

Ensuring Research Resilience Through Programmatic & Facilities Alignment

RESEARCH SPACE & FACILITIES STRATEGIC PLAN
MICHIGAN STATE UNIVERSITY

2019 SCUP Conference

MICHIGAN STATE
UNIVERSITY

CO ARCHITECTS



Presenters



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Asst. Director – Facilities Planning
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UNIVERSITY



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Principal

CO ARCHITECTS



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Associate

CO ARCHITECTS

Agenda

- 1. MSU Initiatives and Goals**
- 2. Campus Overview**
- 3. Program and Facilities**
- 4. Approaching the Problem**
- 5. The Results**

Agenda

1. MSU Initiatives and Goals

2. Campus Overview

3. Program and Facilities

4. Approaching the Problem

5. The Results

Background

- Planned and Actual Growth in the Research Enterprise
- Research expenditures have more than doubled in the last 10 years
- Global Impact Initiative
 - 100 new research intensive faculty to be hired in 5 years
 - Year-4 over 85 faculty have been hired
 - Identified research areas of emphasis
- Creation of new Institutes and Departments – past 5 years
- Current Strategic Space and Facilities Plan coming to fruition
 - Recent Space Investments: 500,000 GSF / 175 PIs

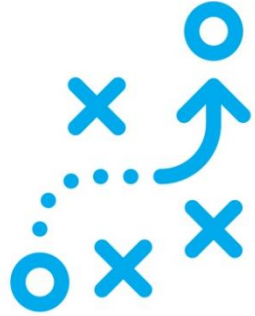
Why This Study?



Create a Strategic Framework.



Support Recruitment & Retention.



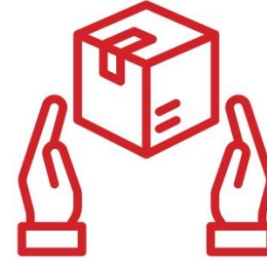
Develop Scenarios for Allocation of Near-Term Release Space.



Assess Core Research Facilities to Guide Future Planning.



Strategy for Providing Animal Care Resources



Ensure Highest and Best Use of Space and Facility Resources.



Ability to Convey Planning and Scenarios to Campus Community.

How Is This Study Different from a Conventional Master Plan?

- **Strategic framework** plan to address research space utilization and development of scenarios
- **Integrated** planning across multiple dimensions
- A living document that can **evolve** over time **in alignment** with the research enterprise
- Continue strategy to **leverage** neighborhoods of scientific inquiry as a basis for space allocation
- **“Kit of Parts”** methodology to guide future planning decisions

