- Multi-Campus Program Migration Studies
- Classroom Mix Analysis
- Research Lab Analysis

FACILITY PROGRAMMING/PLANNING

- Program Planning
- Educational Adequacy Studies
- Facilities Inventory Verification
- Feasibility Studies
- New Campus Planning

BENCHMARKING

- Comparative Analysis
- Peer Surveys on Best Practices

ACADEMIC PLANNING

- Strategic Planning
- Environmental Scanning
- Occupational Demand/Workforce Analysis
- Career/Guided Pathway Modeling
- Program Gap Analysis
- New Program Feasibility Studies
- New Teaching/Learning Strategies
- Demographic and Participation Rate Studies
- Educational Master Planning
- Workforce Development

POLICY DEVELOPMENT

- Space Policy Recommendations
- Capital Planning Procedures

ADDITIONAL DASHBOARD TOPICS

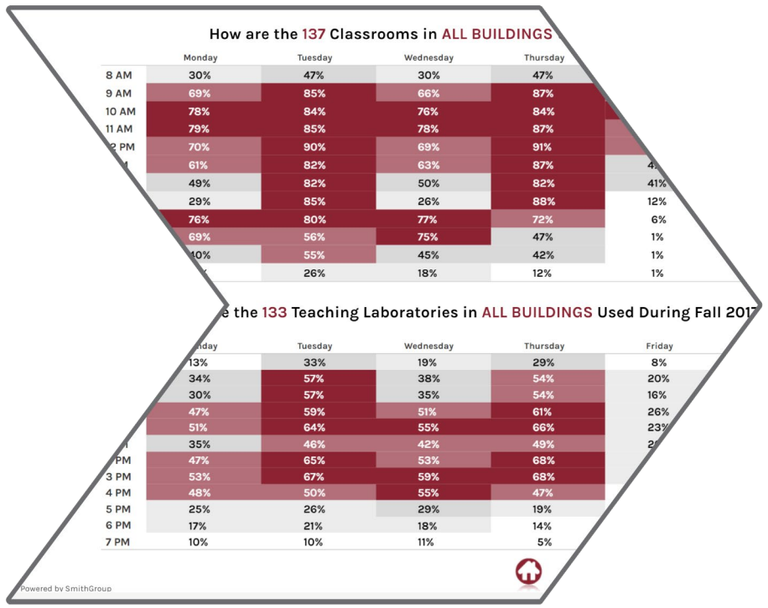
- Internal Survey Responses
- Scheduling Blocks
- Classroom Assessment
- Instructional Space Use

HOW DO WE WORK?

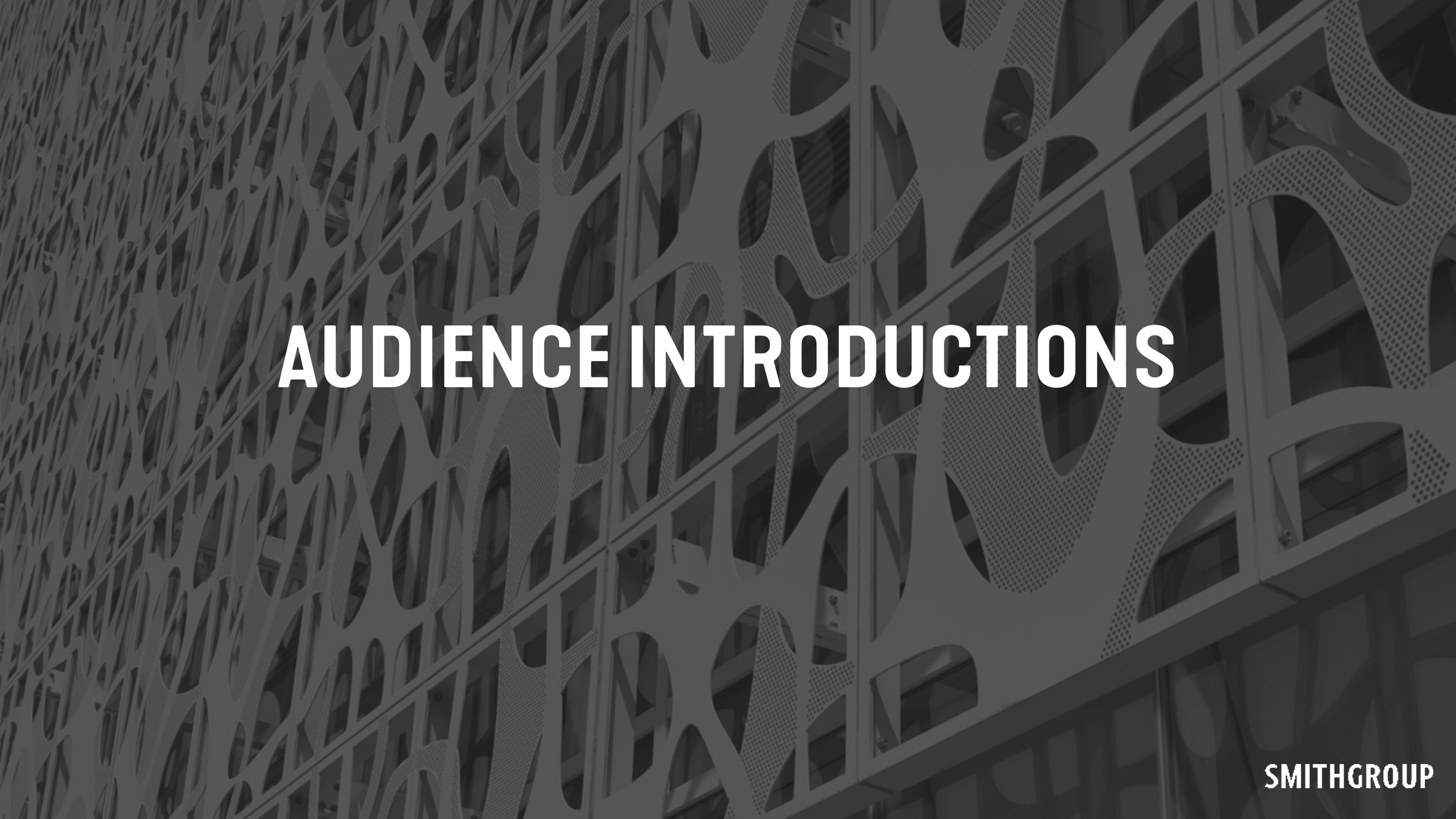
STEP 1. GATHER & ALIGN DATA

gID	RoomID	HEGIS Discipline Code	HEGIS Discipline Description	Space Type Code	Space Type Description	Inst'l Level	Assignable Sq Feet	Stati	
103		19021	Physics	0029	Spec Instruction	0	629		
		19021	Physics	0011	Tch Lab Serv	1/2	1,272	0	
		19021	Physics	0011	Tch Lab Serv	1/2	310	0	
		19021	Physics	0035	Prf Fac/Admn	0	120	1	
		19021	Physics	0030	Profsnl-Fac	0	1,151	14	0.
		19021	Physics	0036	Clr Fac/Admn	0	140	1	0.
		19021	Physics	0037	Svc Fac/Admn	0	560	0	0.
		021	Physics	0051	Conf Room	0	101	4	0.
			Science Education	0010	Tch Lab	1	1,295	24	12.48
			Science Education	0010	Tch Lab	1	1,296	24	12.48
			Science Education	0029	Spec Instruction	0	308	4	0.
			Science Education	0029	Spec Instruction	0	646	8	0.
			ence Education	0011	Tch Lab Serv	1/2	538	0	0.
			ce Education	0035	Prf Fac/Admn	0	120	1	0.
			Education	0030	Profsnl-Fac	0	596	6	0.
			Education	0036	Clr Fac/Admn	0	140	1	0.
			e Education	0037	Svc Fac/Admn	0	172	0	0.
			disciplne	0001	Lecture	0	3,916	150	349.50
			terdiscipline	0002	Lecture Serv	0	570	0	0.
			Geology	0010	Tch Lab	1	1,832	48	24.96
			Science Education	0010	Tch Lab	2	1,306	36	14.04
			Science Education	0011	Tch Lab Serv	2	274	0	0.
		1	Interdiscipline	0001	Lecture	0	1,240	60	139.80
		001	Interdiscipline	0001	Lecture	0	1,226	60	139.80
		19021	Physics	0010	Tch Lab	1	648	24	12.48
		19141	Geology	0016	Rsrch Lab	3	935	9	0.
		49021	Natural Science	0010	Tch Lab	1	313	3	1.5
		49021	Natural Science	0010	Tch Lab	1	320	3	
		49021	Natural Science	0010	Tch Lab	2	291	3	
03		49021	Natural Science	0030	Profsnl-Fac	0	484	6	
103		49021	Natural Science	0037	Svc Fac/Admn	0	334		
103		49021	Natural Science	0056	Gen Storage	0	65		
103		49021	Natural Science	0035	Prf Fac/Admn	0	200		

STEP 2. ANALYZE & VISUALIZE



STEP 3. STRATEGIZE & DELIVER SOLUTIONS



AUDIENCE INTRODUCTIONS

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THE COMPETITIVE RESEARCH LANDSCAPE

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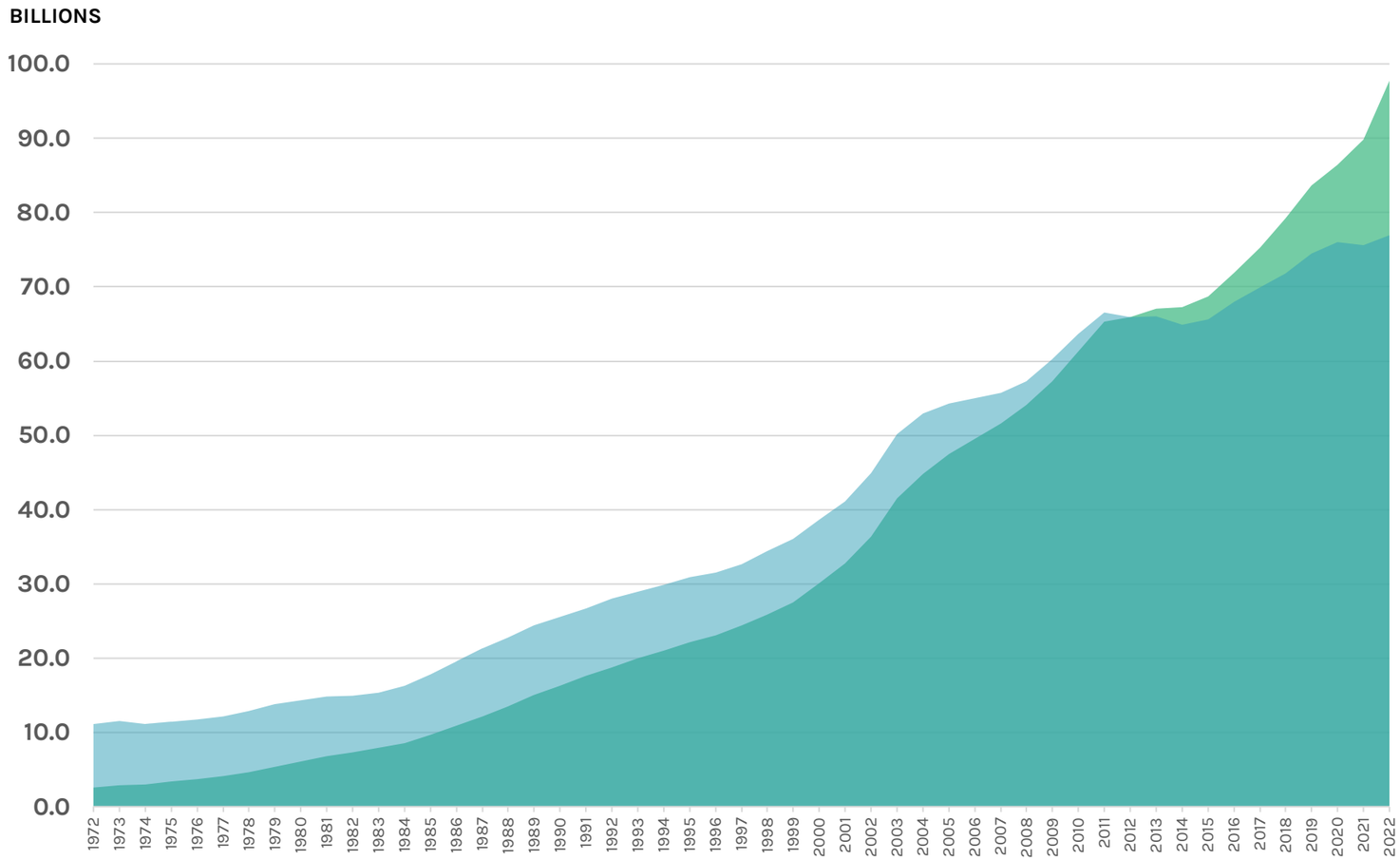
ENTERPRISE VIEW

PURCHASING POWER

- Over the past decade, research expenditures have increased more than $30B in current dollars
  - Gains have been modest in constant dollars—just over $11B
- The FED is approaching 3/2 target—3% GDP growth with 2% inflation



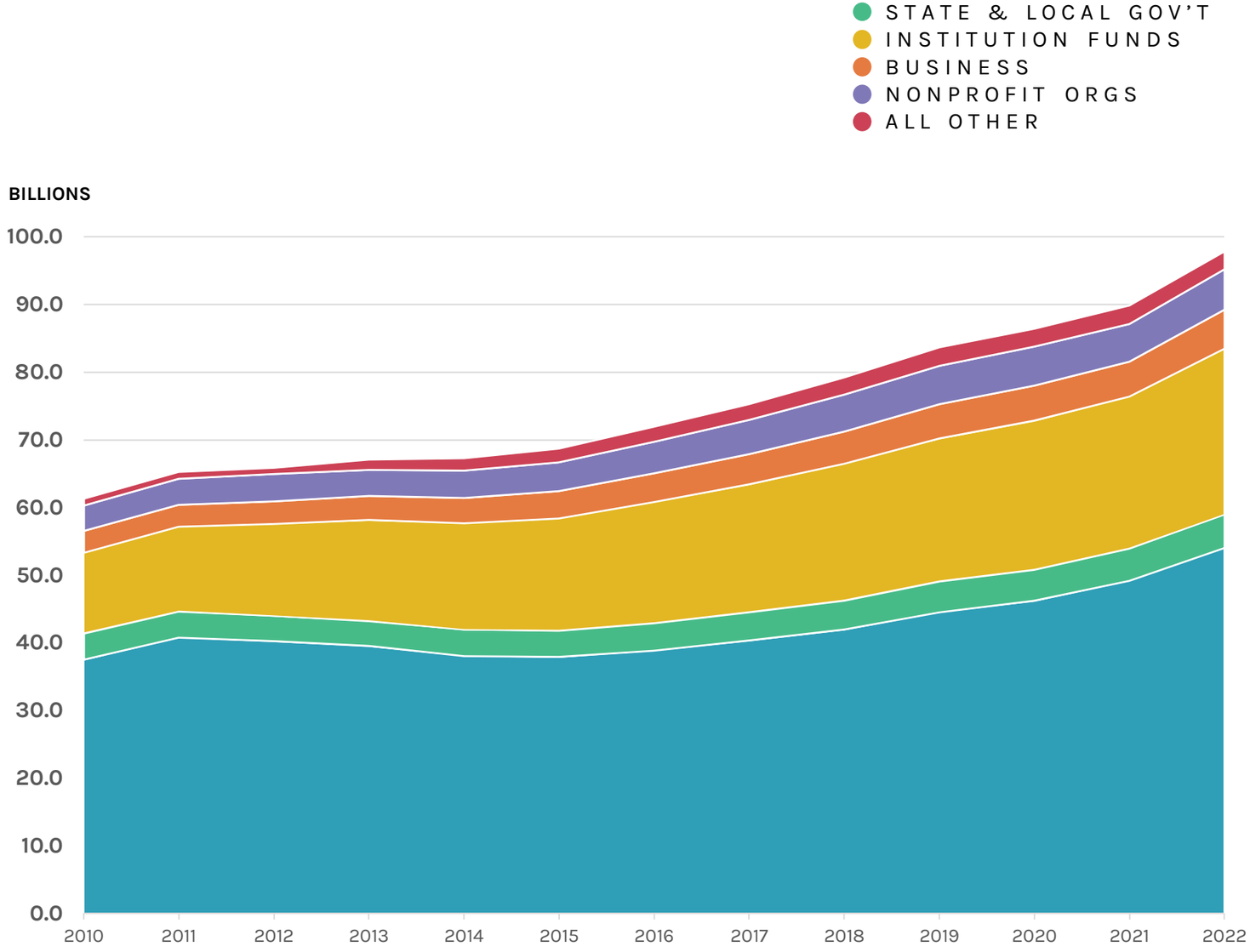
Note(s):
Gross domestic product deflators come from the Bureau of Economic Analysis and are available in Table 1.1.9 "Implicit Price Deflators for Gross Domestic Product" at https://www.bea.gov/iTable/index_nipa.cfm (accessed September 2023).

Source(s):
National Center for Science and Engineering Statistics, Higher Education Research and Development Survey.