Agenda

1. MSU Initiatives and Goals

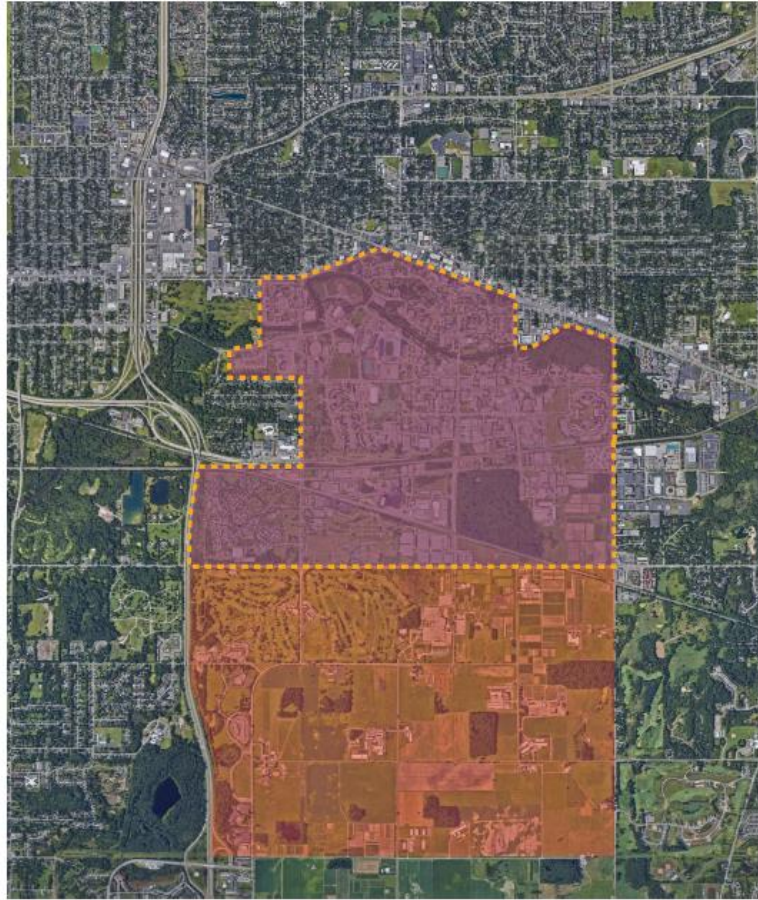
2. Campus Overview

3. Program and Facilities

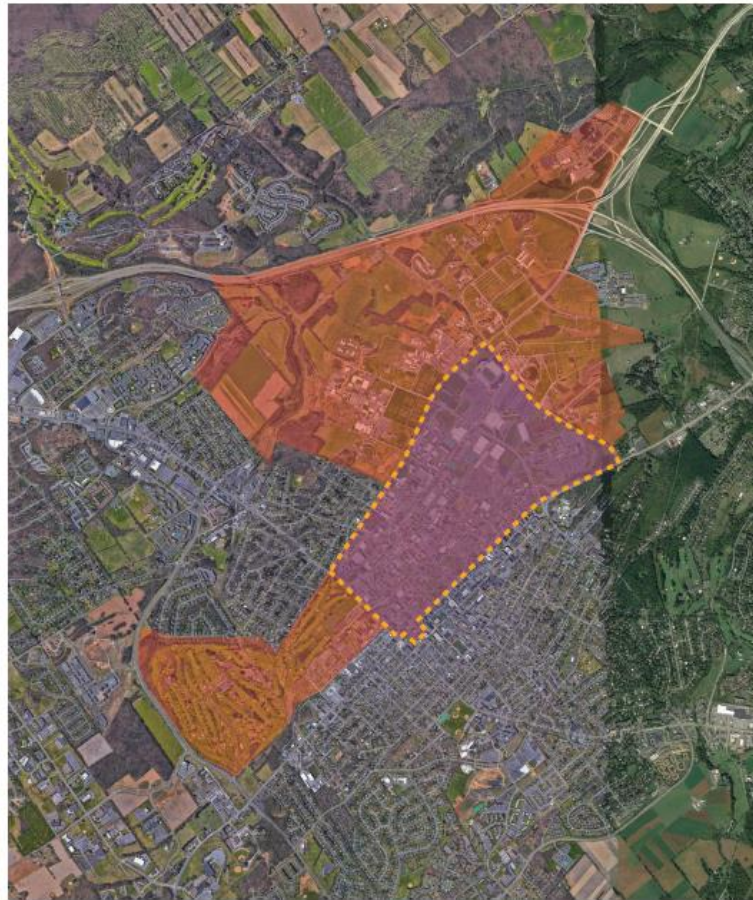
4. Approaching the Problem

5. The Results

Project Overview



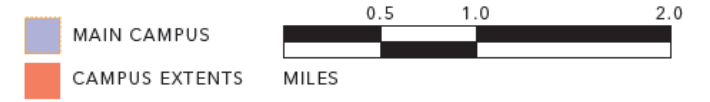
MICHIGAN STATE



PENN STATE



OHIO STATE



Project Overview: Existing Campus

NORTH



CENTRAL



SOUTH



Agenda

1. MSU Initiatives and Goals

2. Campus Overview

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5. The Results

Project Overview: 18 Buildings

NORTH

3

NORTH
CAMPUS

CENTRAL

1

ENGINEERING

3

ANIMAL &
ENVIRONMENTAL
SCIENCES

3

PHYSICAL &
BIOLOGICAL
SCIENCES

4

PLANT
SCIENCES

1

ANIMAL
HEALTH

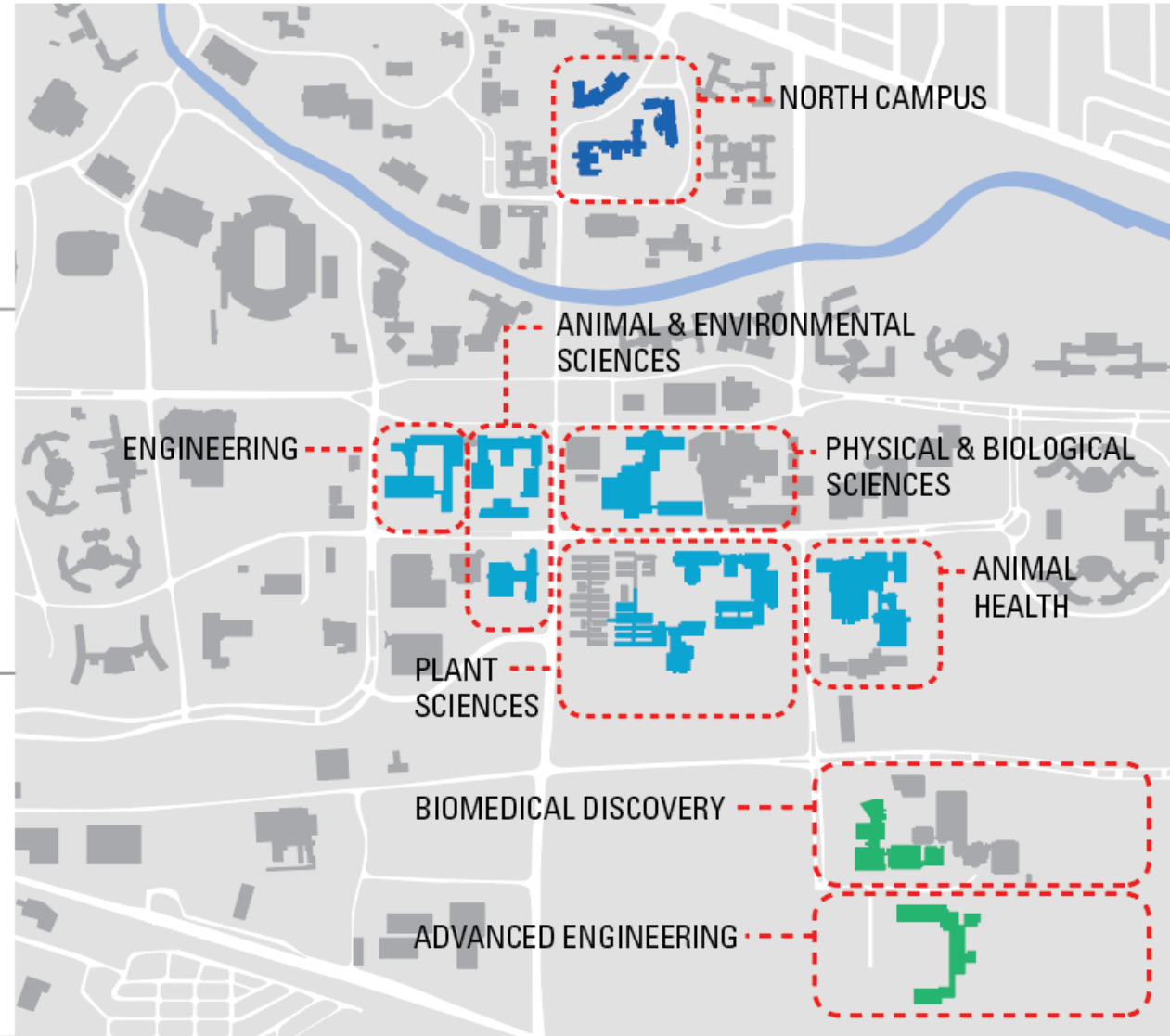
SOUTH

2

BIOMEDICAL
DISCOVERY

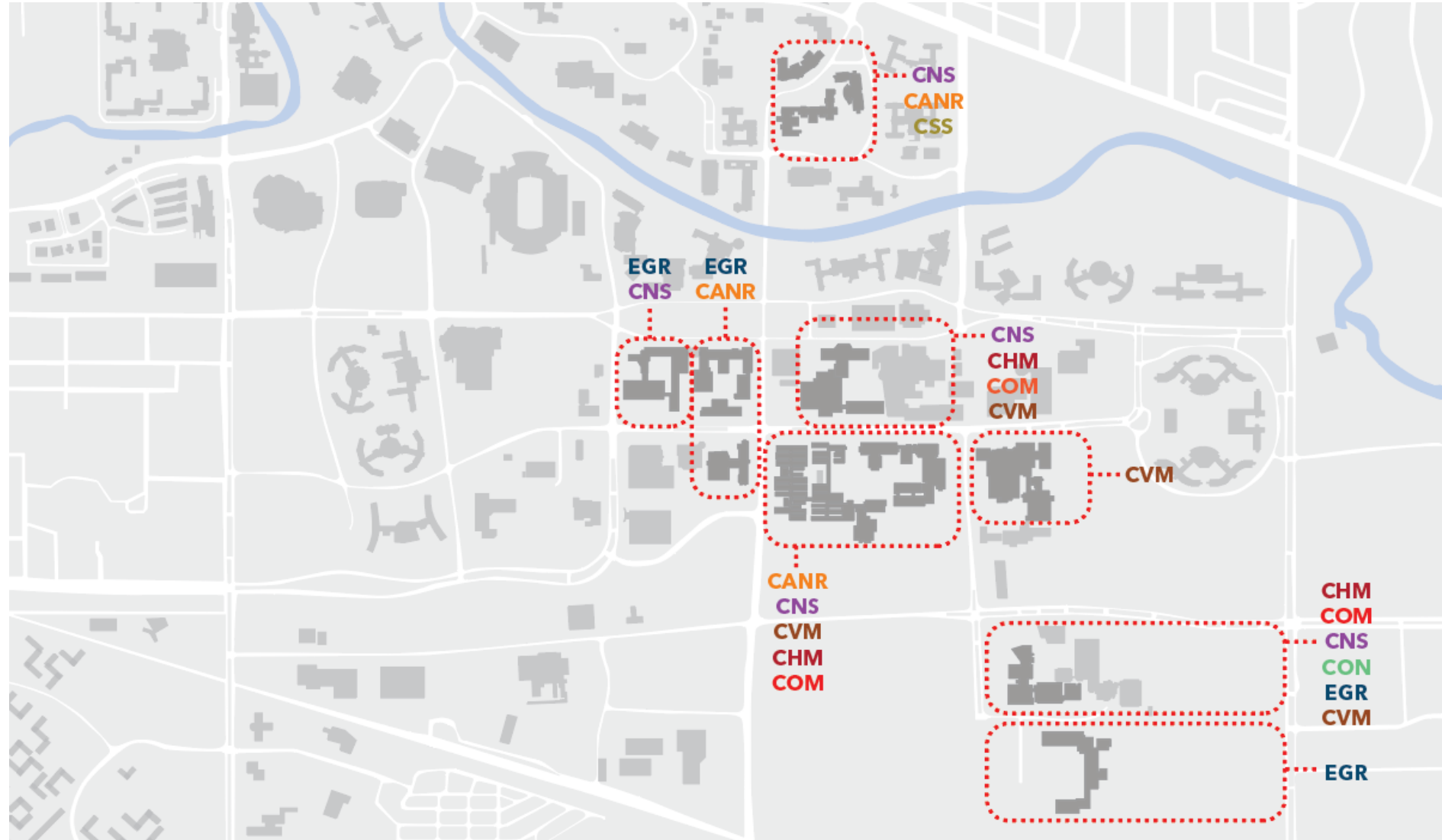
1

ADVANCED
ENGINEERING



College Distribution

-  VETERINARY MEDICINE
CVM
-  SOCIAL SCIENCE
CSS
-  OSTEOPATHIC MEDICINE
COM
-  NATURAL SCIENCES
CNS
-  HUMAN MEDICINE
CHM
-  ENGINEERING
EGR
-  AGRICULTURE & NATURAL RESOURCES
CANR
-  NURSING
CON



Facilities Documentation & Methodology

Engineering Building Summary Upd. 9/2/2016

Engineering Building

Address: 428 South Shaw Ln.
East Lansing, MI 48824

Building Number: 81
Building Name: Engineering Building
Year Built: 1961
Usage: Academic
Square Footage: 421,497

Office quantity (310): 302
Lab quantity (250): 100

Building Contact: Tom Voice
Jeff Curtiss



Occupying Colleges:

College	Departments	Total SF per Dept.	SF Office	SF Lab
???	Case Center for Computer-Aided Eng. and Manuf.	360		
College of Engineering	Chemical Engineering and Materials Science	40,596	8,271	18,816
	Civil and Environmental Engineering	19,374	3,654	4,024
	Composite Materials & Structures Center	14,376	3,298	9,973
	Computer Science and Engineering	24,657	8,308	8,381
	Division of Engineering Computing Services	10,748	2,452	
	Electrical and Computer Engineering	29,517	4,471	14,704
	Engineering Dean	47,877	26,490	3,728
	Division of Engineering Research	66		
	Mechanical Engineering	27,501	5,733	9,531
	Instructional Space	MSU Classroom Space	14,900	
IPF	IPF Administration	457		
	IPF Custodial Services	667		
Total		231,096	62,677	69,157

Prior Renovations:

College	Department	Project #	Room Use	Year	Square Feet	Cost
College of Engineering	Chemical Engineering and Materials Science	CP13305	Composites Teaching Lab - minor renovations - replace fumehoods and add snorkles (1254, 1254A)	2013	619	\$110,000

Biomedical and Physical Sciences Building Summary Upd. 8/18/2016

Biomedical and Physical Sciences Building (BPS)

Address: 567 Wilson Rd
East Lansing, MI 48824

Building Number: 160
Building Name: Biomedical and Physical Sciences
Year Built: 2001
Usage: Academic
Active Square Footage: 377,230

Office quantity (310): 235
Lab quantity (250): 117

Building Contact: Mark Conlin



Occupying Colleges:

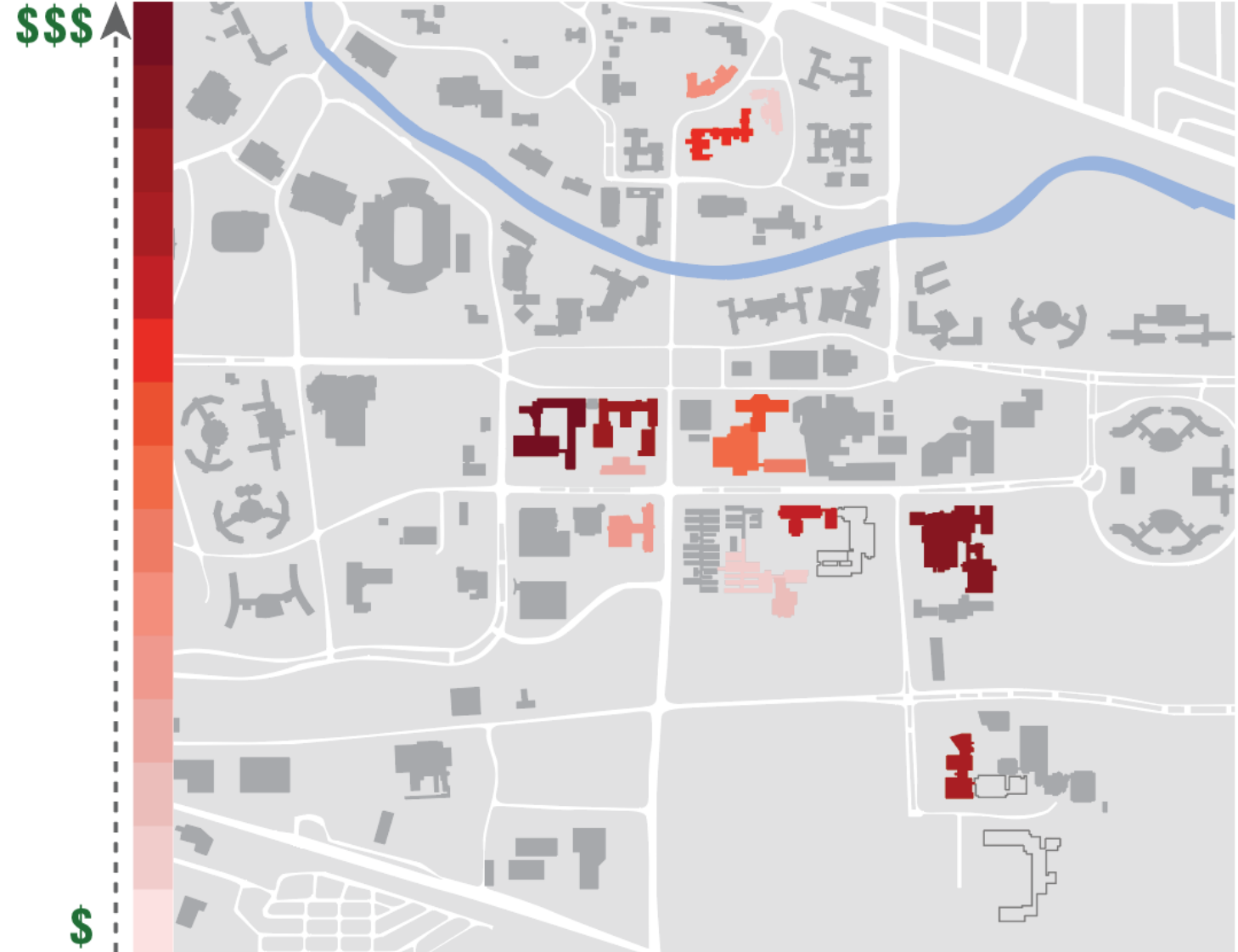
College	Departments	Total SF per Dept.	SF Office	SF Lab
College of Veterinary Medicine	Microbiology & Molecular Genetics	65,849	10,432	30,728
College of Human Medicine	Physiology	50,373	8,122	31,364
	Surgery	1,491		1,491
College of Natural Science	Physics-Astronomy	70,352	23,297	18,425
	Chemistry	1,506		
	Microbiology & Molecular Genetics	1,435	498	938
	Natural Science Dean	661		
College of Engineering	Engineering Dean	157	157	
	VPRGS	3,892	2,987	
Instructional Space	Institute for Cyber Enabled Research	2,496	2,496	
	Animal Care Program	1,941		
	MSU Classroom Space	6,177		
Auxiliary Enterprises	Culinary Services	661		
	IPF Administration	101		
IPF	IPF Custodial Services	852		
Total		207,944	47,988	82,945