ENTERPRISE VIEW

FUNDING SOURCES

- The federal government provides the largest percentage of research funding—55%
- Institution Funds account for nearly a quarter of all research expenditures
  - Increasingly important as seed funding for junior faculty & new programs
- Industry funding is not expanding at the rate presumed by most universities



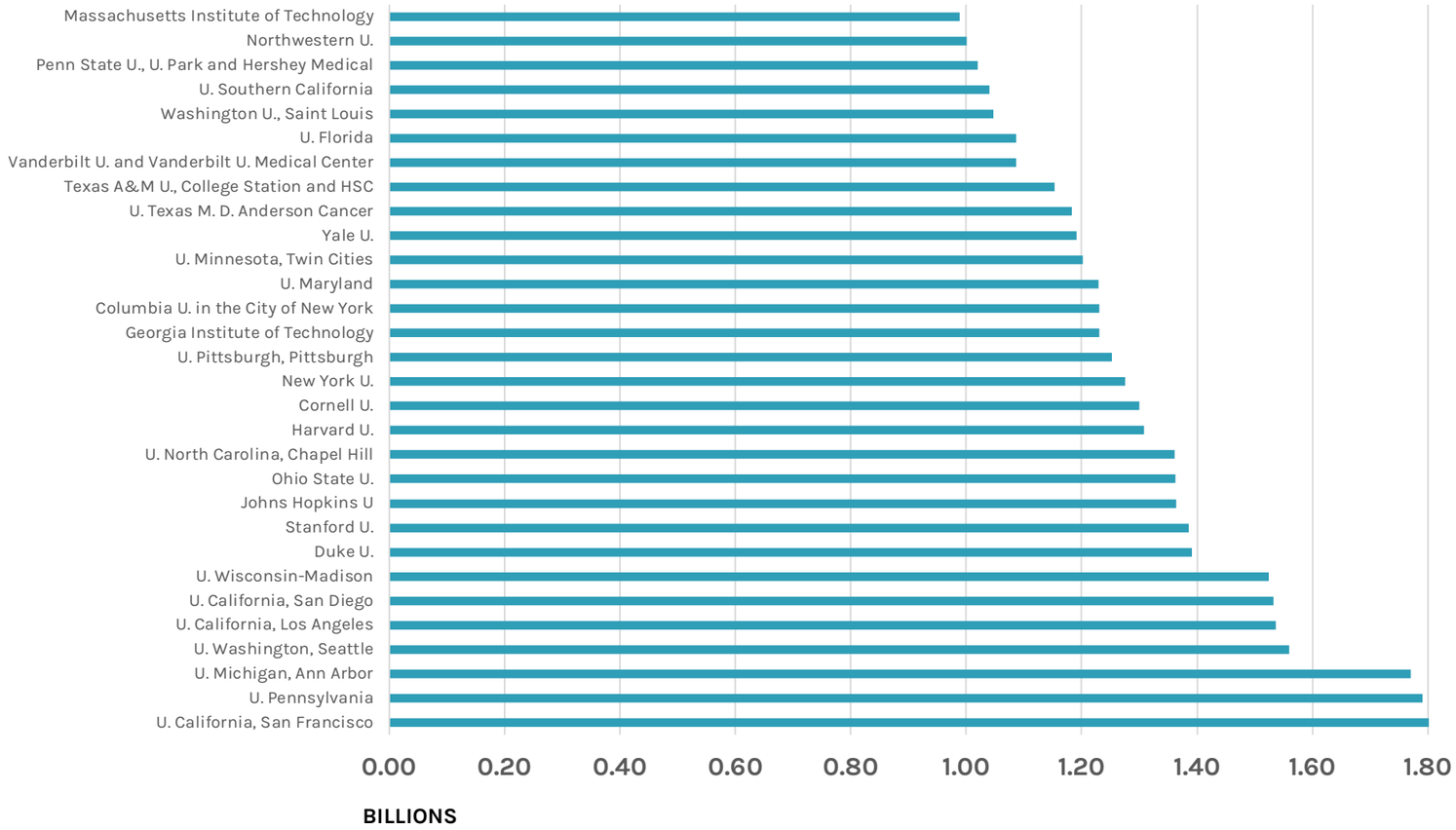
Note(s):
Because of rounding, detail may not add to total. Includes all institutions surveyed in the fiscal years shown.

Source(s):
National Center for Science and Engineering Statistics, Higher Education Research and Development Survey.

ENTERPRISE VIEW

CROWDED ROOM

- For the past five years, the top 30 research universities have combined for more than 40% of all expenditures
- Half public universities, half private
- Research is growing most rapidly among this peer group
  - Informed, deliberate competition



Note(s):

- Johns Hopkins University Applied Physics Laboratory excluded, with $2,056 million in total R&D expenditures in FY 2022.
- University of Maryland includes expenditures from University of Maryland, Baltimore and University of Maryland, College Park campuses.
- Because of rounding, detail may not add to total. Rankings are based on unrounded totals. This table reflects the leading 30 institutions for FY 2022; the institutions listed may not be in the top 30 of prior fiscal years.

Source(s):
National Center for Science and Engineering Statistics, Higher Education Research and Development Survey.

CARNEGIE BASIC CLASSIFICATION

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INTRODUCTION

CARNEGIE BASIC CLASSIFICATION

1973

Carnegie Classification is established

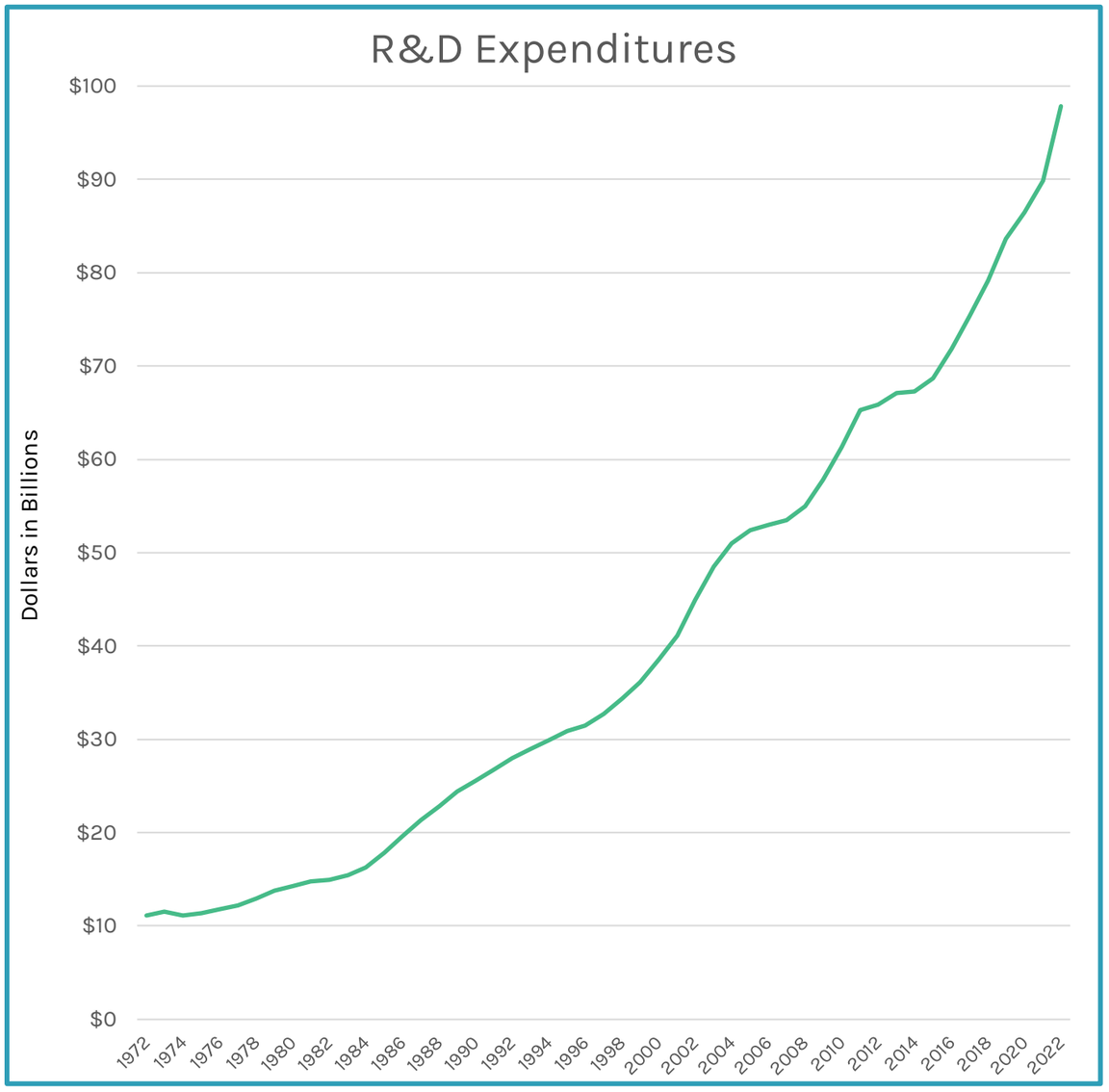
The leading framework for recognizing and describing institutional diversity in U.S. higher education

Carnegie Foundation for the Advancement of Teaching

ACE® American Council on Education®

OVERVIEW & BACKGROUND

HISTORICAL TRENDS



1973 & 1976

R1: Top 50 by federal research grants (if awarded 50+ PHDs)

R2: Top 100 by federal research grants (if awarded 50+ PHDs)

1987 & 1994

R1: Receive at least $33.5 (1987) or $40M (1994) in federal research grants and awarded 50+ PhDs

R2: Receive $12.5-$33.5M (1987) or $12.5-$40M (1994) in federal research grants and awarded 50+ PhDs

2000

Research – Extensive: Awarded 50+ PhDs across 15+ disciplines

Research – Intensive: Awarded 10 PhDs across 3+ disciplines or 20+ overall

2005 to 2021

Very High – very high-level research activity; awarded **70 PhDs** (spent **$50+ million** starting in 2018)

High – high level research activity; awarded 20+ PhDs (spent $5+ million starting in 2018)

OVERVIEW & BACKGROUND

CARNEGIE BASIC CLASSIFICATION

NSF Data

- Higher Education & Development (HERD) Survey
- Graduate Students and Post-doctorates in Science and Engineering (GSS) Survey

IPEDS Data

- Research Doctorates by Field

Calculated Metrics

Per-Capita:

- S&E R&D Expenditures
- Non-S&E R&D Expenditures
- S&E Research Staff

➢ **2021 Carnegie Doctoral Universities**

- 20 research/scholarship doctoral degrees or at least 30 professional practice doctoral degrees in at least 2 programs
- $5 million in research expenditures

➢ **R1** – Doctoral University – Very High Research Activity
➢ **R2** – Doctoral University – High Research Activity
➢ **D/PU** – Doctoral/Professional Universities

OVERVIEW & BACKGROUND

BENEFITS AND PRIDE OF VERY HIGH RESEARCH INSTITUTIONS

UMBC

R1 DOCTORAL UNIVERSITY

Achieving R1 status is an
incredible accomplishment.
This is a great day for DU!

—JEREMY HAEFNER

WE R1

OVERVIEW & BACKGROUND

BENEFITS AND PRIDE OF VERY HIGH RESEARCH INSTITUTIONS

Research

Funding opportunity

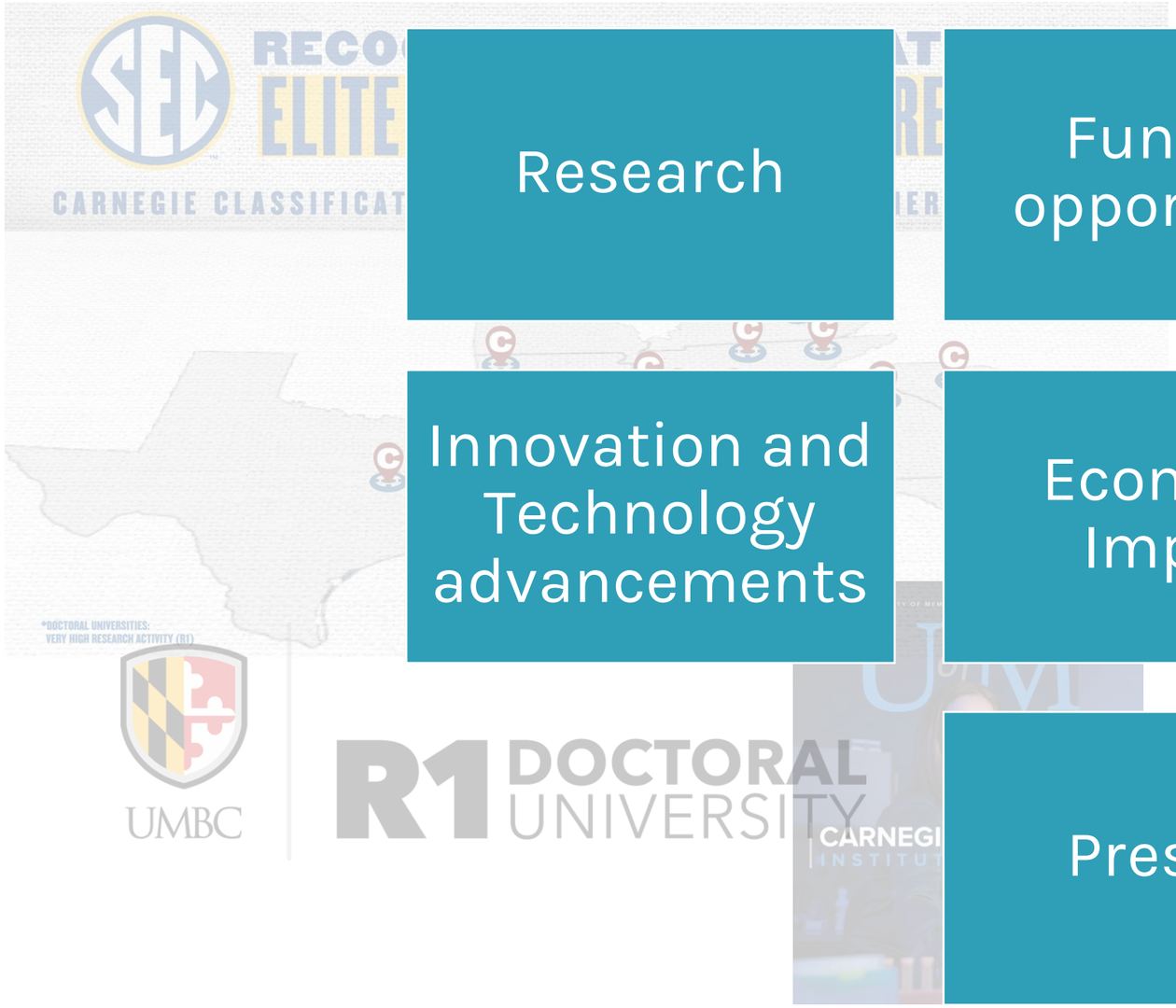
Recruitment

Innovation and Technology advancements

Economic Impact

Transfer of Knowledge

Prestige



EXAMPLES

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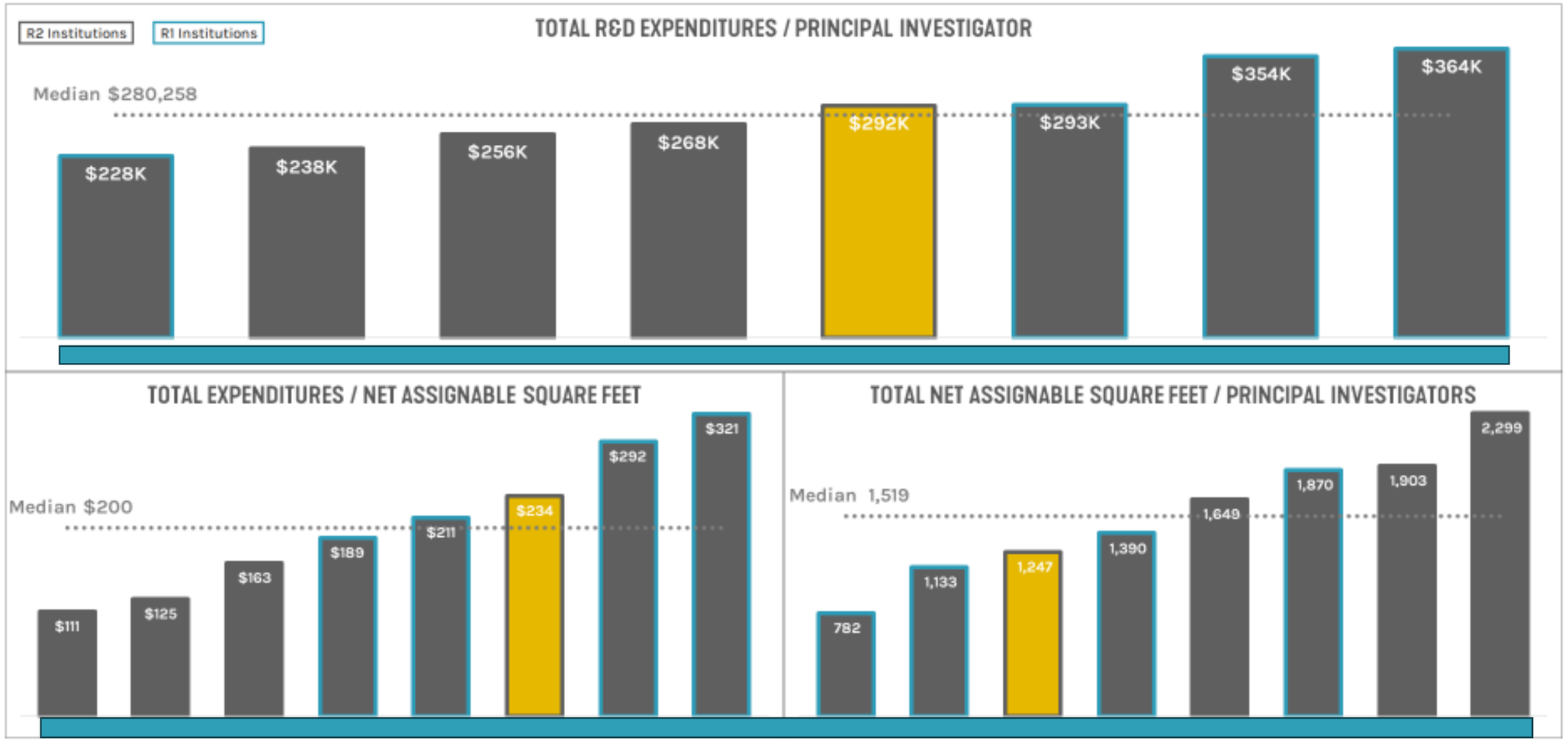
USES & EXAMPLES

UNIVERSITY OF IDAHO – SPACE NEEDS STRATEGY

HERD AND RESEARCH FACILITIES - FY2019



SOURCE: National Center for Science and Engineering Statistics – Higher Education Research and Development Survey FY2019 and Survey of Science and Engineering Research Facilities FY2019

CLASSIFICATION UPDATE

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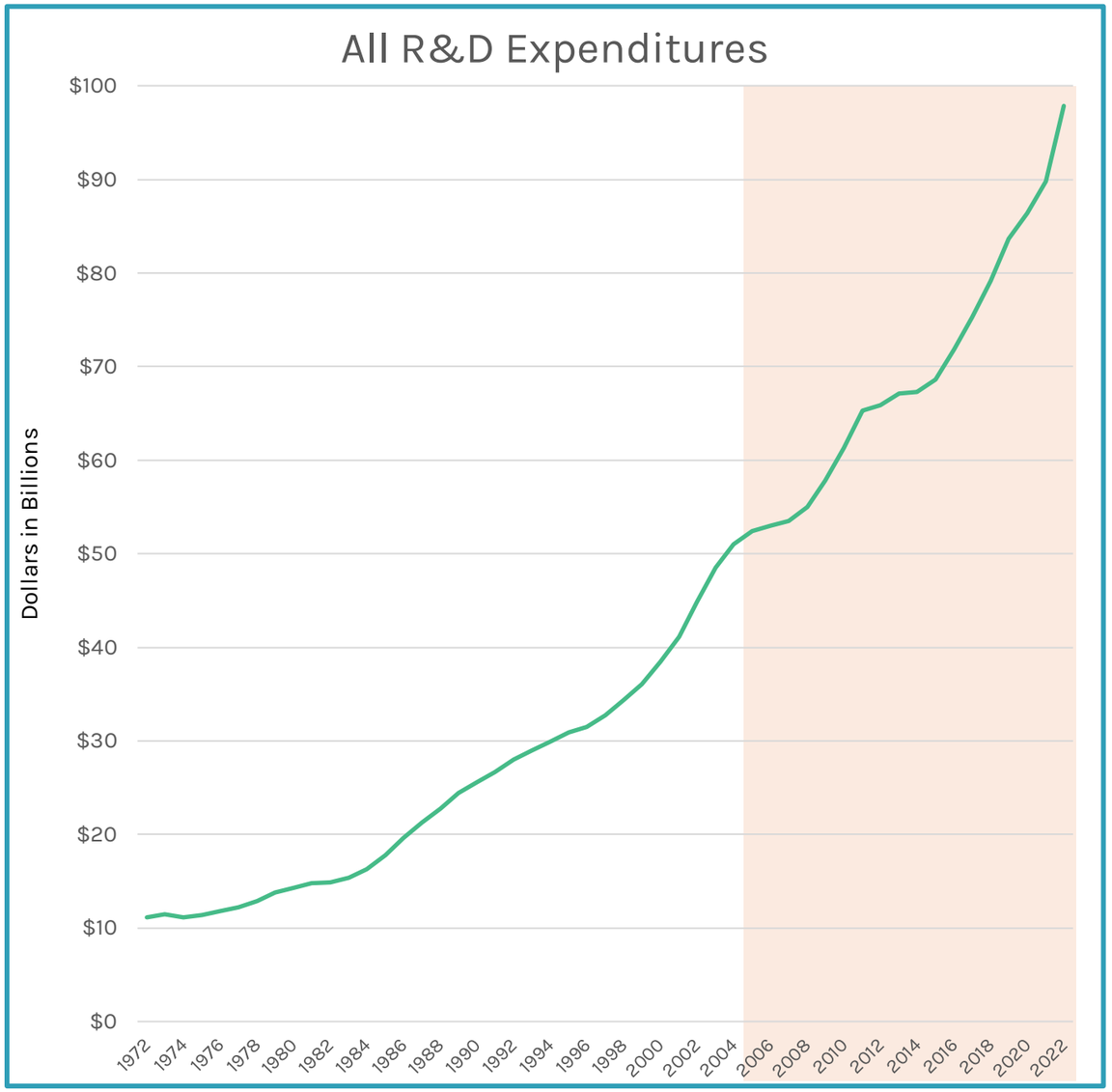
OVERVIEW & BACKGROUND

HISTORICAL TRENDS



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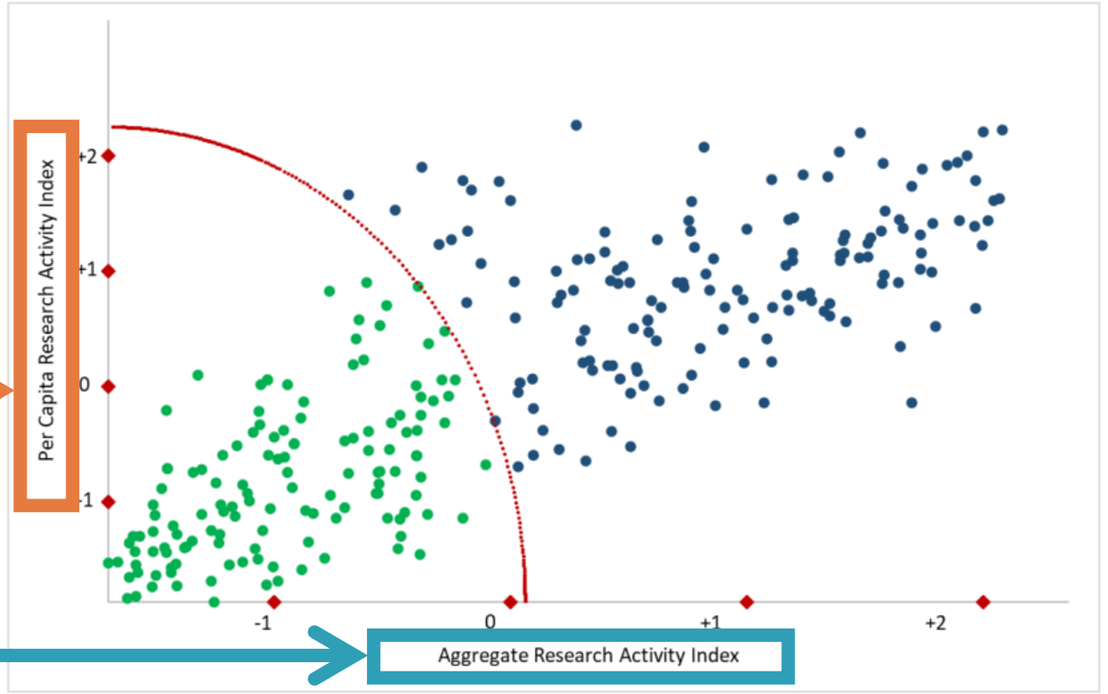
OVERVIEW & BACKGROUND

HISTORICAL TRENDS – 2021 CLASSIFICATION

Aggregate analysis (first principal component explained 70% of the total variance)	
S&E R&D Expenditures	0.905
Non-S&E R&D Expenditures	0.809
S&E Research Staff	0.913
Doctorates: Social Sciences	0.880
Doctorates: Humanities	0.846
Doctorates: STEM	0.920
Doctorates: Other Fields	0.597

Per-capita analysis (first principal component explained 71% of the total variance)	
Per-capita S&E R&D Expenditures	0.931
Per-capita Non-S&E R&D Expenditures	0.643
Per-capita S&E Research Staff	0.939

WHAT THIS DISTRIBUTION LOOKS LIKE



NEWS & CHANGES – 2025 CARNEGIE RESEARCH DESIGNATIONS

NEW FORMULA AND METRICS; REVAMPED BASIC CLASSIFICATION

R1

- Spent at least **$50 million** in total R&D expenditures in a year as reported to the NSF HERD survey
- Awarded at least **70 research/scholarship doctorates** in a year as reported to IPEDS

R2

- Spent at least **$5 million** in total R&D expenditures in a year as reported to the NSF HERD survey
- Awarded at least **20 research/scholarship doctorates** in a year as reported to IPEDS

RESEARCH COLLEGES & UNIVERSITIES

- Spent at least **$2.5 million** in total R&D expenditures in a year as reported to the NSF HERD survey
- Does not include institutions designated R1 or R2

- 2025 basic classification will be based on most recent data OR most recent three-year average, whichever is higher

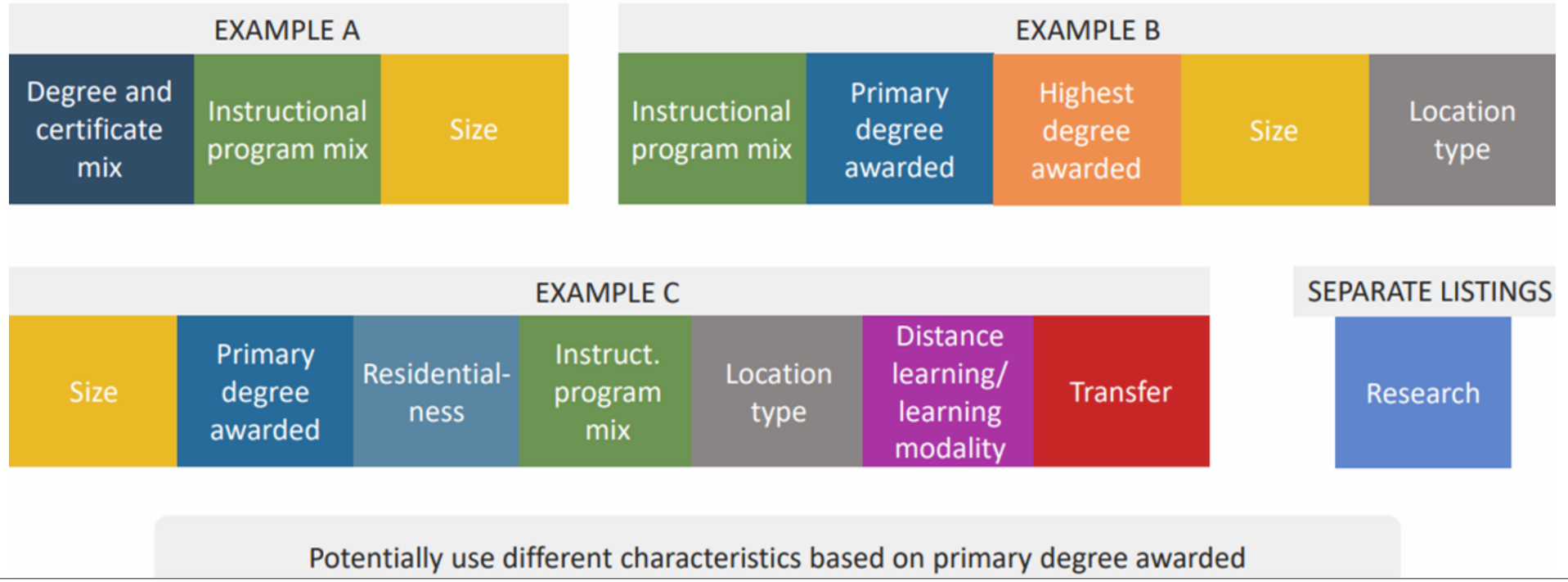
- Post 2025 basic classification will be determined on three-year average of the most recent three years of data

NEWS & CHANGES – 2025 CARNEGIE RESEARCH DESIGNATIONS

NEW FORMULA AND METRICS; REVAMPED BASIC CLASSIFICATION

➢ Other **yet-to-be determined** factors will also contribute to an institution's basic classification

POTENTIAL MULTI-DIMENSIONAL CLASSIFICATION FOR THE 2025 BASIC*

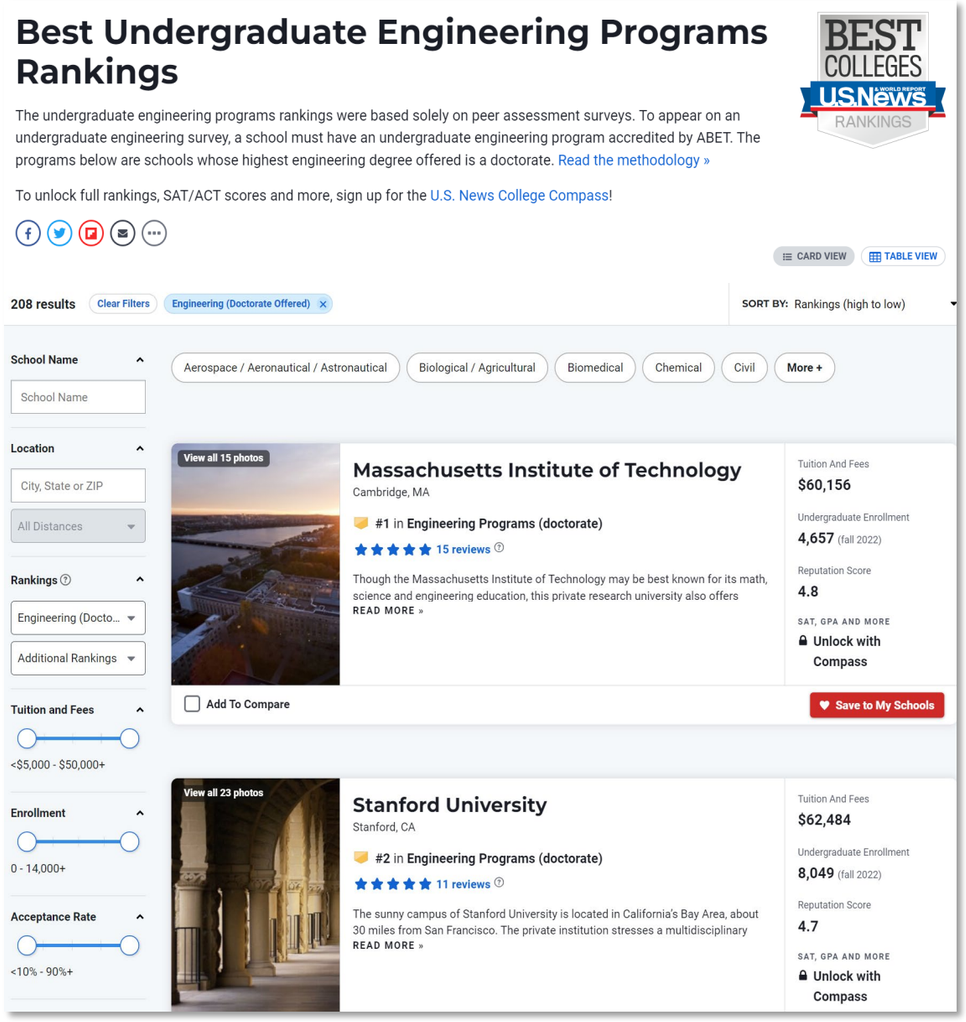


U.S. NEWS & WORLD REPORT COLLEGE RANKINGS

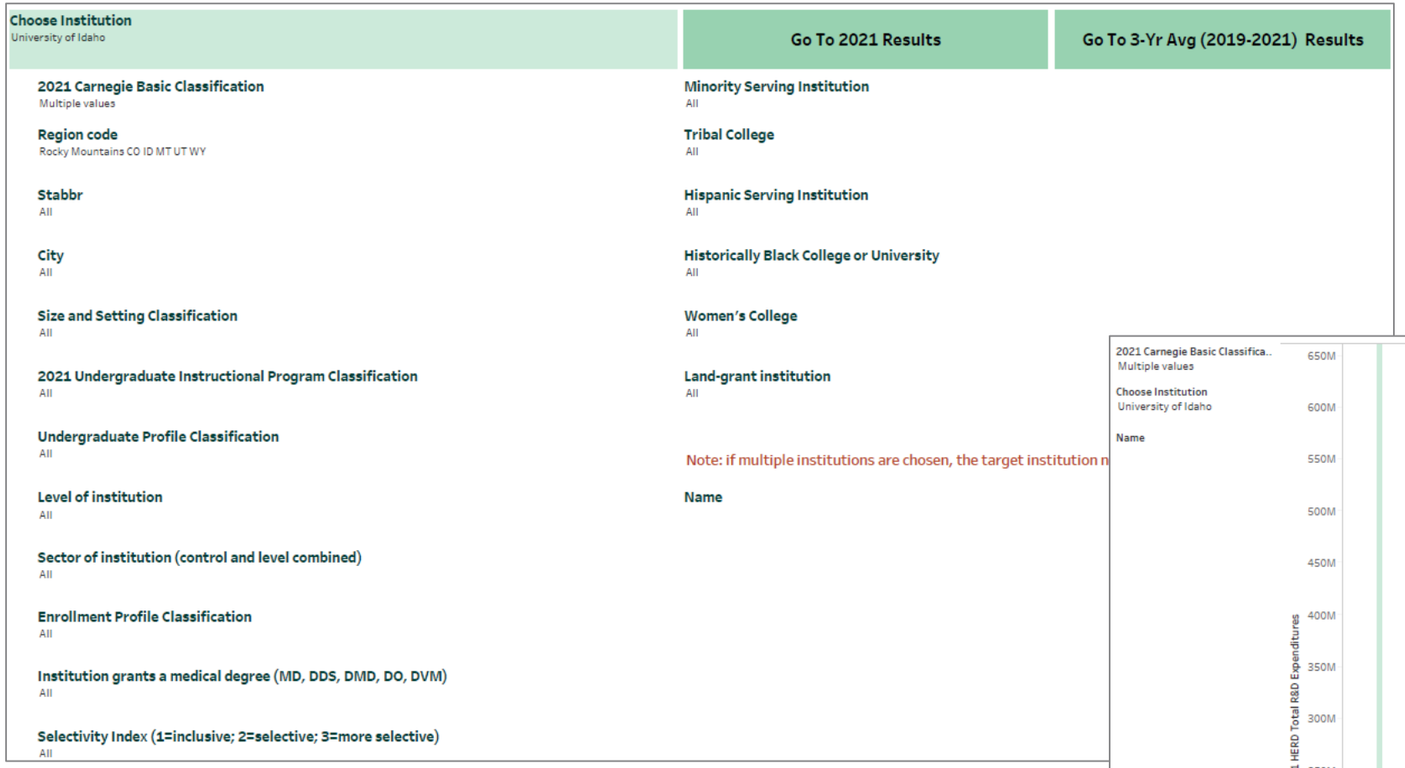
EXPERT ADVICE, RANKINGS & DATA

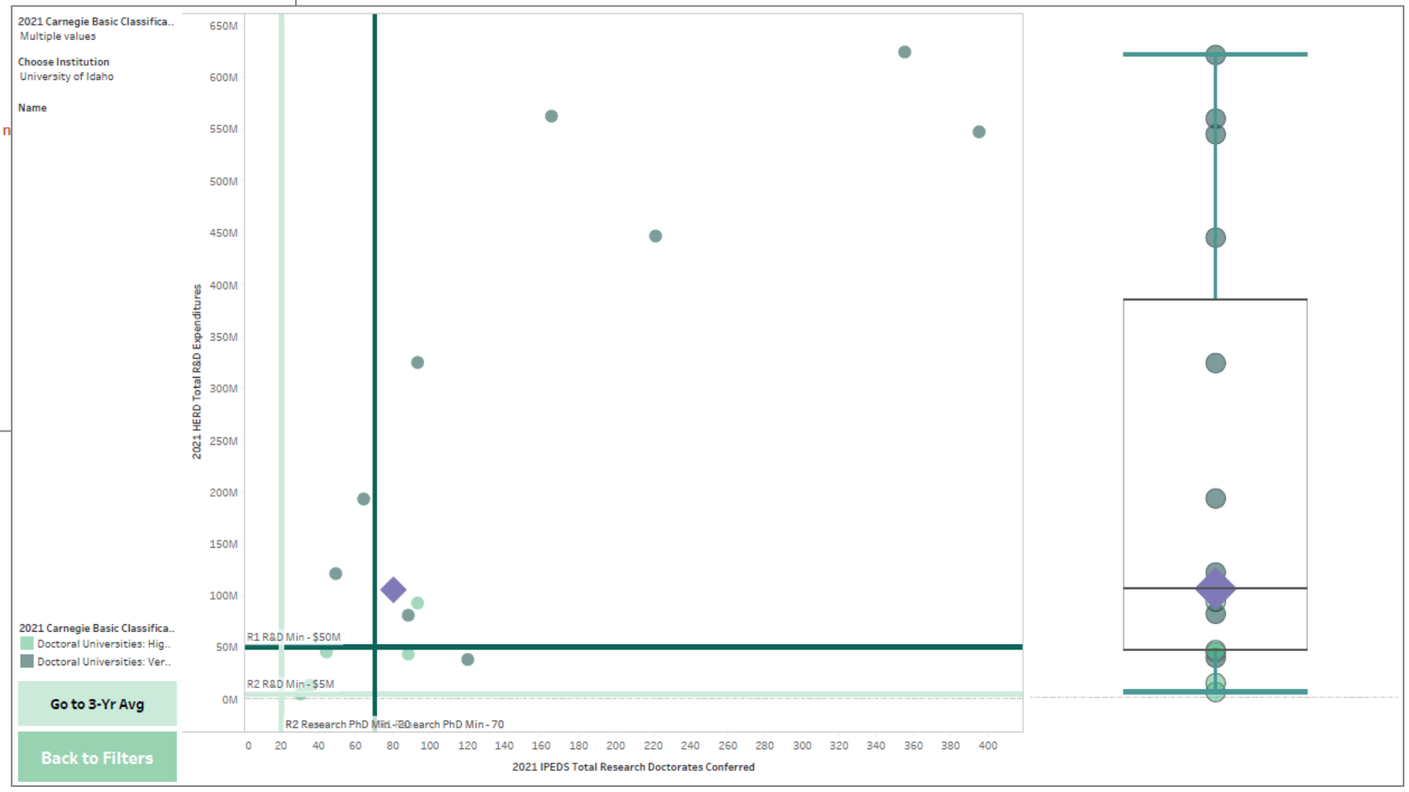
U.S. News in one of the most popular sources for college rankings.