Prior Renovations:

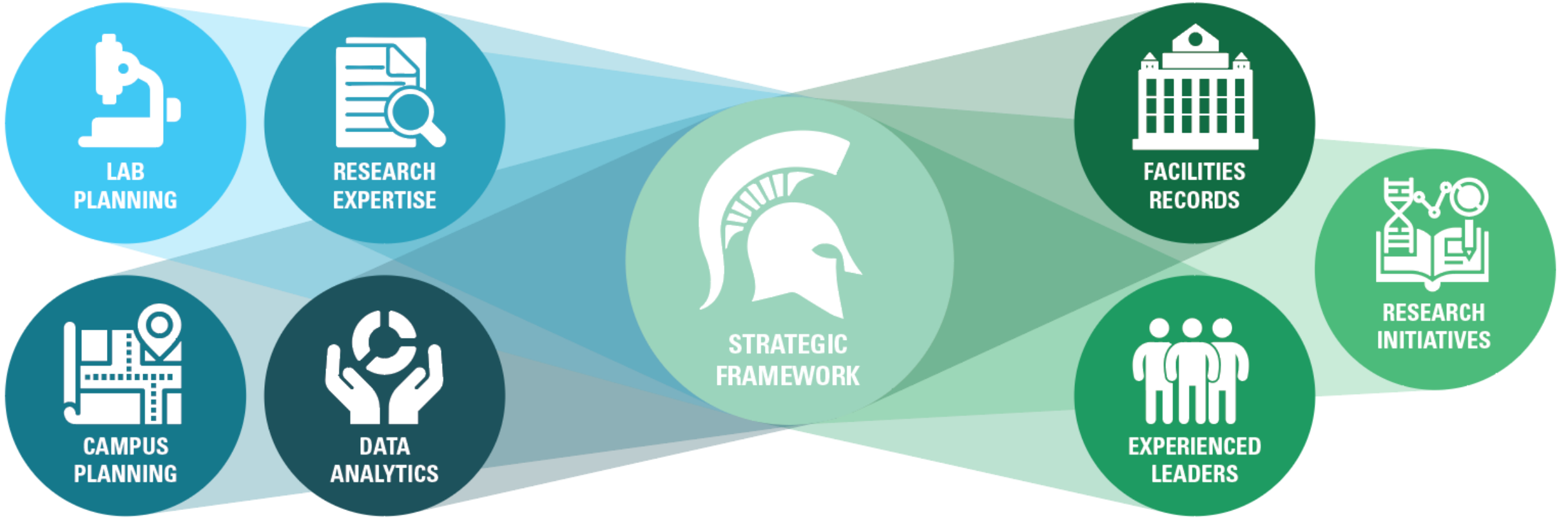
College	Department	Project #	Room Use	Year	Square Feet	Cost
College of Veterinary Medicine	Radiology	CP13140	MRI/Wet Lab (1113)	2013	724	\$384,538
College of Human Medicine	Physiology	CP13260	Faculty Offices (2201, 2201F)	2013	837	\$115,322

Investment to Date

- Integrated Planning Process – Five-year capital plan updated annually
- Programmatic Infrastructure Investment over last five years
- Planned capital renewal over next five years (deferred maintenance)



Team Approach



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UNIVERSITY

Guiding Principles

Build on current strengths and unique capabilities.



Reinforce research convergence opportunities.



Support new opportunities for research excellence.



Identify and align pending vacancies and migrations.



Think about existing space differently.

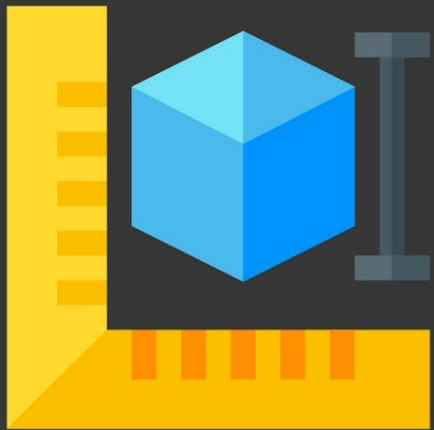


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Process

1. Measure



2. Imagine






3. Implement



Schedule

Research Space Planning Study

	MONTH 1	MONTH 2	MONTH 3	MONTH 4	MONTH 5	MONTH 6	MONTH 7
 <p>Measure</p>	<p>3</p> <ul style="list-style-type: none"> - Review existing materials - Facility Assessment - Facilities Inventory - Programmatic initiatives & requirements - Research funding & growth assessment - Campus analysis diagrams 						
 <p>Imagine</p>	<p>4</p> <ul style="list-style-type: none"> - Visioning: Define mission, vision, values - Benchmarking analysis - Space allocation methodology - Trends and themes: identify strategies - MSU "Blue Sky" road map - Optimize space program 						
 <p>Implement</p>				<p>4</p> <ul style="list-style-type: none"> - Strategic framework - Growth by program-space-funding-time - Physical planning scenarios - Cost modeling scenarios - Documentation 			

Measure



Observe



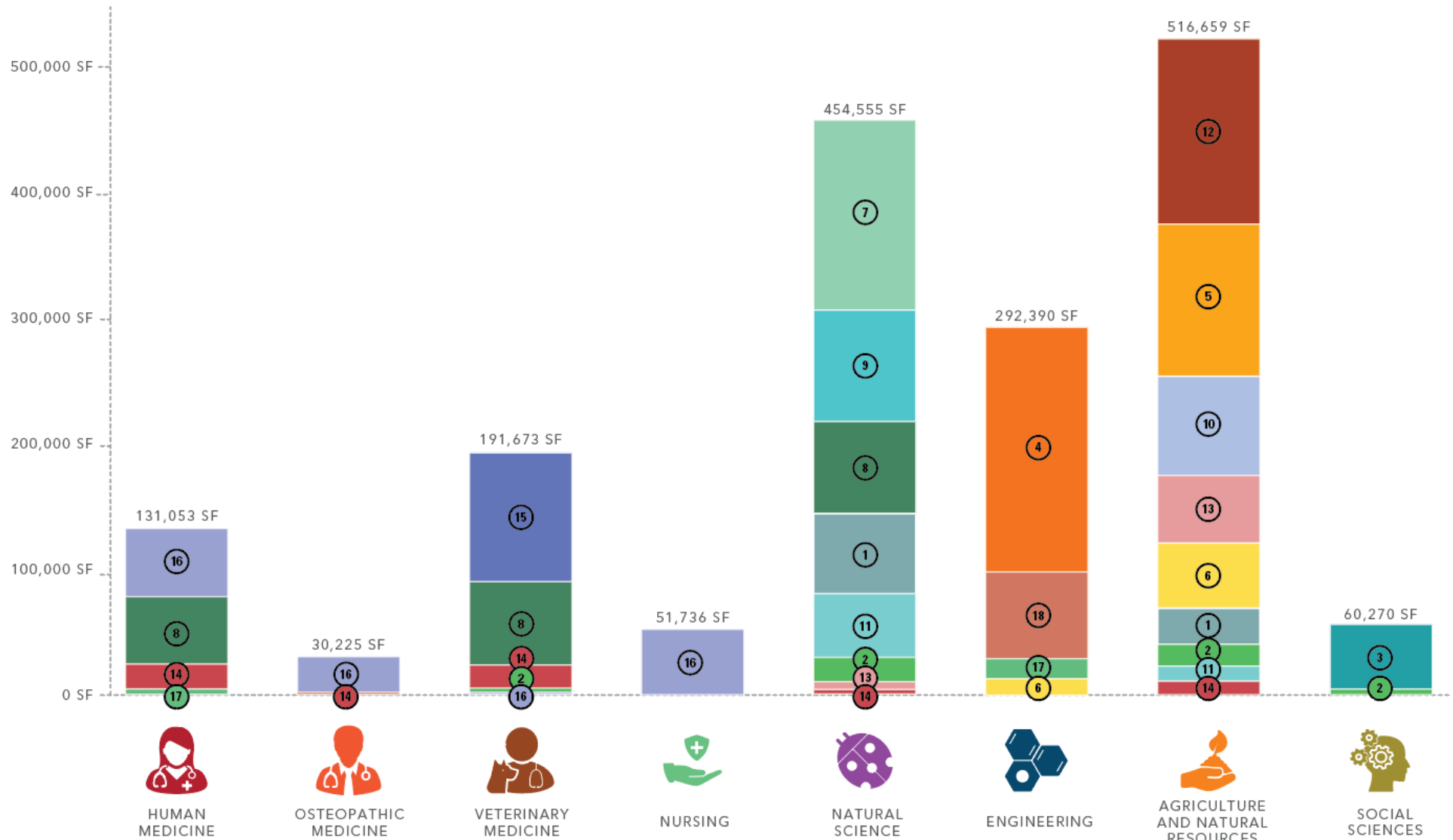
Gather



Assess

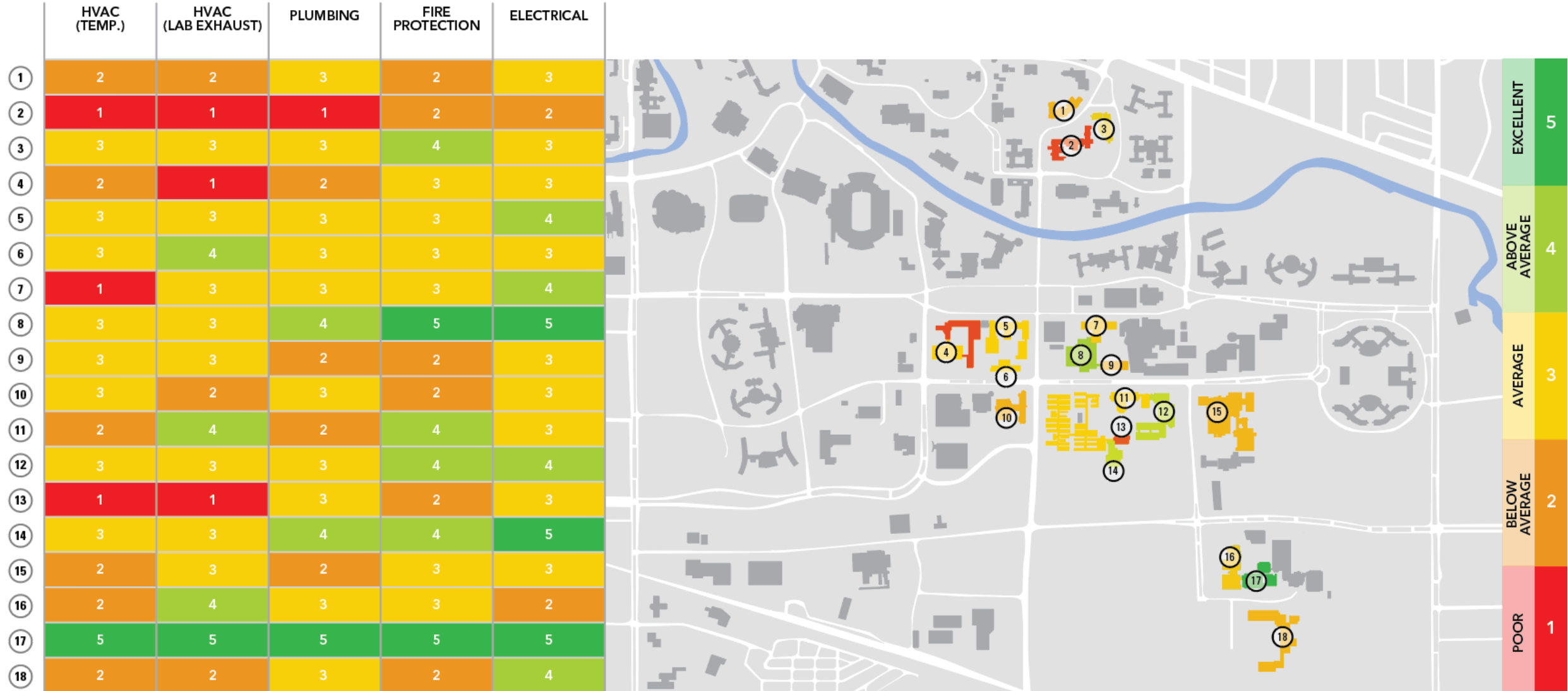
College Summary

- 1 NATURAL SCIENCE
- 2 GILTNER HALL
- 3 PSYCHOLOGY
- 4 ENGINEERING
- 5 ANTHONY HALL
- 6 FOOD SCIENCE
- 7 CHEMISTRY
- 8 BIOMEDICAL AND PHYSICAL SCIENCES
- 9 BIOCHEMISTRY
- 10 NATURAL RESOURCES
- 11 PLANT BIOLOGY
- 12 PLANT AND SOIL SCIENCES
- 13 CENTER FOR INTEGRATED PLANT SYSTEMS
- 14 FOOD SAFETY AND TOXICOLOGY
- 15 VETERINARY MEDICAL CENTER
- 16 LIFE SCIENCE
- 17 BIO ENGINEERING FACILITY
- 18 ENGINEERING RESEARCH COMPLEX



* SF doesn't include entirety of college space but focuses on buildings within this study.