In addition to their four overall rankings, which encompass National Universities, Liberal Arts Colleges, Regional Universities and Regional Colleges, this platform also includes dozens of more-focused rankings and lists.



CS&A TOOL


Choose Institution
University of Idaho
Go To 2021 Results
Go To 3-Yr Avg (2019-2021) Results
2021 Carnegie Basic Classification
Multiple values
Region code
Rocky Mountains CO ID MT UT WY
Stabbr
All
City
All
Size and Setting Classification
All
2021 Undergraduate Instructional Program Classification
All
Undergraduate Profile Classification
All
Level of institution
All
Sector of institution (control and level combined)
All
Enrollment Profile Classification
All
Institution grants a medical degree (MD, DDS, DMD, DO, DVM)
All
Selectivity Index (1=inclusive; 2=selective; 3=more selective)
All
Minority Serving Institution
All
Tribal College
All
Hispanic Serving Institution
All
Historically Black College or University
All
Women's College
All
Land-grant institution
All
Note: if multiple institutions are chosen, the target institution n
Name


2021 Carnegie Basic Classifica..
Multiple values
Choose Institution
University of Idaho
Name
2021 Carnegie Basic Classifica..
Doctoral Universities: Hig..
Doctoral Universities: Ver..
Go to 3-Yr Avg
Back to Filters
2021 HERD Total R&D Expenditures
650M
600M
550M
500M
450M
400M
350M
300M
250M
200M
150M
100M
50M
0M
R1 R&D Min - $50M
R2 R&D Min - $5M
R2 Research PhD Min - 20
Research PhD Min - 70
0
20
40
60
80
100
120
140
160
180
200
220
240
260
280
300
320
340
360
380
400
2021 IPEDS Total Research Doctorates Conferred

THE CASE FOR SPACE

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WHY SPACE?

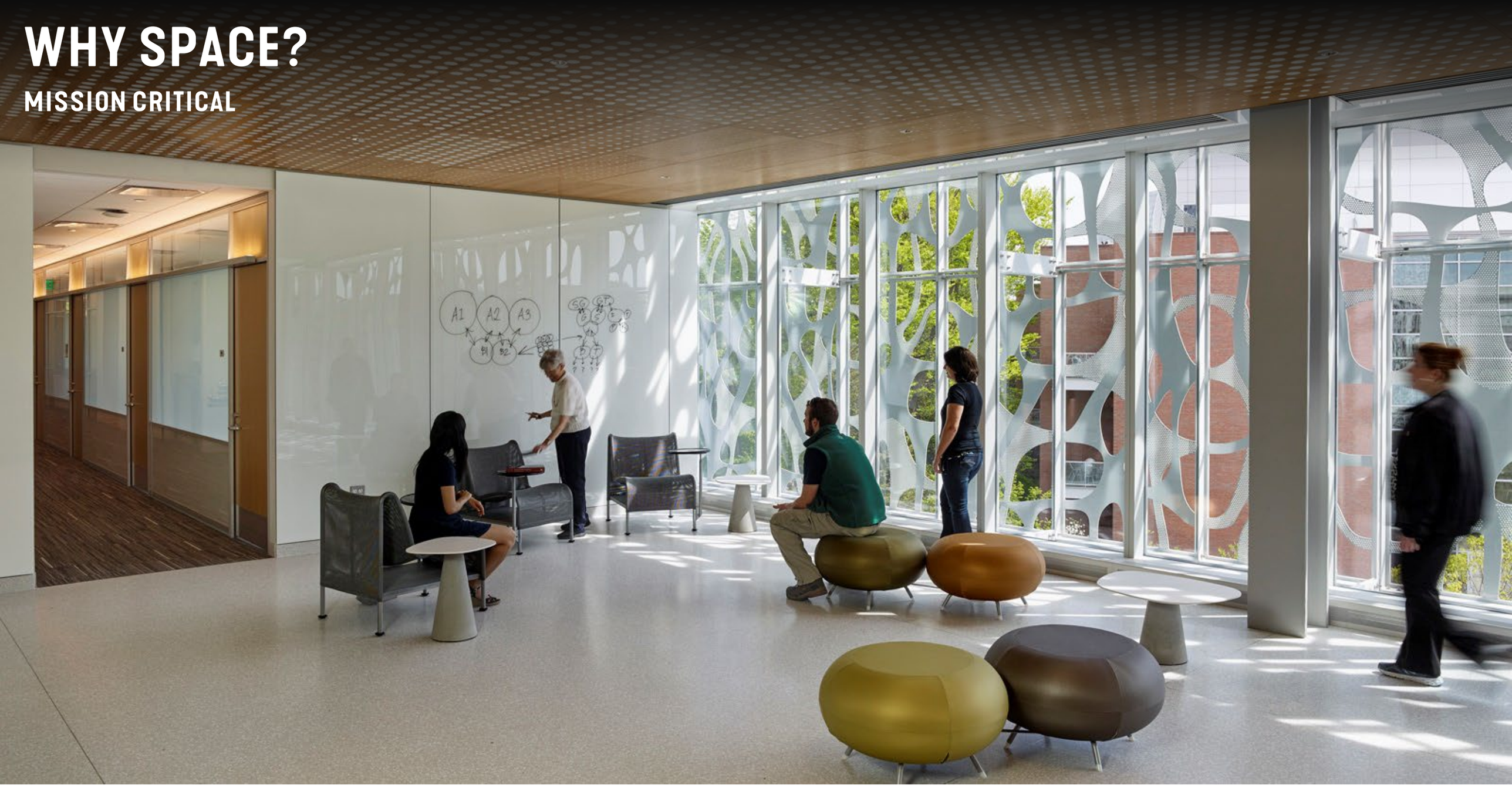
MISSION CRITICAL

WHY SPACE?

MISSION CRITICAL

WHY SPACE?

MISSION CRITICAL

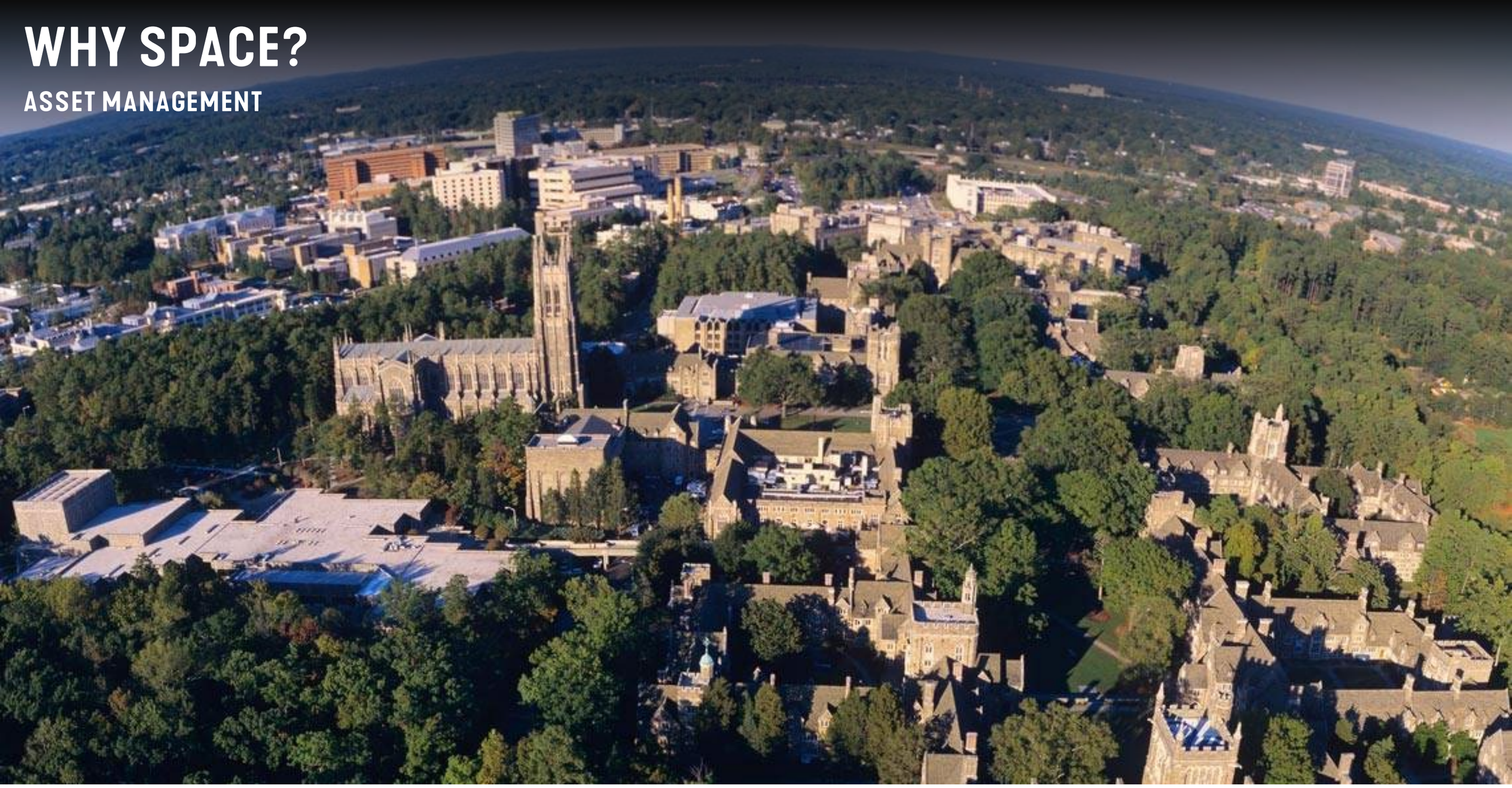


WHY SPACE?

REVENUE & RECOGNITION

WHY SPACE?

ASSET MANAGEMENT



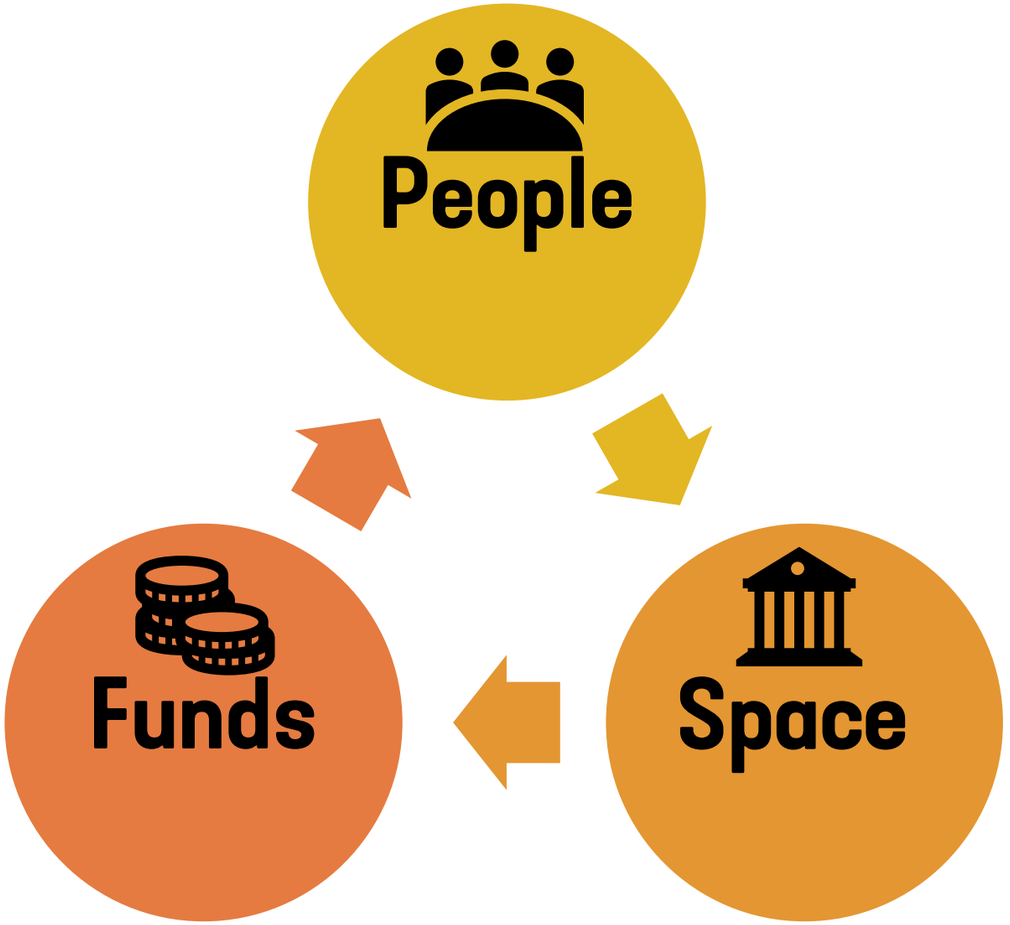
WHY SPACE?