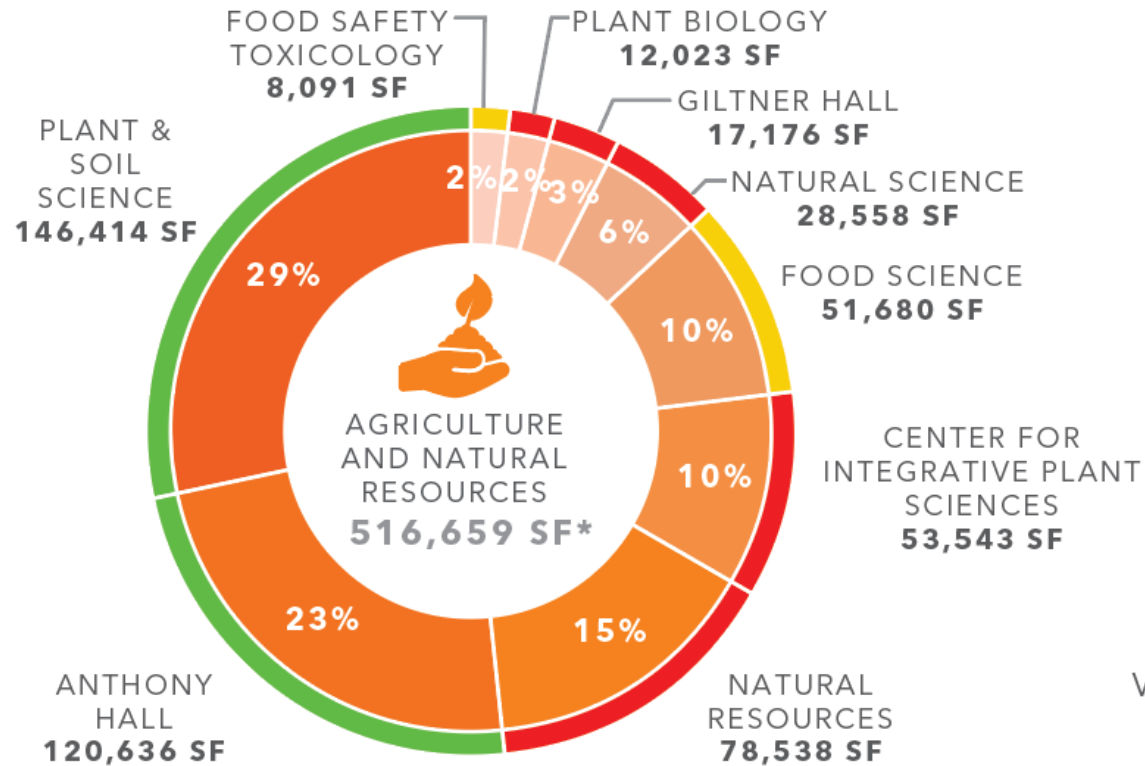
Technical Analysis



College Profile: Agriculture and Natural Resources

SPACE DISTRIBUTION BY BUILDING

** SF doesn't include entirety of college space but focuses on buildings within this study.*



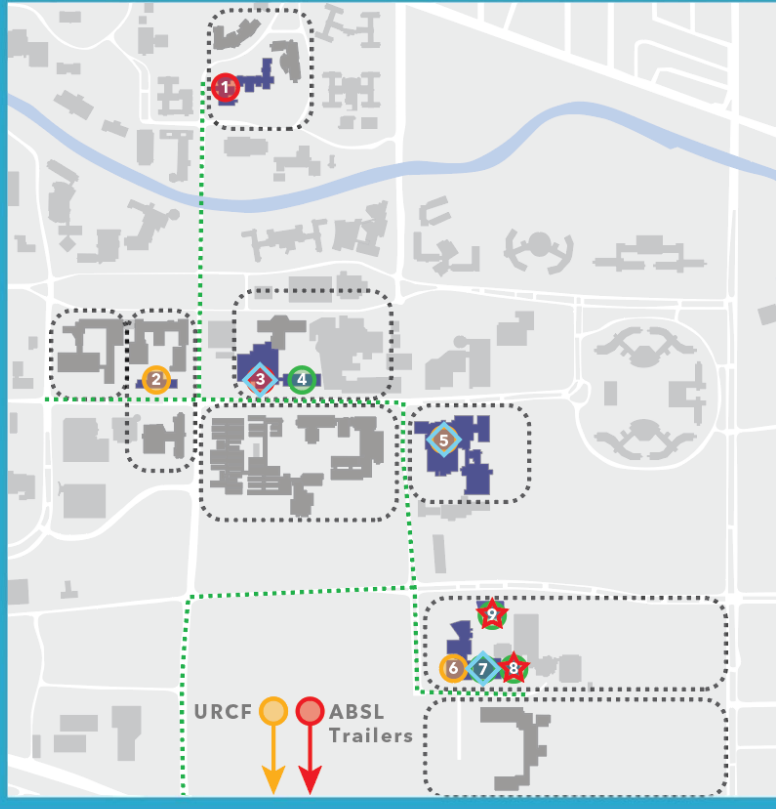
FUNCTIONAL ASSESSMENT

PRIMARY INTERDISCIPLINARY COLLABORATION

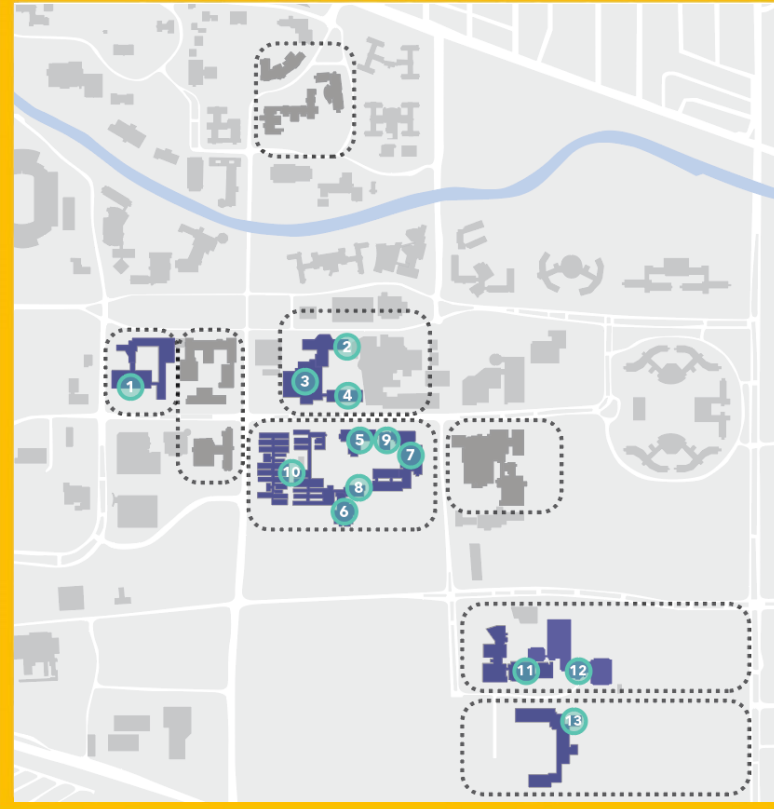


Campus Variables

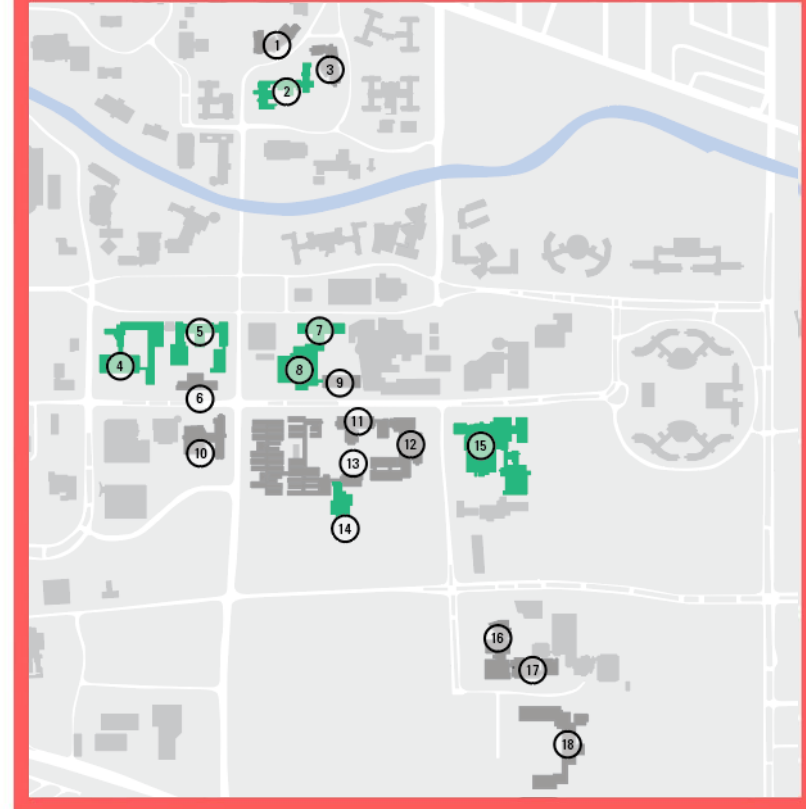
Animal Facilities



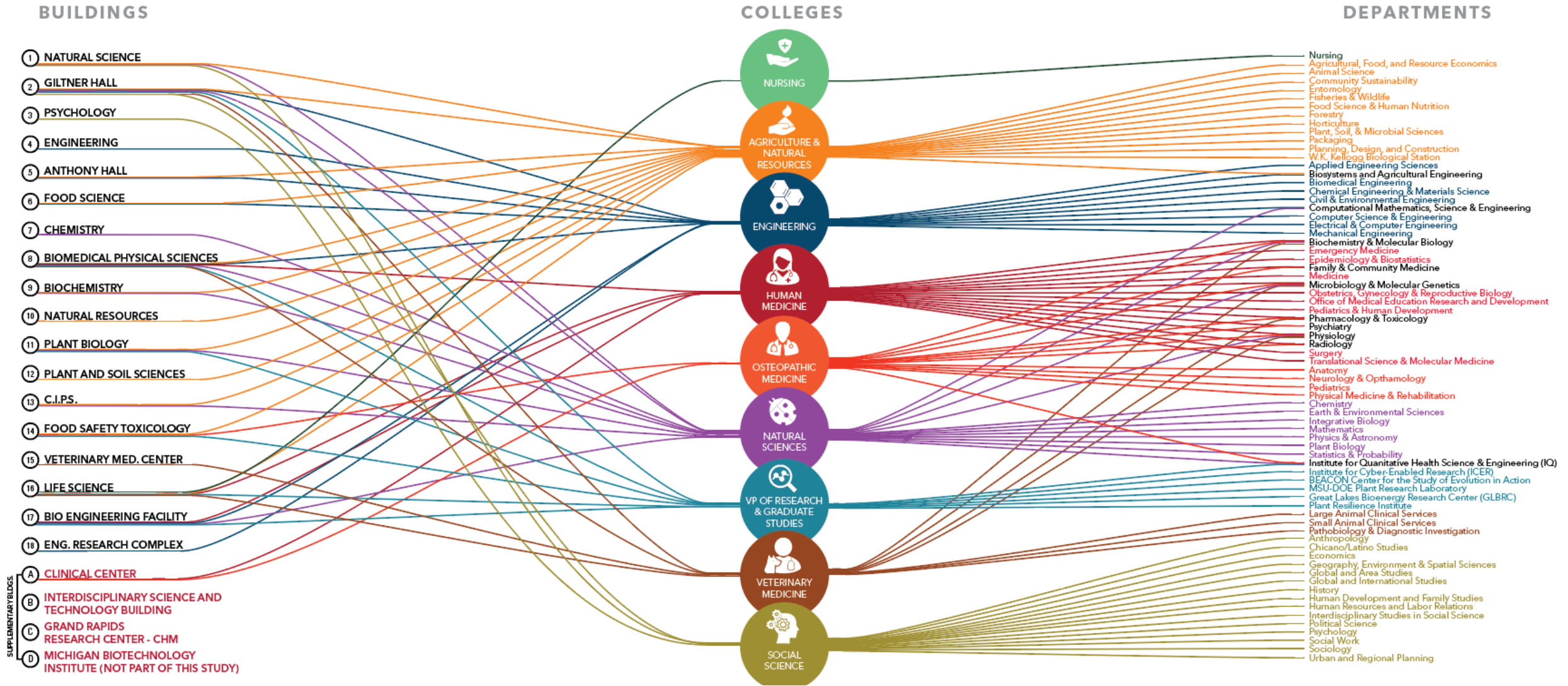
Core Facilities



Vacancies & Migrations



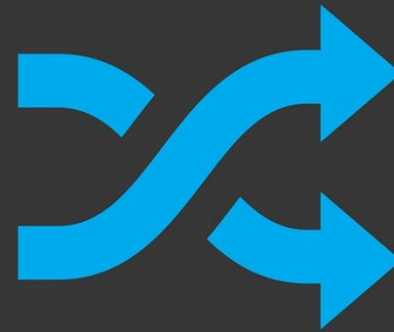
Research / Building / Department Web Diagram



Imagine



Envision




Question



Iterate

Research Themes

COLLEGES

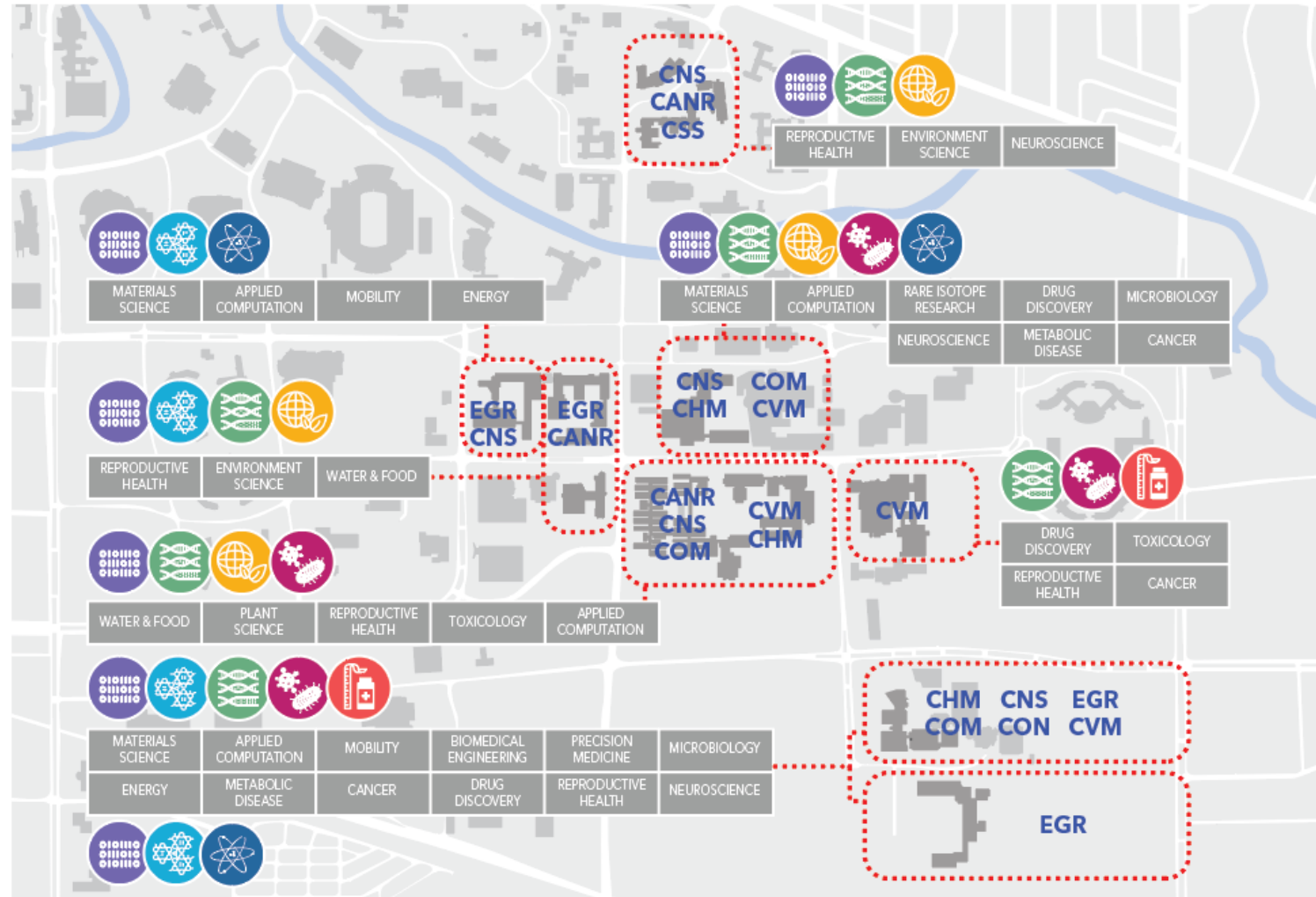
-  **VETERINARY MEDICINE**
CVM
-  **SOCIAL SCIENCE**
CSS
-  **OSTEOPATHIC MEDICINE**
COM
-  **NATURAL SCIENCES**
CNS
-  **HUMAN MEDICINE**
CHM
-  **ENGINEERING**
EGR
-  **AGRICULTURE & NATURAL RESOURCES**
CANR
-  **NURSING**
CON

RESEARCH PRIORITIES

MATERIALS SCIENCE
APPLIED COMPUTATION
MOBILITY
ENERGY
REPRODUCTIVE HEALTH
ENVIRONMENT SCIENCE
NEUROSCIENCE
RARE ISOTOPE RESEARCH
DRUG DISCOVERY
METABOLIC DISEASE
MICROBIOLOGY
CANCER
WATER & FOOD
TOXICOLOGY
PLANT SCIENCE
BIOMEDICAL ENGINEERING
PRECISION MEDICINE

GLOBAL IMPACT INITIATIVES

















































-  **COMPUTATION**
-  **ADVANCED ENGINEERING**
-  **GENOMICS**
-  **PLANTS/FOOD/ENVIRONMENT**
-  **ANTIBIOTIC RESISTANCE**
-  **PRECISION MEDICINE**
-  **ADVANCED PHYSICAL SCIENCES**