ASSET MANAGEMENT


DATA IS OUR FRIEND
SMITHGROUP

INSTITUTIONAL ASSETS

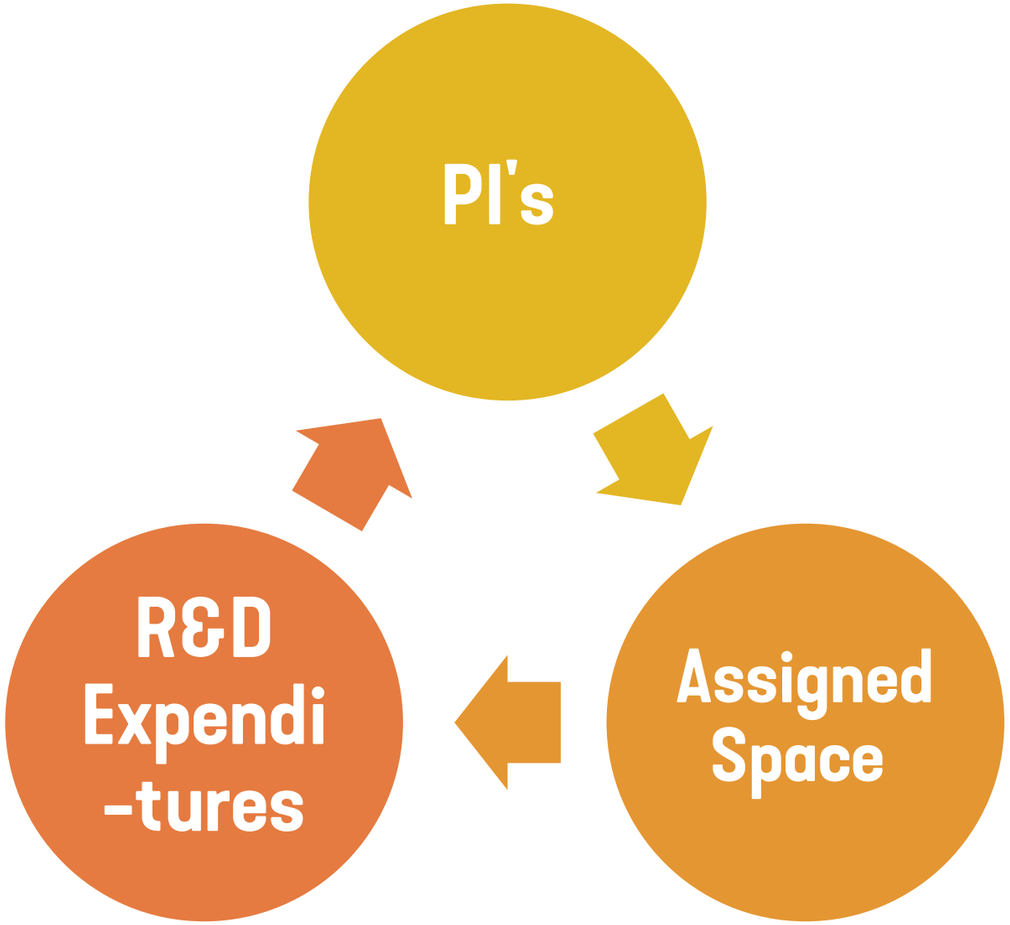
DATA MANAGEMENT AFFECTS SPACE ALLOCATION, GOVERNANCE, AND POLICIES



University of Memphis

DATA NEEDS

DATA MANAGEMENT AFFECTS SPACE ALLOCATION, GOVERNANCE, AND POLICIES



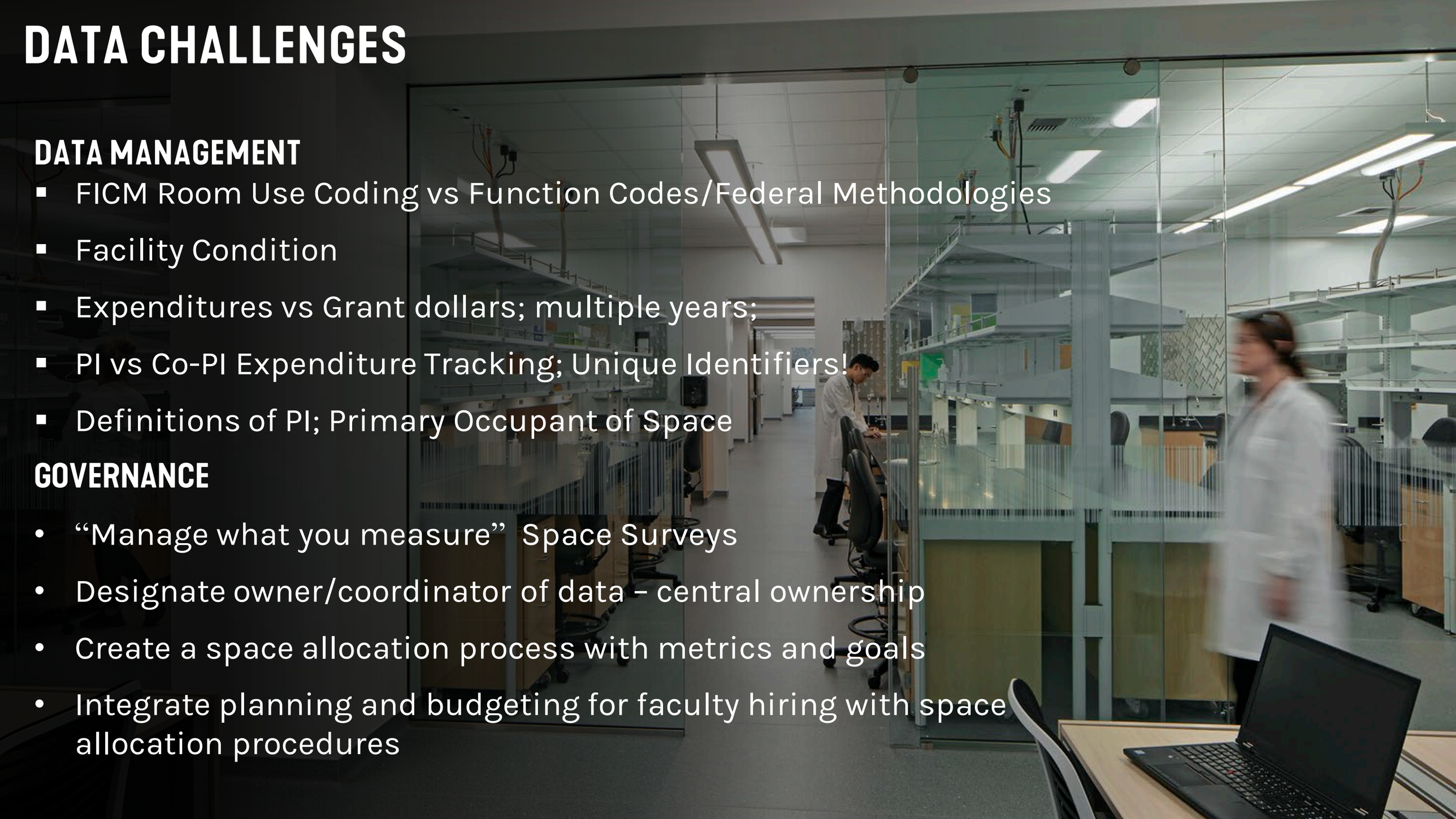
University of Memphis

DATA COLLECTION

FACILITIES SURVEYS AND DATA COLLECTION

- Blend or connect data sets
  - PI’s
  - Assignable Sq Feet
  - Expenditures
- Data Desired/Field
  - Group/Dept
  - Room Use Code
  - Condition
  - Other Metrics

DATA CHALLENGES



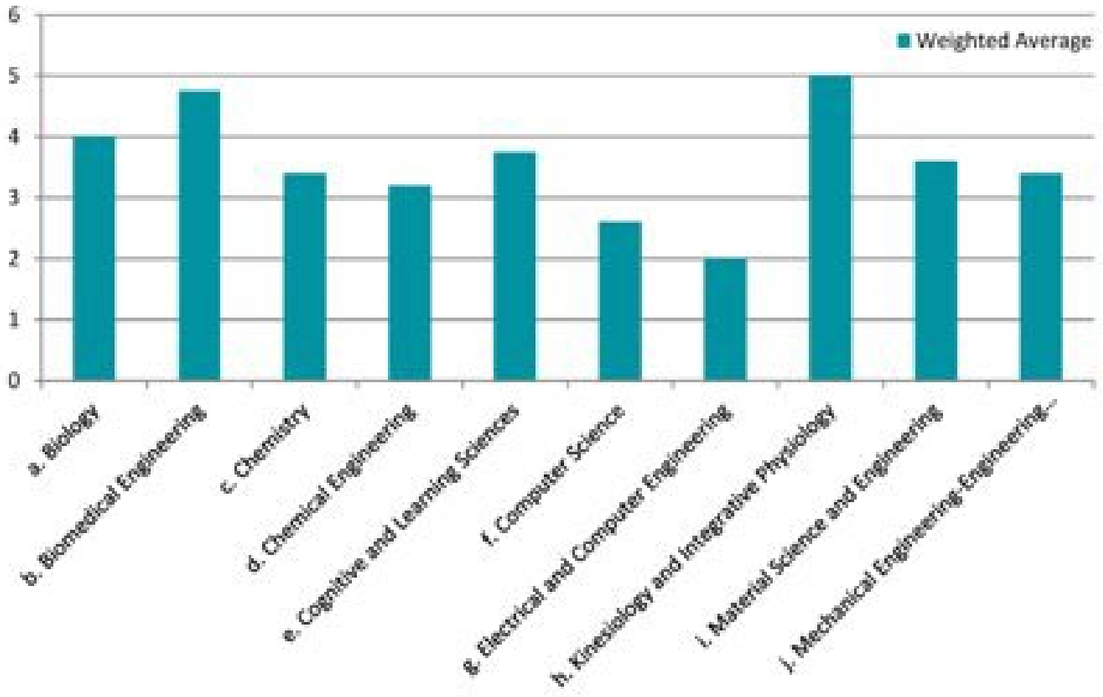
DATA MANAGEMENT

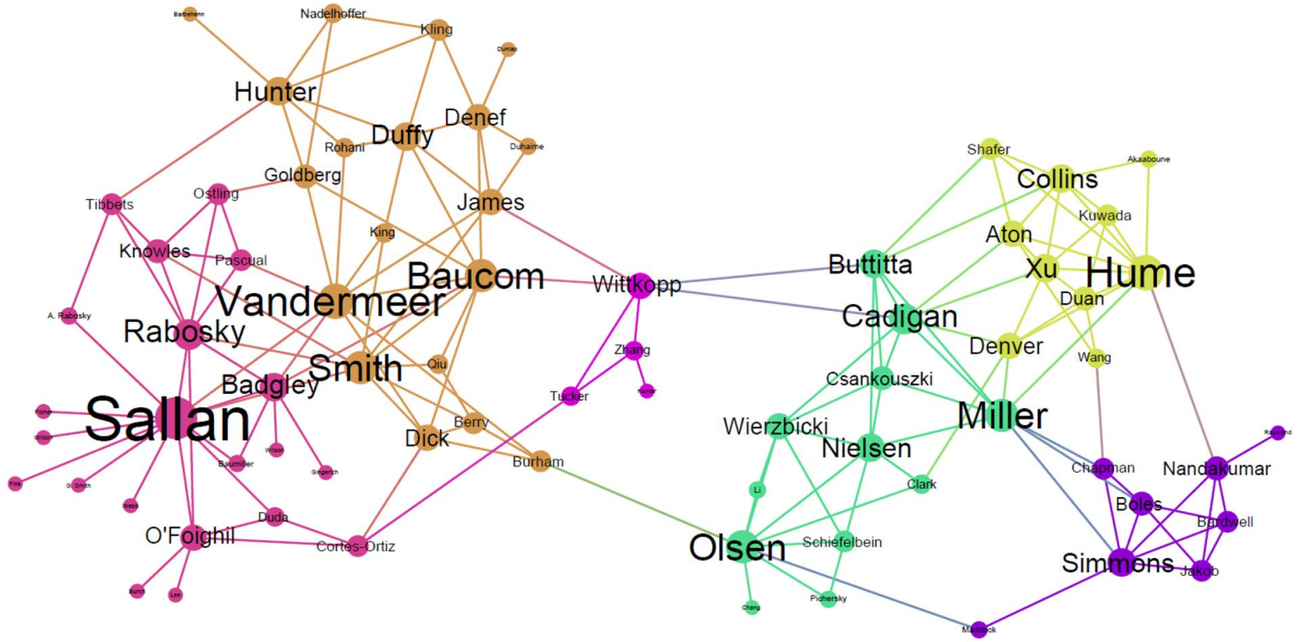
- FICM Room Use Coding vs Function Codes/Federal Methodologies
- Facility Condition
- Expenditures vs Grant dollars; multiple years;
- PI vs Co-PI Expenditure Tracking; Unique Identifiers!
- Definitions of PI; Primary Occupant of Space

GOVERNANCE

- “Manage what you measure” Space Surveys
- Designate owner/coordinator of data – central ownership
- Create a space allocation process with metrics and goals
- Integrate planning and budgeting for faculty hiring with space allocation procedures

MAPPING COLLABORATIONS

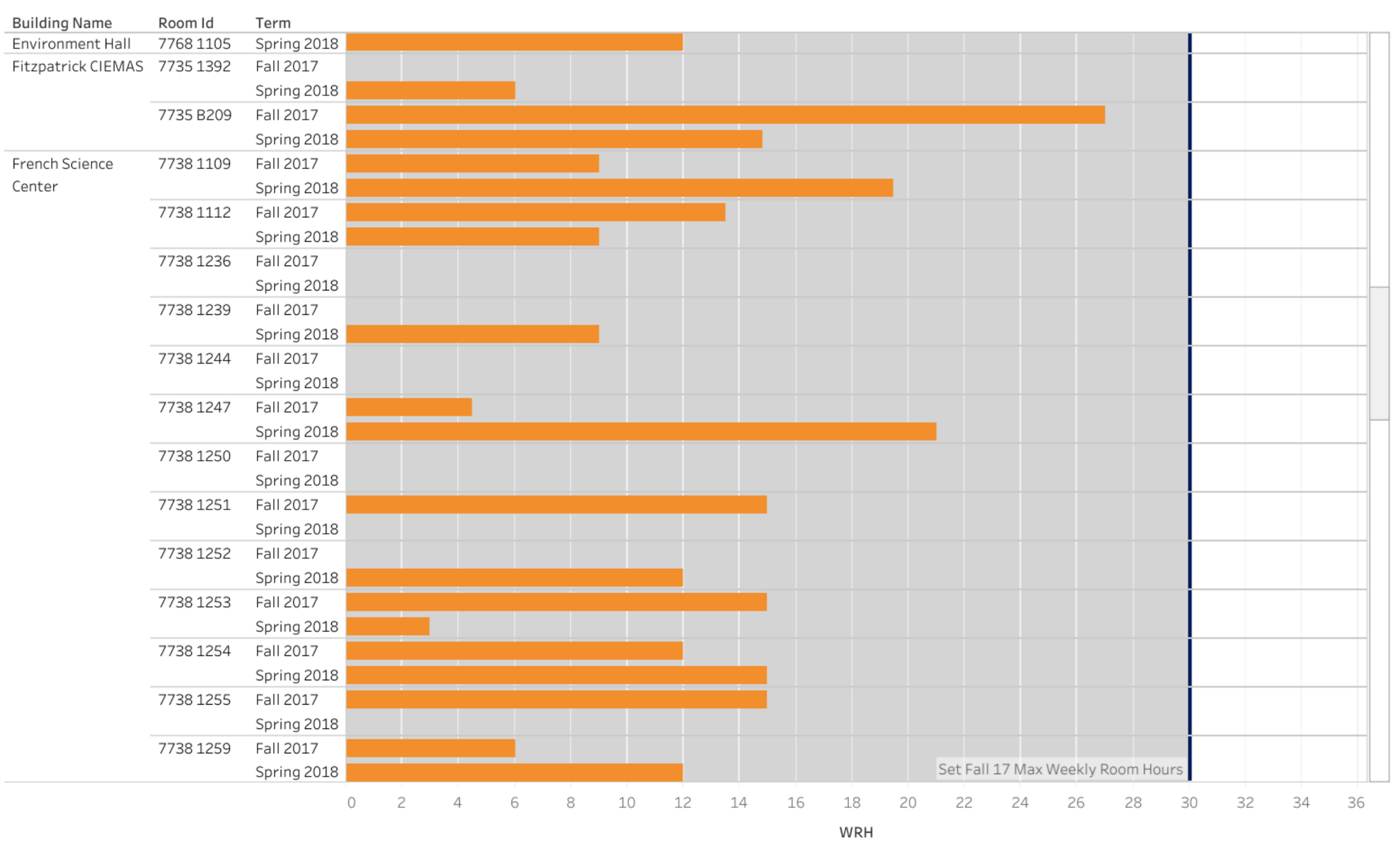




DASHBOARDS

SMITHGROUP

Utilization for Space Type: Teaching Labs



Select Space Type
Teaching Labs

Use the selector above to choose between desired view.

Click on a building name, room id, or term to navigate to dashboard showing list of courses for your selection.

Classroom Filters

Set Fall 17 Max Weekly Room Ho..
30

Building Name
All

Above or Below Parameter
- OK
- Review

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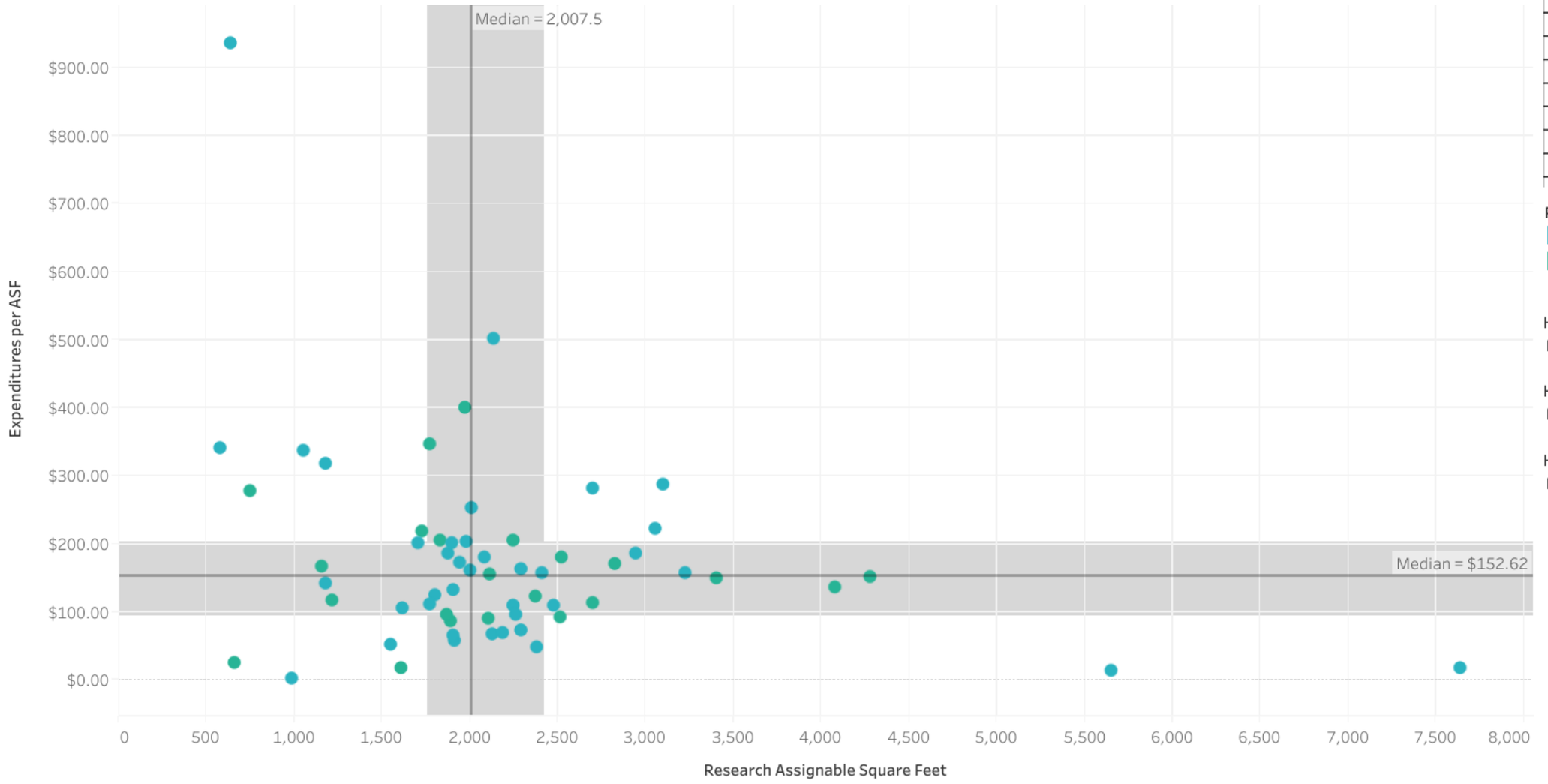
Expenditures and ASF per PI

Note:
Only PI's with minimum of 500 ASF of research space are represented.
Research ASF in TUNL and FELL for Champagne was excluded...



Choose View
Expenditures and ASF per ..

PI Primary Dept Filter
- [ ] Art,Art History & Visu..
- [x] Biology
- [ ] Biomedical Engineeri..
- [x] Chemistry
- [ ] Civil & Environmental ..
- [ ] Classical Studies
- [ ] Computer Science
- [ ] Division of Marine Sci..
- [ ] Divisional Deans

PI Primary Dept Legend
- Biology
- Chemistry

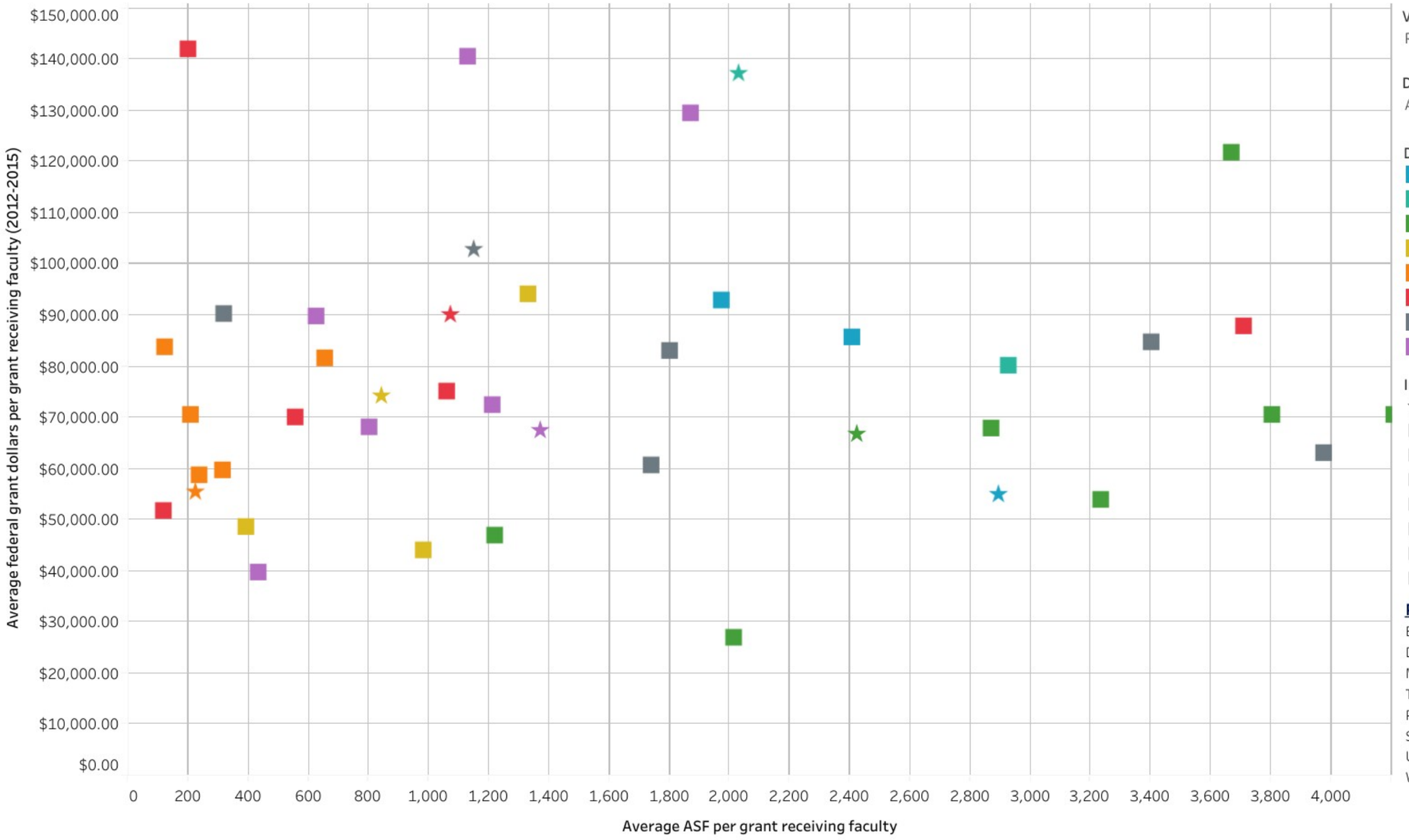
Highlight PI Last Name
No items highlighted

Highlight PI Last Name
No items highlighted

Highlight PI Last Name
No items highlighted

SMITHGROUP

Duke and Peers Research Space Production



View Selector
Research Space Production

Department Filter
All

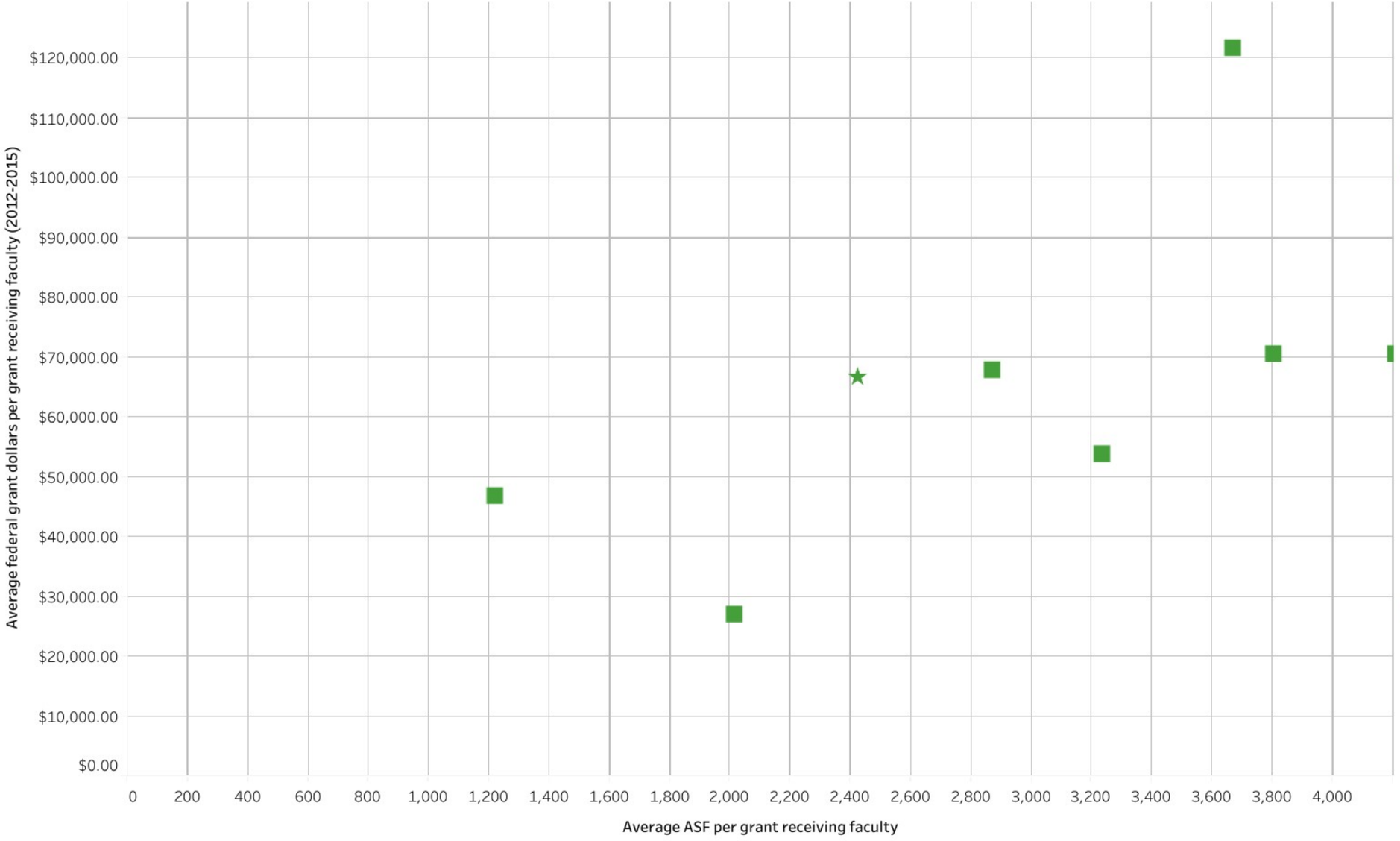
Department (Choose to highlight)
- Department A
- Department B
- Department C
- Department D
- Department E
- Department F
- Department G
- Department H

Institution (Choose to highlight)
- Duke University
- Institution 1
- Institution 2
- Institution 3
- Institution 4
- Institution 5
- Institution 6
- Institution 7

Participating Institutions

Brown University
Dartmouth College
Massachusetts Institute of Technology
Princeton University
Stanford University
University of Pennsylvania
Washington University in St. Louis

Duke and Peers Research Space Production



View Selector
Research Space Production

Department Filter
Department C

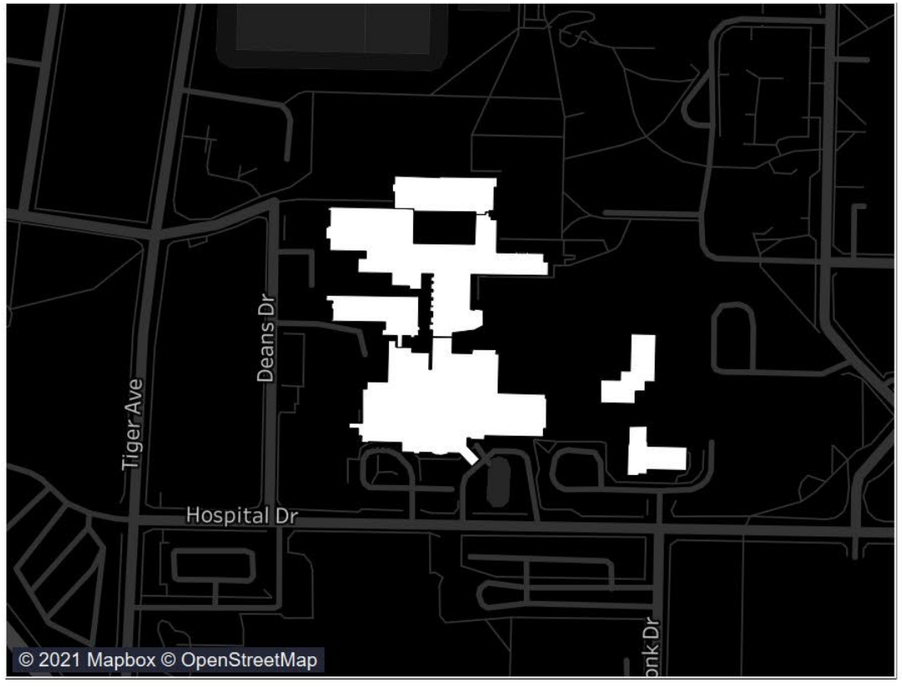
Department (Choose to highlight)
Department C

Institution (Choose to highlight)
- Duke University
- Institution 1
- Institution 2
- Institution 3
- Institution 4
- Institution 5
- Institution 6
- Institution 7

Participating Institutions
Brown University
Dartmouth College
Massachusetts Institute of Technology
Princeton University
Stanford University
University of Pennsylvania
Washington University in St. Louis

Research Space

(RUCs 250-XX, 255-XX, & 310-12)



- Research/Nonclass Lab
- Research/Nonclass Lab Ser
- Office

Home Dept

All

Building Name

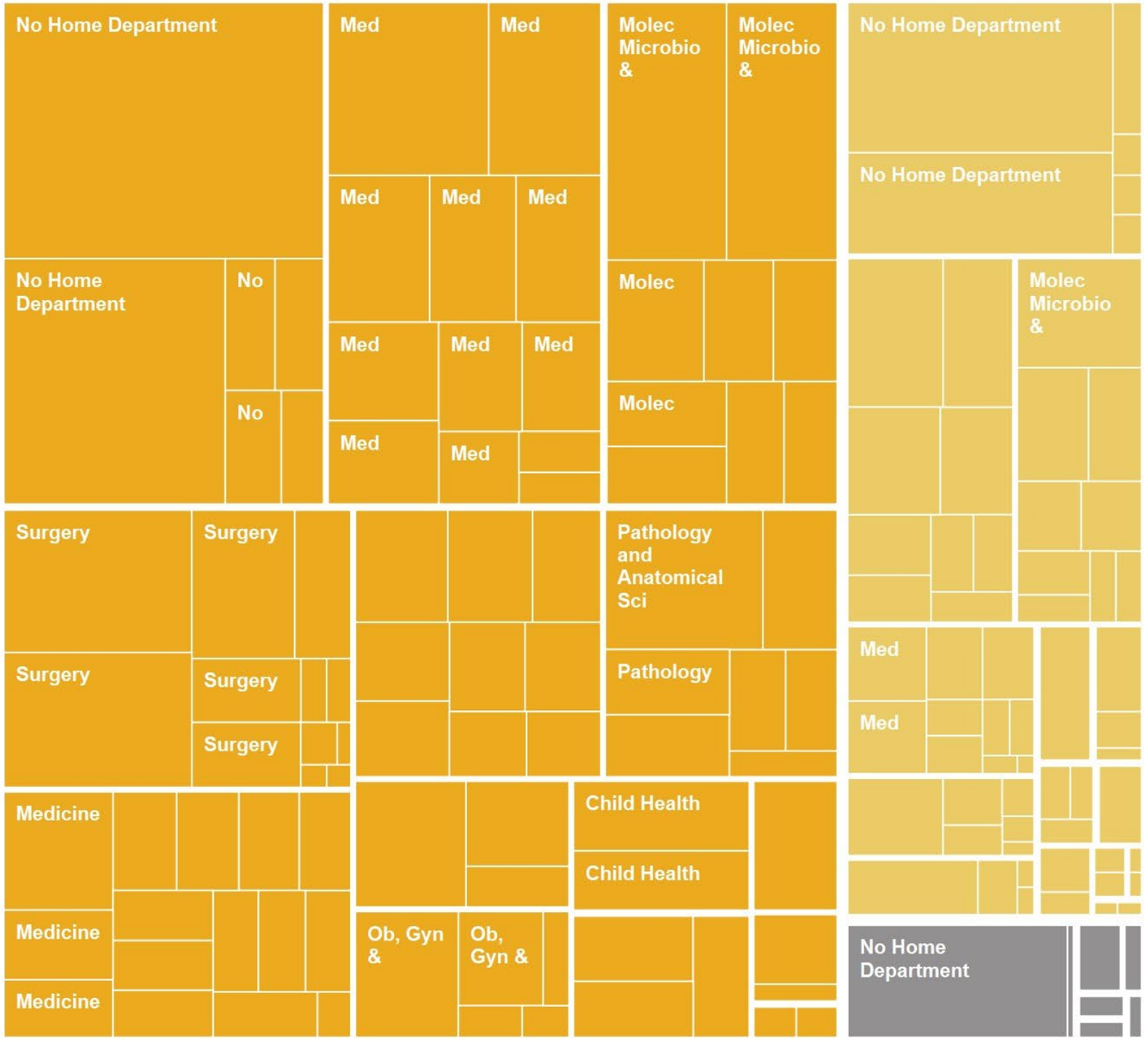
All

PI NAME

All

Bldg & Room ID	Room Department	Type of Room	Room ASF
37060 M112	Dean of Medicine	Research/Nonclass Lab Ser	219
37060 M114	Ophthalmology	Research/Nonclass Lab	648
37060 M125A	Dean of Medicine	Research/Nonclass Lab Ser	122
37060 M126	Dean of Medicine	Research/Nonclass Lab Ser	91
37060 M128	Dean of Medicine	Research/Nonclass Lab Ser	99
37060 M132	Dean of Medicine	Research/Nonclass Lab Ser	238
37060 M134	Dean of Medicine	Research/Nonclass Lab	2,337
37060 M134A	Dean of Medicine	Research/Nonclass Lab Ser	152
37060 M134B	Dean of Medicine	Research/Nonclass Lab Ser	125
37060 M134C	Dean of Medicine	Research/Nonclass Lab Ser	140
37060 M148	Child Health	Research/Nonclass Lab	1,767
37060 M148A	Child Health	Research/Nonclass Lab Ser	170
37060 M148B	Child Health	Research/Nonclass Lab	149

NOTE: Some rooms have multiple occupants.