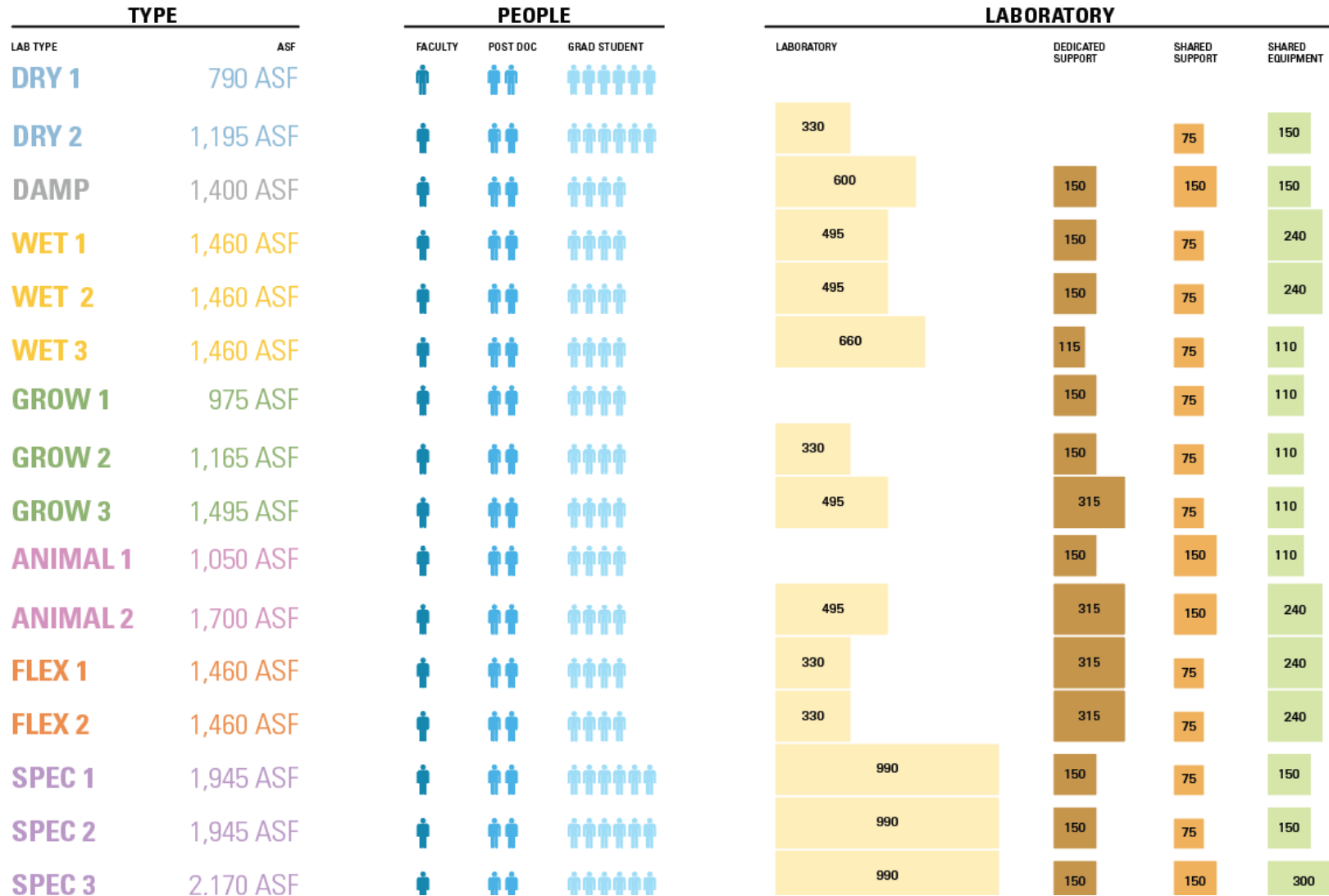
Phenotypes Matrix

TYPE	
LAB TYPE	ASF
DRY 1	790 ASF
DRY 2	1,195 ASF
DAMP	1,400 ASF
WET 1	1,460 ASF
WET 2	1,460 ASF
WET 3	1,460 ASF
GROW 1	975 ASF
GROW 2	1,165 ASF
GROW 3	1,495 ASF
ANIMAL 1	1,050 ASF
ANIMAL 2	1,700 ASF
FLEX 1	1,460 ASF
FLEX 2	1,460 ASF
SPEC 1	1,945 ASF
SPEC 2	1,945 ASF
SPEC 3	2.170 ASF

Phenotypes Matrix

TYPE		PEOPLE		
LAB TYPE	ASF	FACULTY	POST DOC	GRAD STUDENT
DRY 1	790 ASF			
DRY 2	1,195 ASF			
DAMP	1,400 ASF			
WET 1	1,460 ASF			
WET 2	1,460 ASF			
WET 3	1,460 ASF			
GROW 1	975 ASF			
GROW 2	1,165 ASF			
GROW 3	1,495 ASF			
ANIMAL 1	1,050 ASF			
ANIMAL 2	1,700 ASF			
FLEX 1	1,460 ASF			
FLEX 2	1,460 ASF			
SPEC 1	1,945 ASF			
SPEC 2	1,945 ASF			
SPEC 3	2.170 ASF			

Phenotypes Matrix



Phenotypes Matrix

TYPE		PEOPLE			LABORATORY				OFFICE										
LAB TYPE	ASF	FACULTY	POST DOC	GRAD STUDENT	LABORATORY	DEDICATED SUPPORT	SHARED SUPPORT	SHARED EQUIPMENT	PI	POST DOC	GRAD STUDENT/ WRITE UP					SHARED MEETING	SHARED ADMIN		
DRY 1	790 ASF	1	2	6					120	120	75	75	75	75	75	75	75	25	
DRY 2	1,195 ASF	1	2	6	330		75	150	120	120	75	75	75	75	75	75	75	25	
DAMP	1,400 ASF	1	2	4	600	150	150	150	120	120	40	40	40	40				75	25
WET 1	1,460 ASF	1	2	4	495	150	75	240	120	120	40	40	40	40				75	25
WET 2	1,460 ASF	1	2	4	495	150	75	240	120	120	40	40						75	25
WET 3	1,460 ASF	1	2	4	660	115	75	110	120	120	40	40	40	40				75	25
GROW 1	975 ASF	1	2	4		150	75	110	120	120	75	75	75	75				75	25
GROW 2	1,165 ASF	1	2	4	330	150	75	110	120	120	40	40	40	40				75	25
GROW 3	1,495 ASF	1	2	4	495	315	75	110	120	120	40	40	40	40				75	25
ANIMAL 1	1,050 ASF	1	2	4		150	150	110	120	120	75	75	75	75				75	25
ANIMAL 2	1,700 ASF	1	2	4	495	315	150	240	120	120	40	40	40	40				75	25
FLEX 1	1,460 ASF	1	2	4	330	315	75	240	120	120	40	40	40	40				75	25
FLEX 2	1,460 ASF	1	2	4	330	315	75	240	120	120	40	40	40	40				75	25
SPEC 1	1,945 ASF	1	2	6	990	150	75	150	120	120	40	40	40	40	40	40		75	25
SPEC 2	1,945 ASF	1	2	6	990	150	75	150	120	120	40	40	40	40	40	40		75	25
SPEC 3	2.170 ASF	1	2	6	990	150	150	300	120	120	40	40	40	40	40	40		75	25

Phenotypes Profiles

WET 1 BENCH

PRIMARY ACTIVITIES

WORKS WITH BIOLOGICAL SAMPLES PRIMARILY PREPARED IN TISSUE CULTURE ROOMS, WITH OCCASIONAL FUME HOOD USE. MAY OPERATE IN COMPLIANCE WITH BSL-2 STANDARDS.

PRIMARY DISCIPLINES

BIOLOGY
PHYSIOLOGY
CELLULAR BIOLOGY

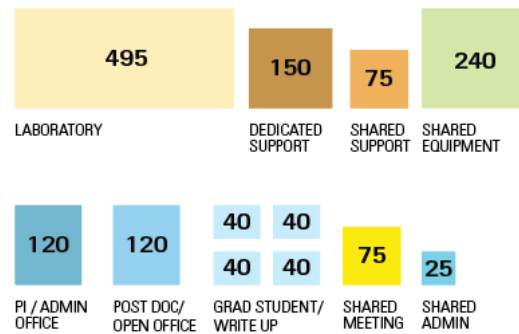
MICROBIOLOGY
TOXICOLOGY

AVERAGE GROUP SIZE

7 PEOPLE 1 / 2 / 4



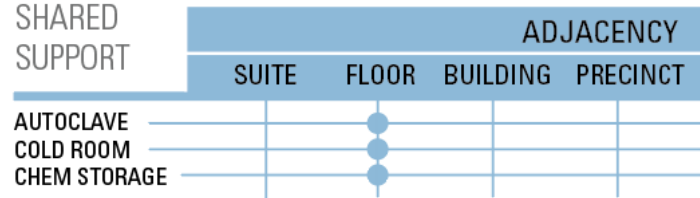
SPACE PLANNING GUIDELINES



1,460 ASF +/-

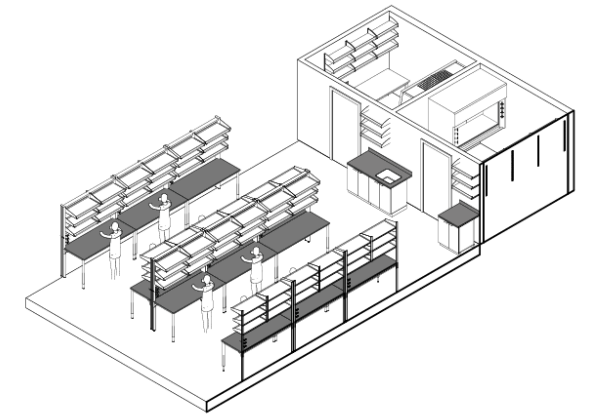
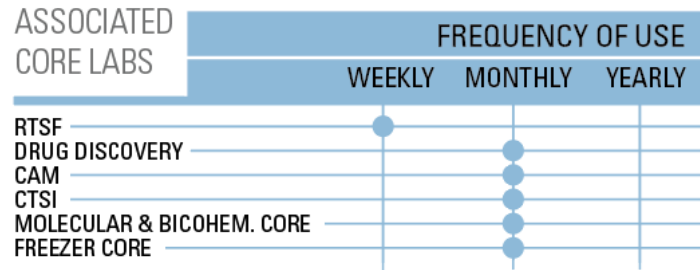
SHARED SUPPORT