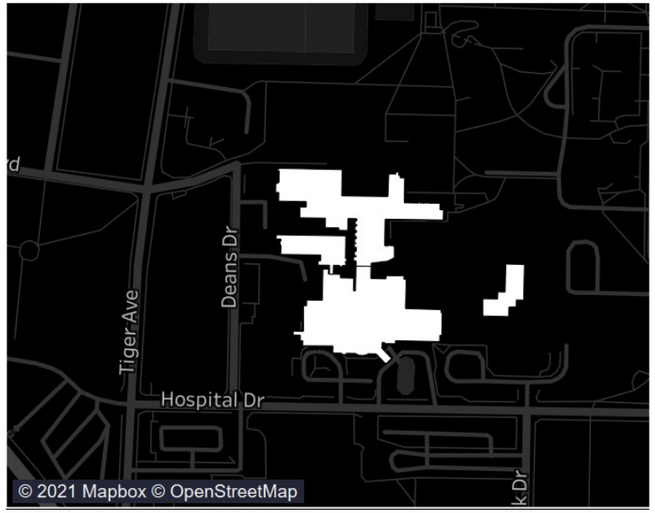
Principal Investigators

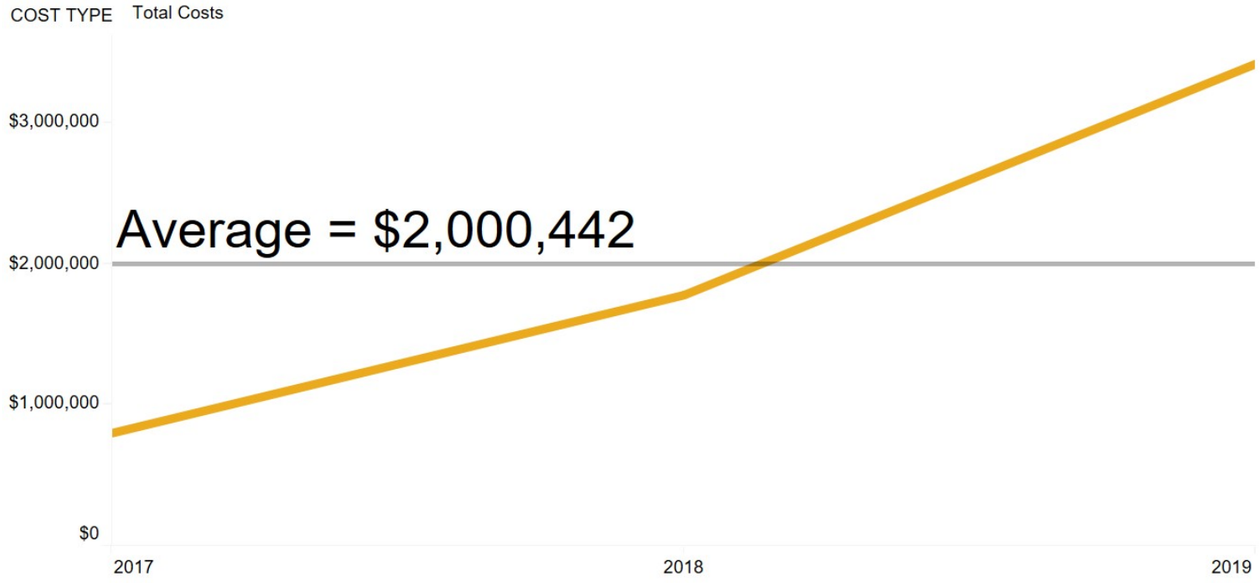
(Only RUCs 250-XX & 255-XX)

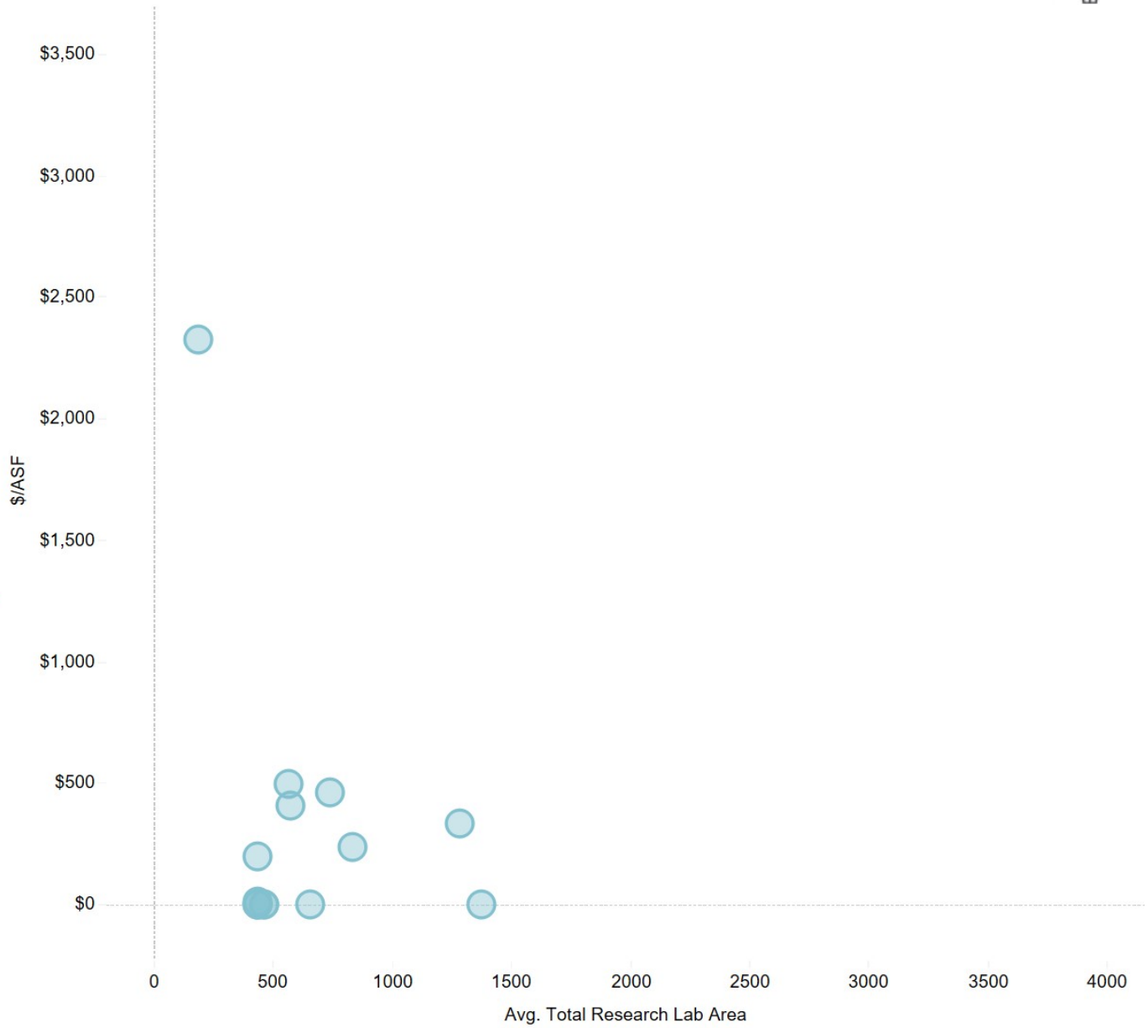
PI NAME All

HOME DEPT. Medicine

Medicine



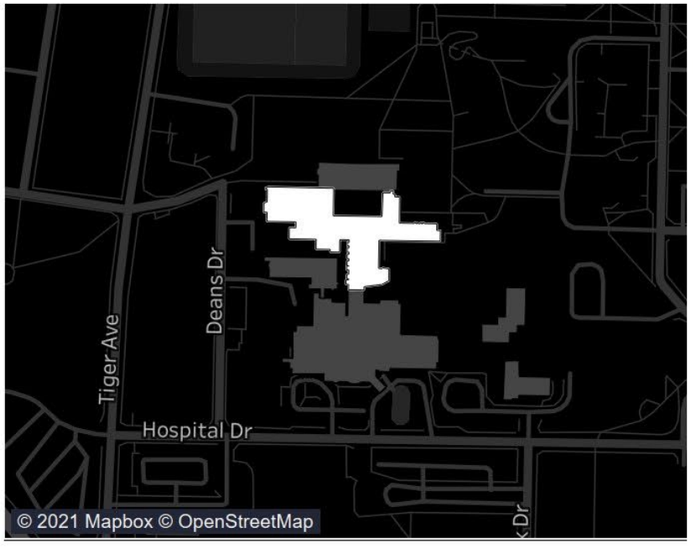




TOTAL ASF VALUES MAY NOT MATCH
ASF amounts on this dashboard exclude 310-12 Research Office space which is shown on other dashboards in this workbook.

Research Labs & Service with Ratings

(RUCs 250-XX, 255-XX, & 310-12)



Building Name: All

Room Id: All

All

All Windows

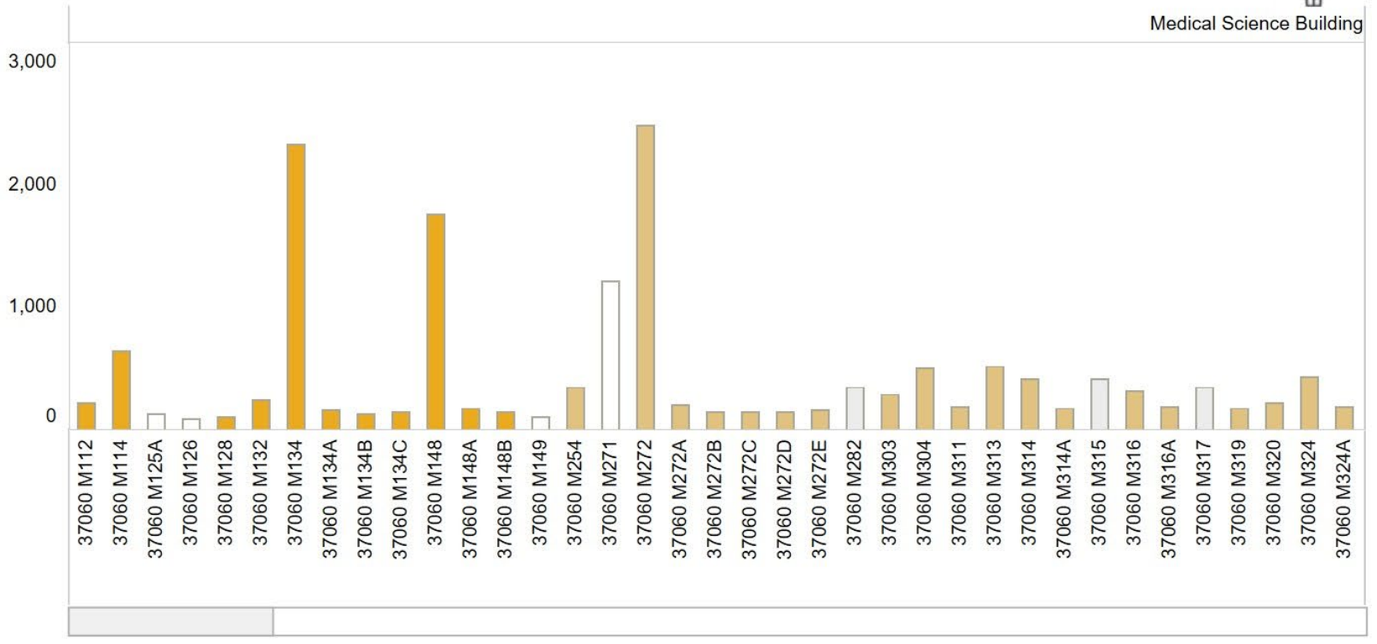
BioSafety Cabinets - 0 to 4

Chemical Fume Hoods - 0 to 4

Sinks - 0 to 6

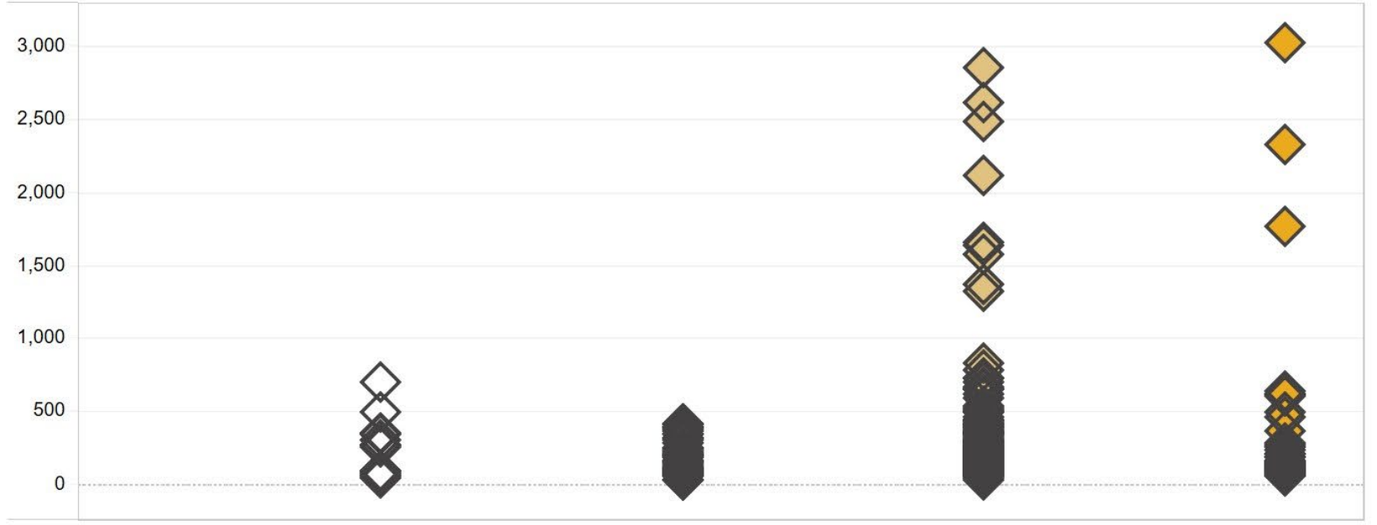
Snorkels - 0 to 2

RATING
- Poor
- Fair
- Good
- Excellent



NOTE: Selecting a building in the map above will provide options to open a PDF of floorplans.

Building Name	Bldg & Room ..	Condition Category
Clinical Support & Education Bldg	42000 CE530	Finishes
		Flooring
		Lighting
		MEP
	42000 CE0631A	Finishes
		Flooring
		Lighting
		MEP
Mason Institute Building	42089 EC202	Finishes
		Flooring
		Lighting
		MEP
	42089 EC203	Finishes
		Flooring



NOTE: Selecting a room in the chart above will provide options to open a PDF of either room pictures or floorplans.

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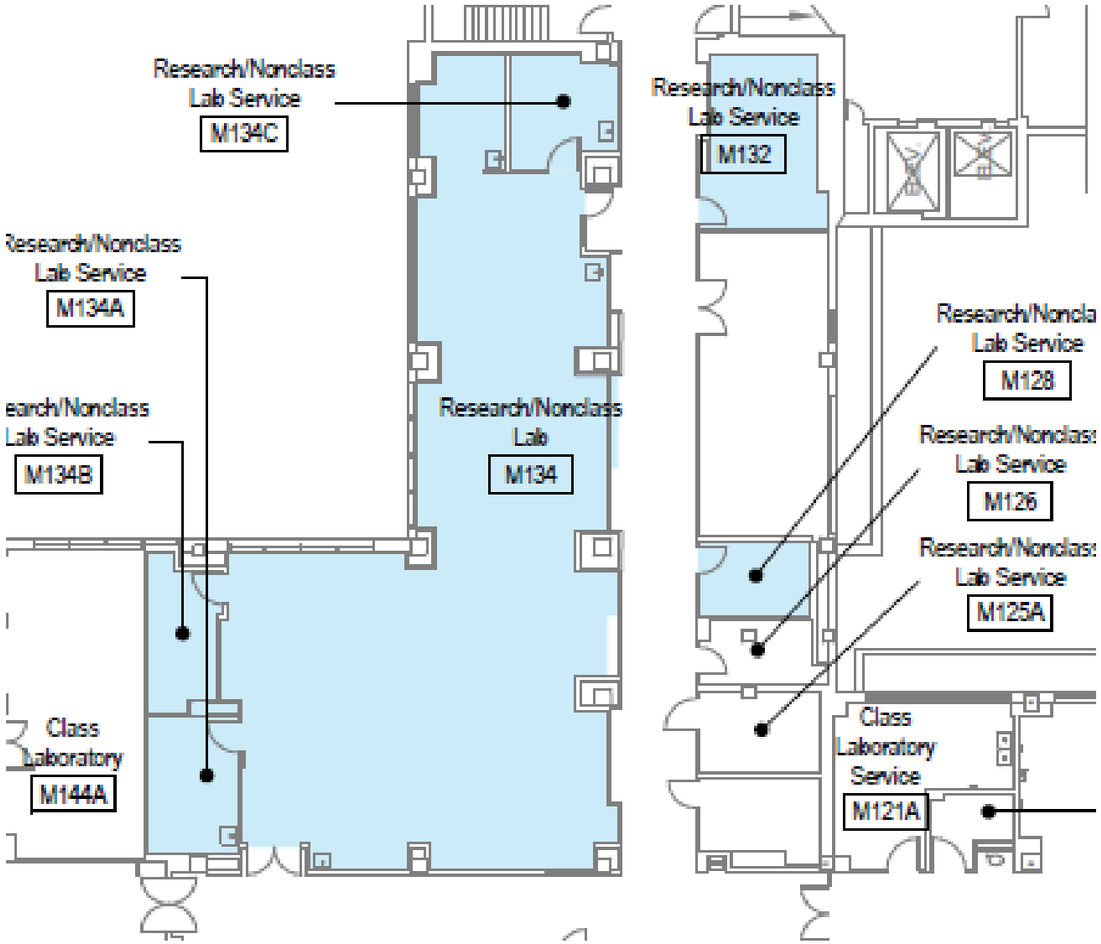
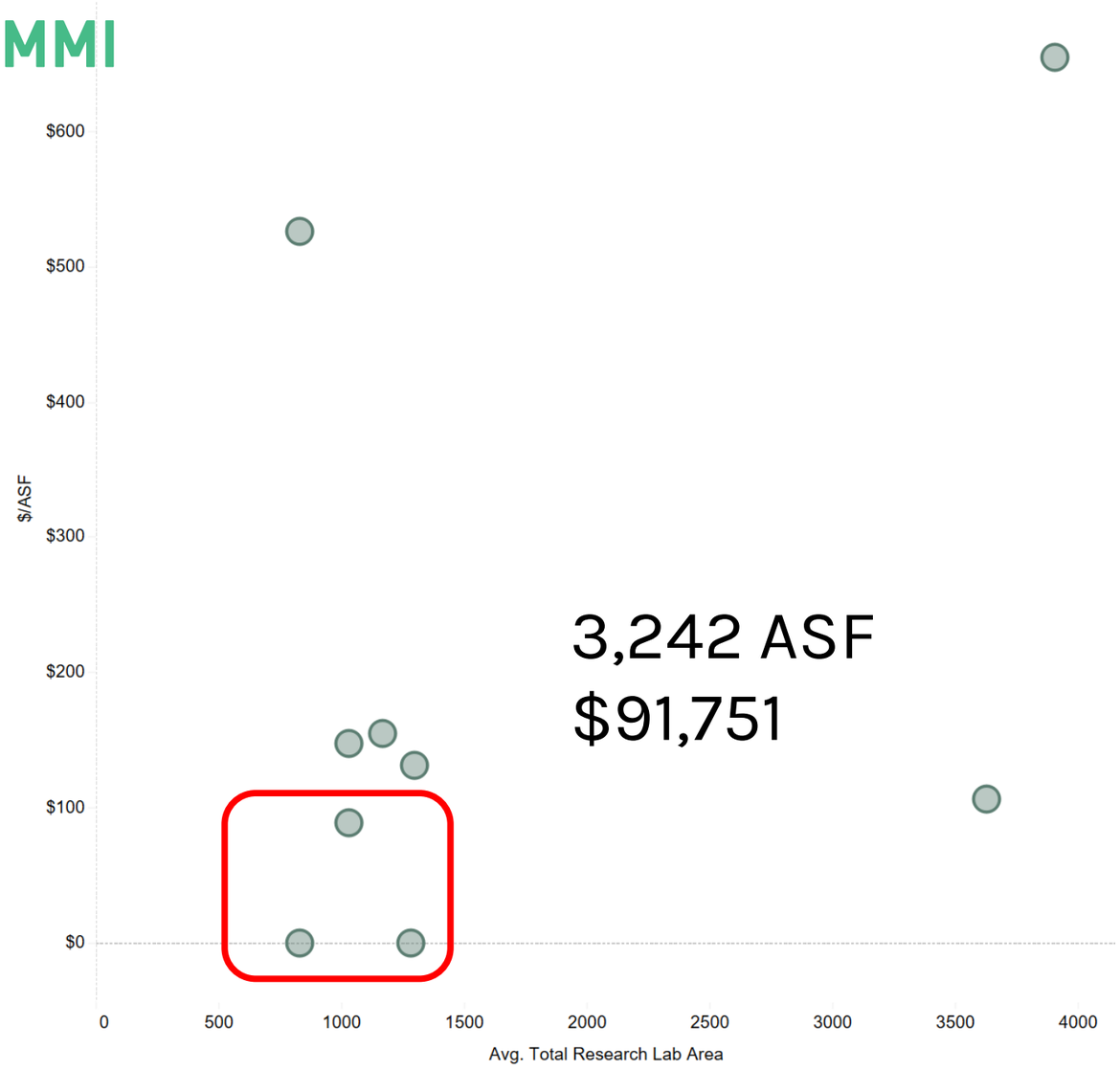
OPPORTUNITIES TO INCREASE UTILIZATION:
1. UTILIZE UNASSIGNED SPACE