AUTOCLAVE
COLD ROOM
CHEM STORAGE



ASSOCIATED CORE LABS

RTSF
DRUG DISCOVERY
CAM
CTSI
MOLECULAR & BICOHEM. CORE
FREEZER CORE



Building Profile

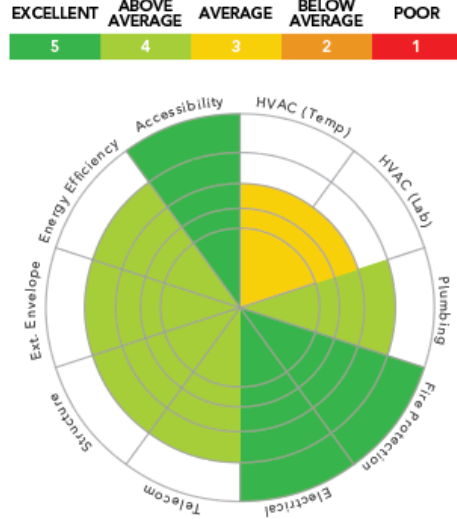
BIOMEDICAL AND PHYSICAL SCIENCES



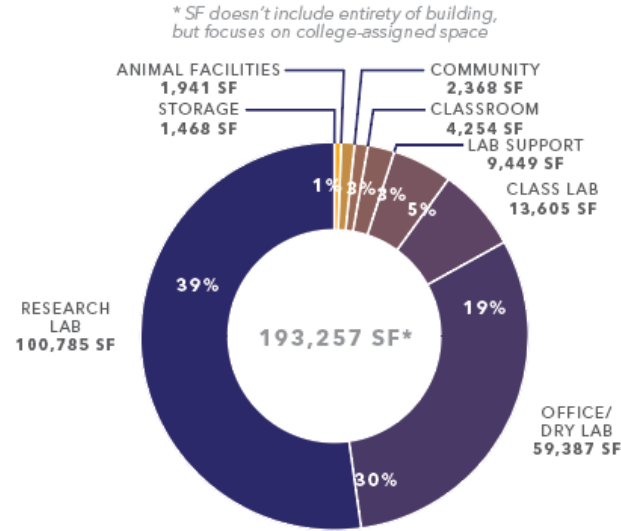
BUILDING DESCRIPTION

YEAR BUILT: 2001
 ADDITIONS: N/A
 TOTAL GSF: 377,230
 TOTAL ASF: 209,485
 ASF ASSESSED: 193,257

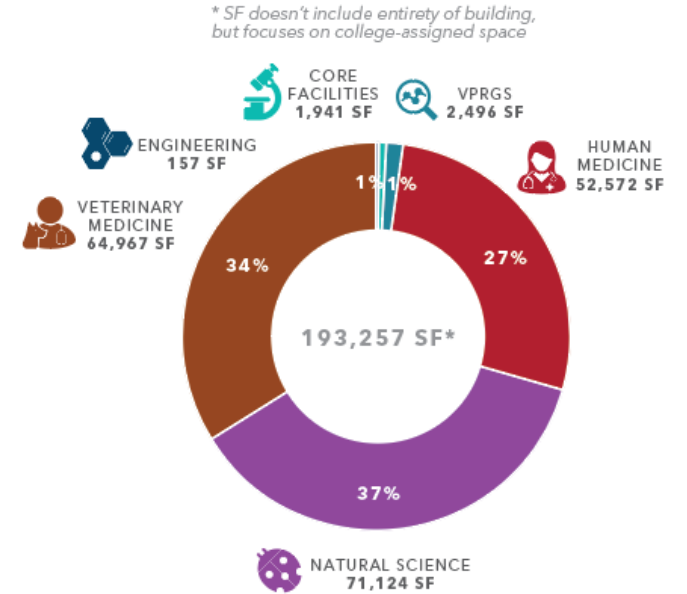
SYSTEMS ASSESSMENT



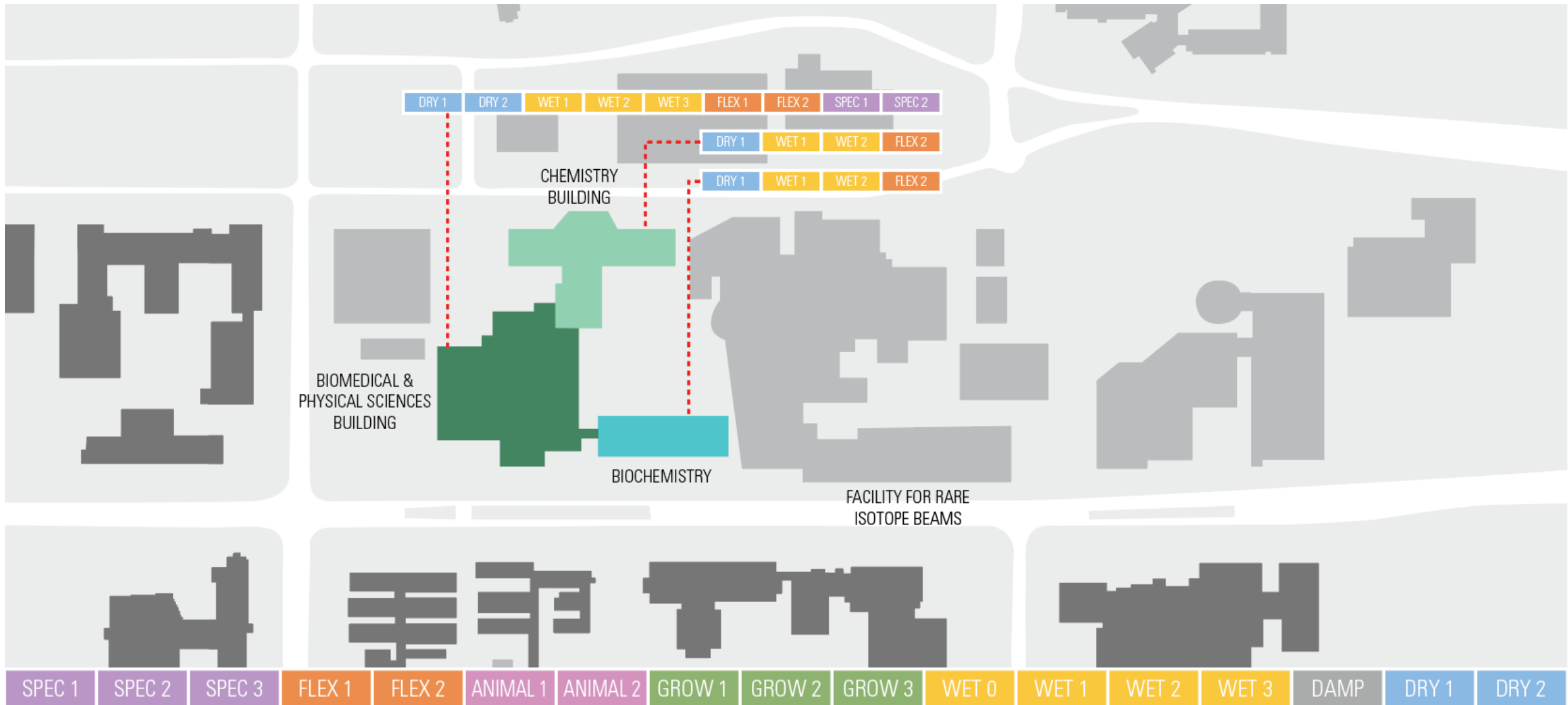
ROOM TYPE DISTRIBUTION



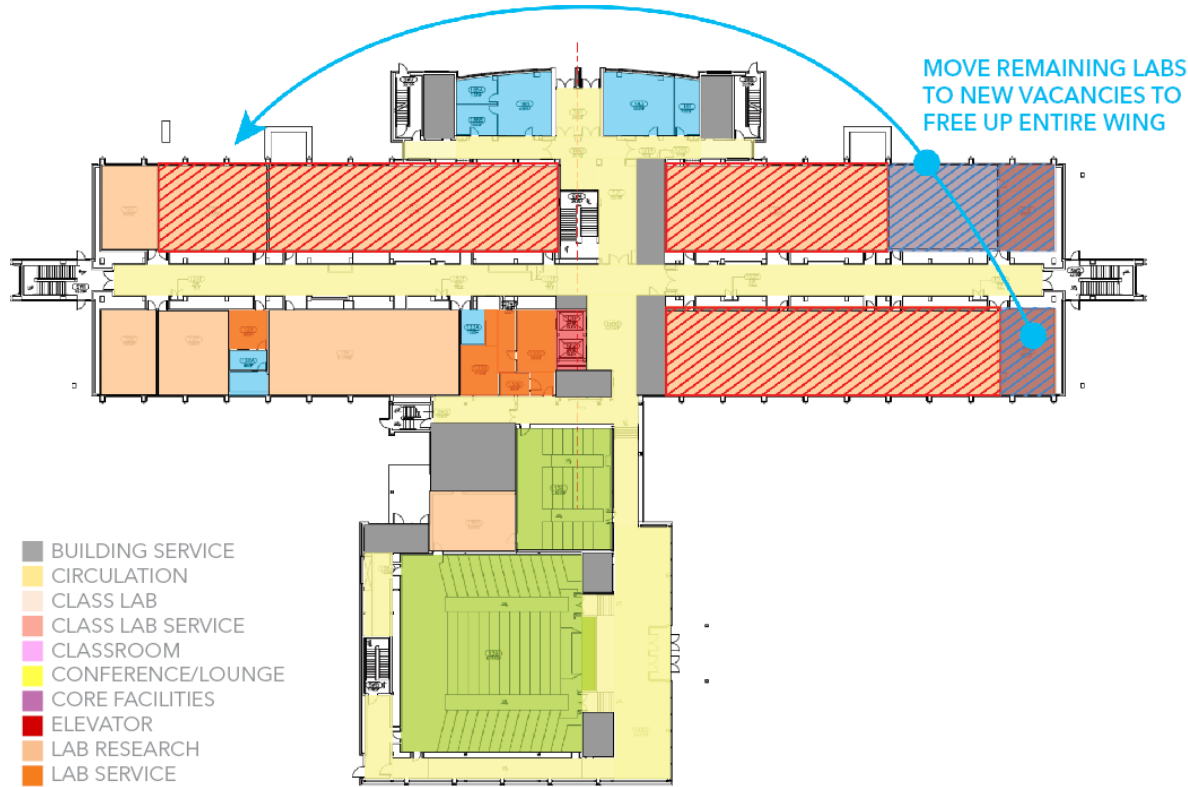
COLLEGE DISTRIBUTION



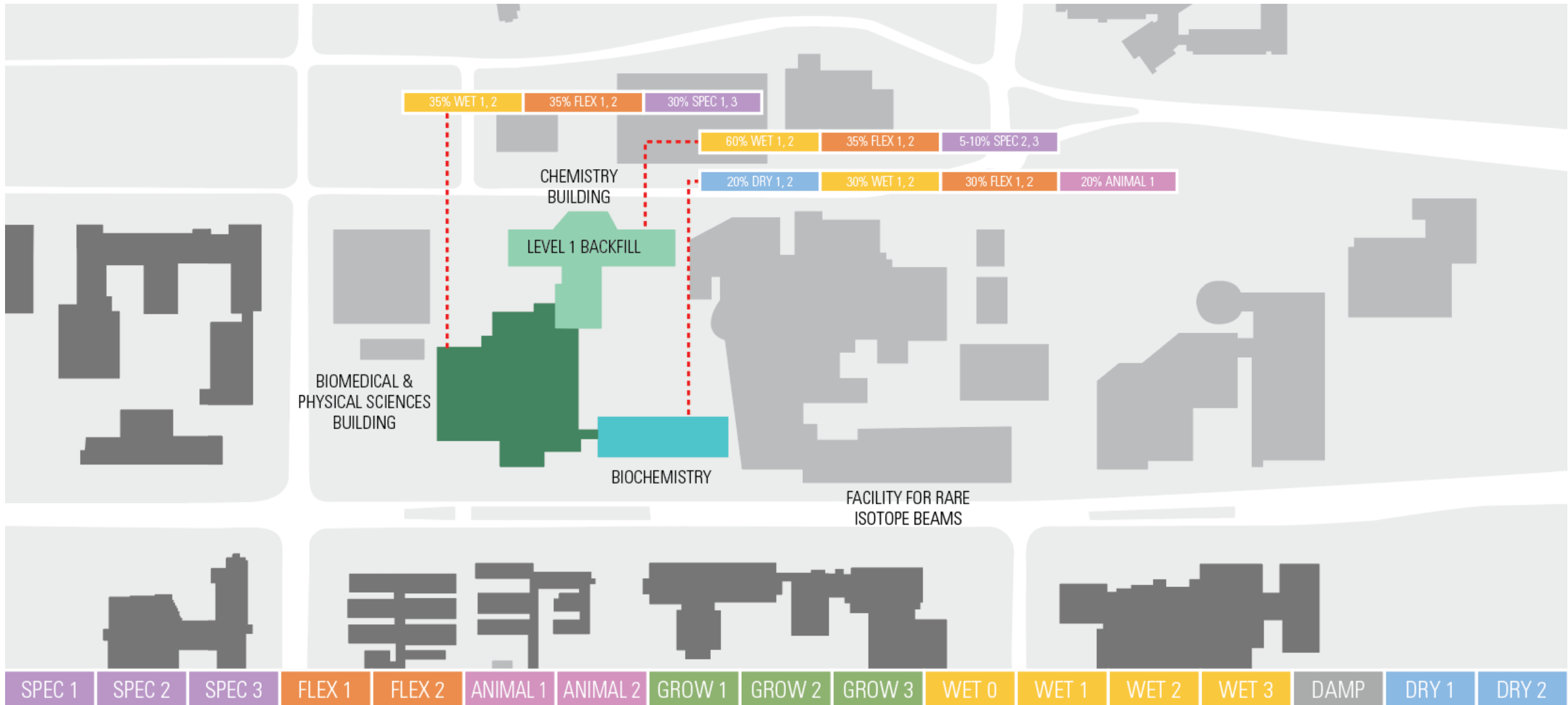
Existing Phenotypes



Floor Plan Reconfigurations



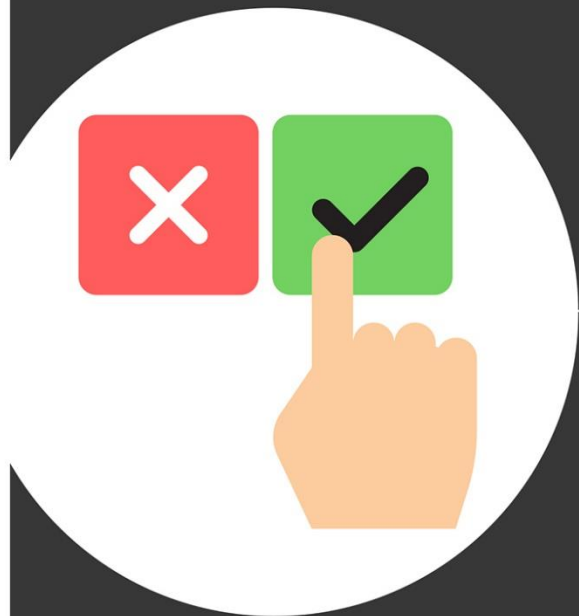
Projected Phenotypes



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Implement



Quantify

1. _____
2. _____
3. _____
4. _____

Prioritize



Document

Final Report: The Strategic Framework Structure & Method

0 Project Overview

1 Campus

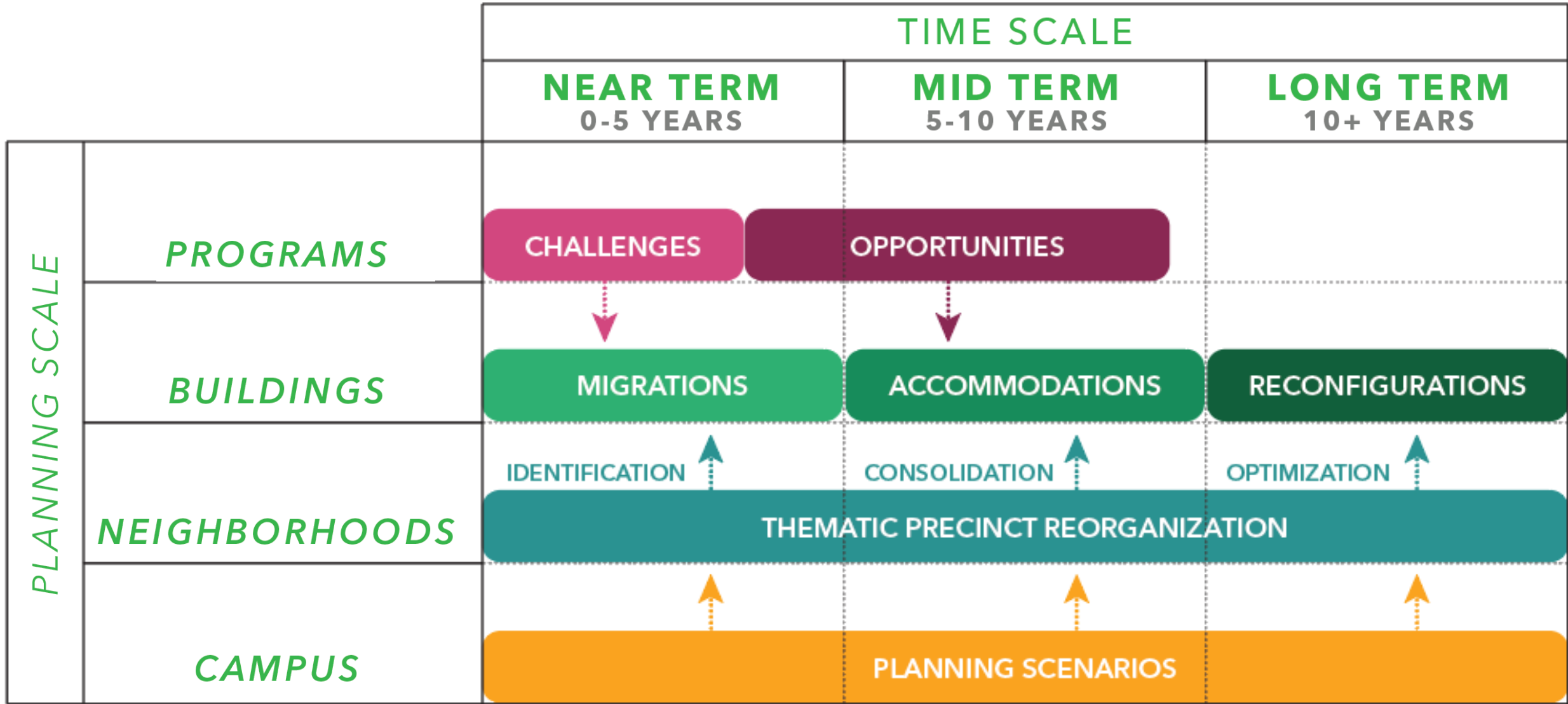
2 Buildings

3 Programs

4 Phenotypes

6 Strategies

Planning Approach