MED SCI M-134



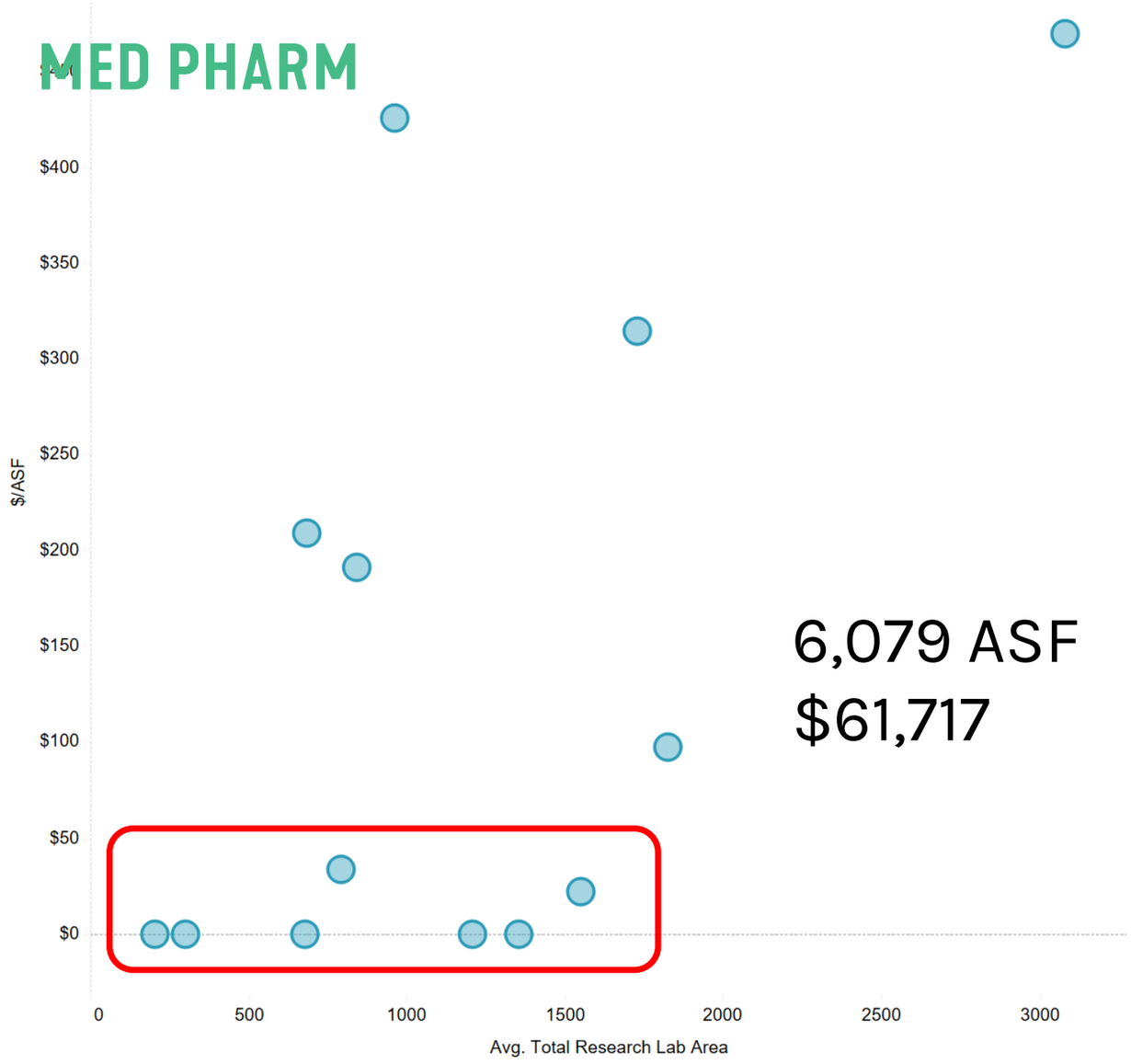
2. INCREASE PRODUCTIVITY OF EXISTING SPACE

MMI



3,242 ASF
$91,751

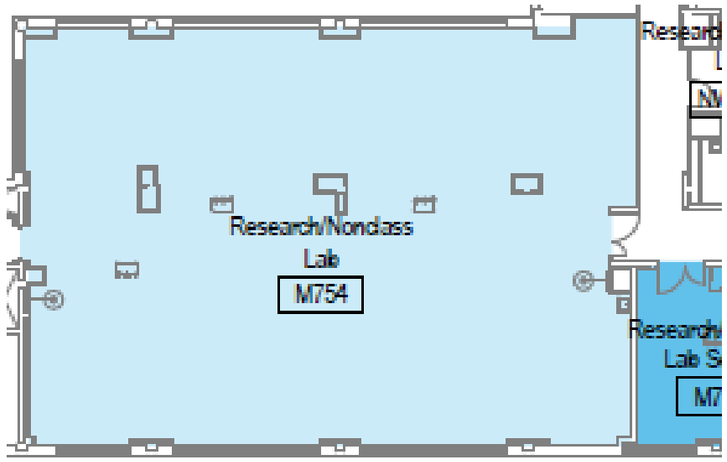
MED PHARM



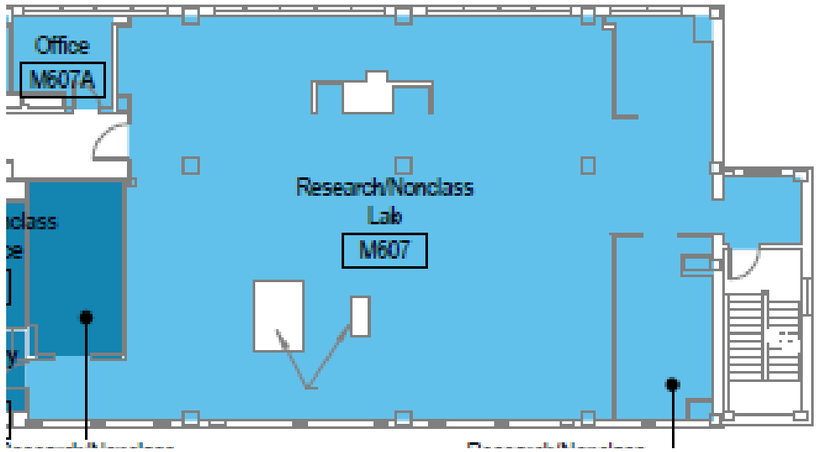
6,079 ASF
$61,717

2. INCREASE PRODUCTIVITY OF EXISTING SPACE

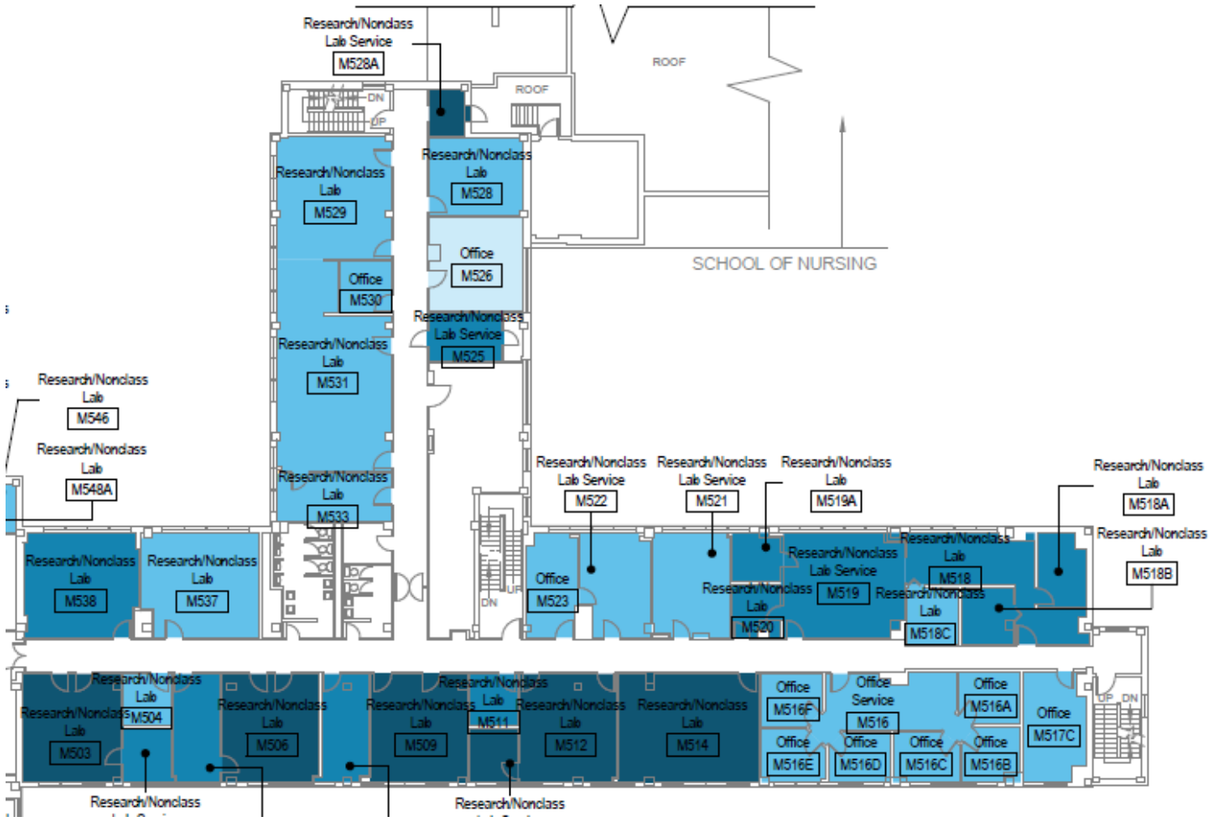
M-754
- 3,027
- Excellent Cond
- **7 PI's**

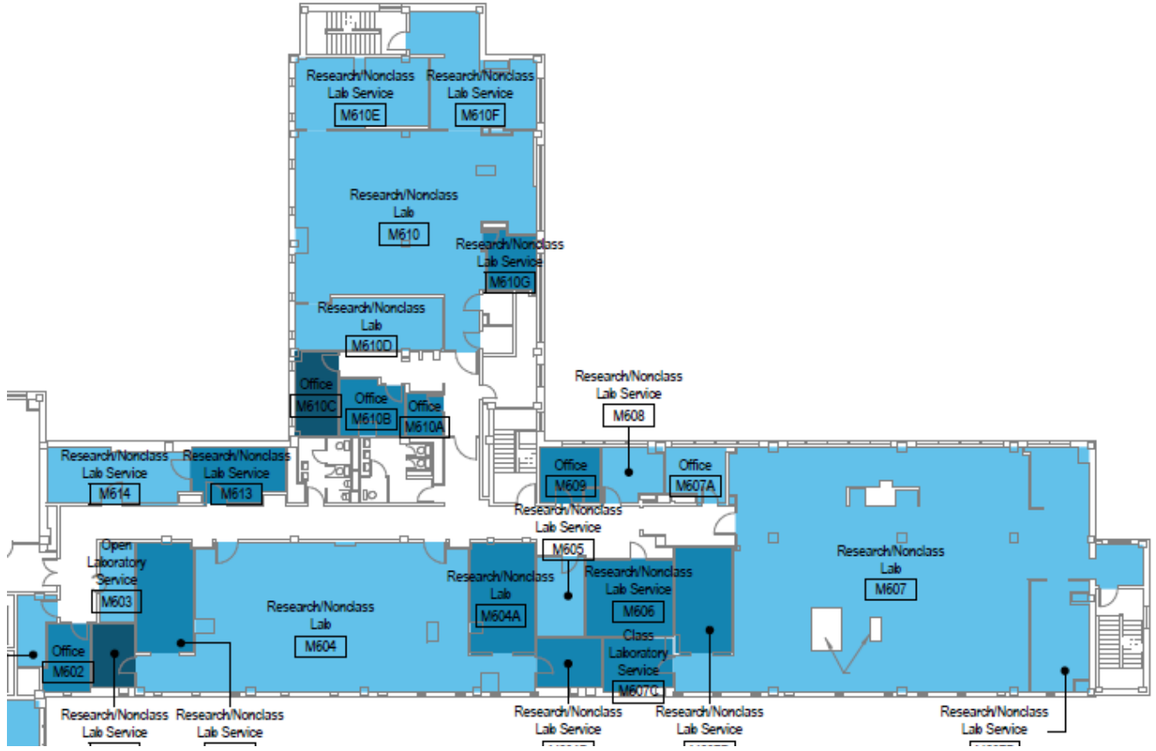


M-607
- 2,860 ASF
- Good Condition
- **(1) PI**



3. RENOVATE SPACE FOR FLEXIBILITY, PI DENSITY





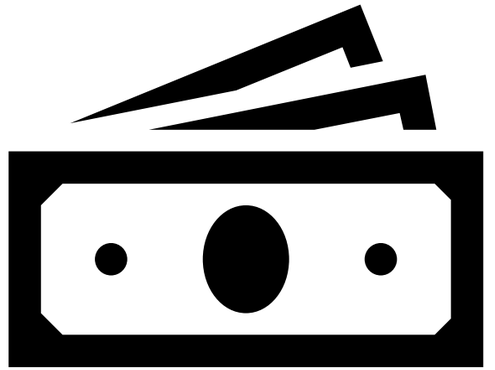
ALTERNATIVE EXAMPLE: BUILD NEW

TARGET: $100M Expenditures

- $250k/PI → 400 PI's
- $500k/P I→ 200 PI's

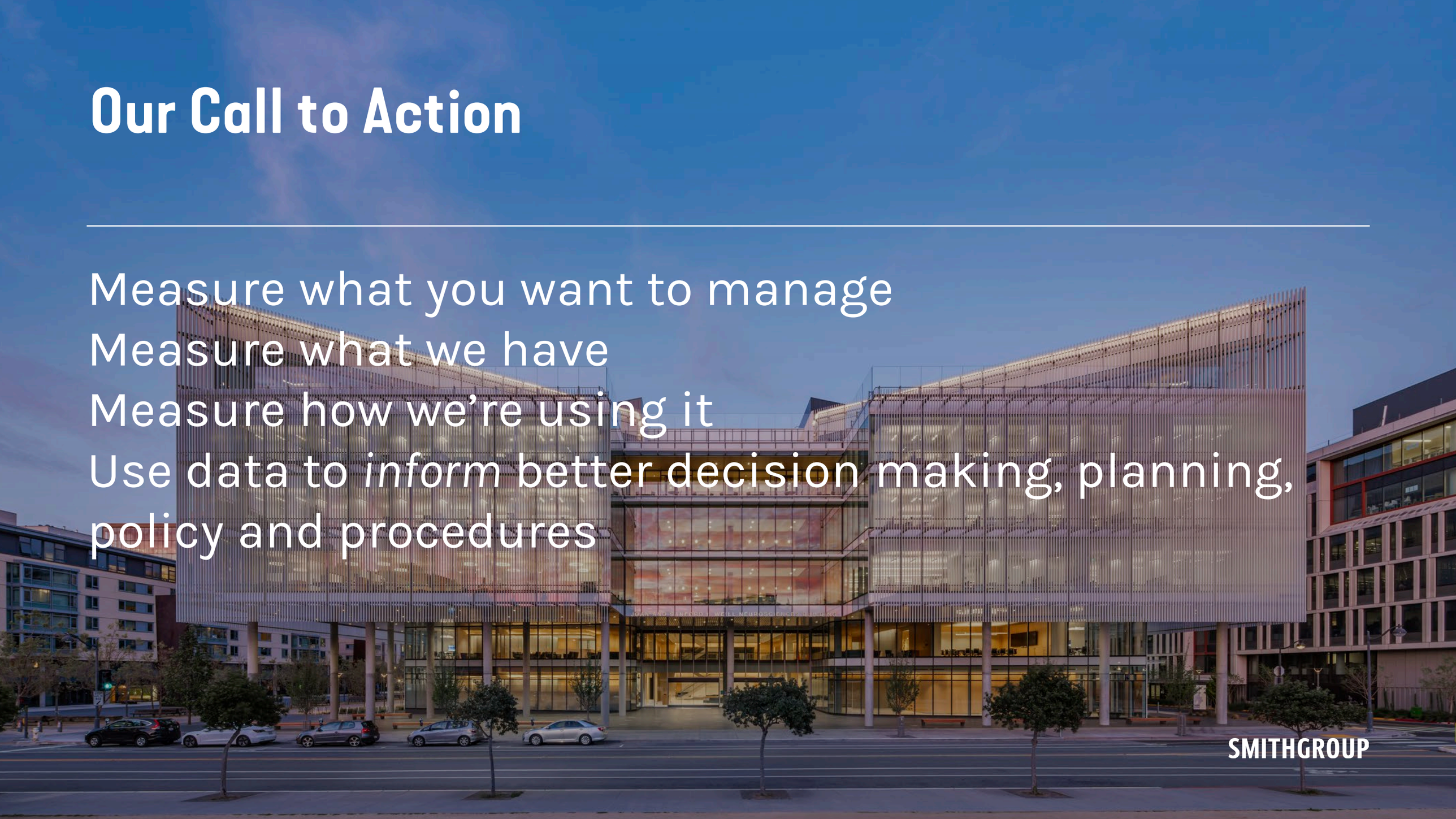
- 50% Lab Intensive = 100 PI's
- 30 Engr @ 1500 ASF/PI
- 70 Scientists @ 1200 ASF/PI
- → 139,000 ASF
- → 232,000 GSF

- Construction cost @ $1,000-$1,200/GSF =
- $232,000,000 – $278,400,000



Our Call to Action

Measure what you want to manage
Measure what we have
Measure how we're using it
Use data to *inform* better decision making, planning, policy and procedures



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THANK YOU

COMMENTS, QUESTIONS?

CONTACT: PAUL.LEEF@SMITHGROUP.COM