Neighborhood Strategies: Physical and Biological Sciences

STRATEGY 1

PHYSICAL & BIOLOGICAL SCIENCES/ MATERIALS SCIENCE EMPHASIS

- Neighborhood programs are realigned anticipating increased demand for research at the intersection of the Physical & Biological Sciences Neighborhood and Engineering Neighborhood.
- Strategy is supported by substantial physical improvements in associated research laboratory capabilities.
- Strategy is enabled by relocation of existing translational biomedical research, and new applied biomedical isotope focus to the South Campus

STRATEGY 2

PHYSICAL & BIOLOGICAL SCIENCES/ BIOSCIENCE/ISOTOPE EMPHASIS

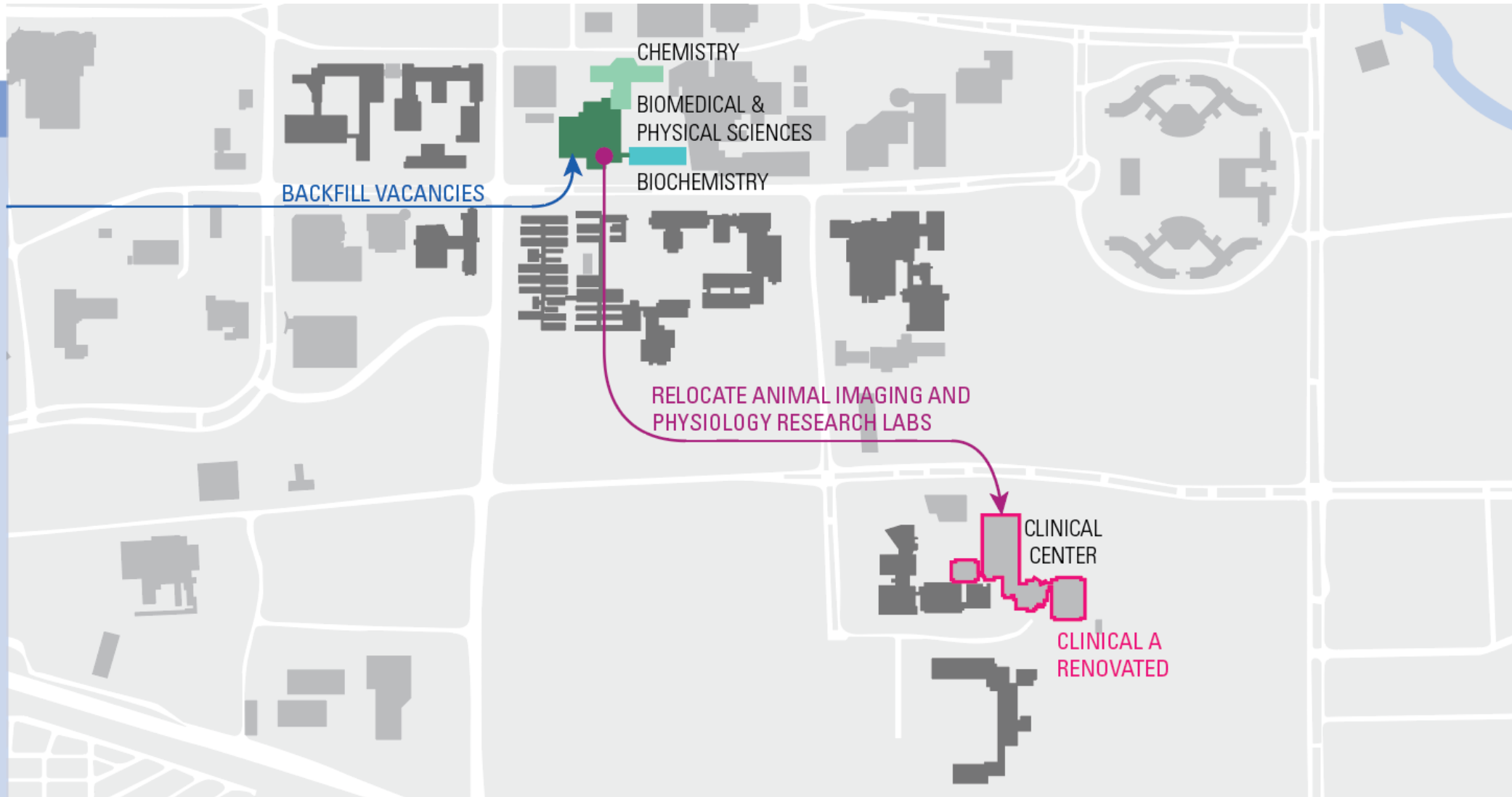
- Neighborhood programs are realigned anticipating increased demand for research at the intersection of Physical & Biological Sciences, including establishment of new applied biomedical isotope focus.
- Strategy enabled by substantial physical improvements in associated research laboratory capabilities on the South Campus
- Provides opportunity for future growth in research at the intersection of Physical & Biological Sciences and Engineering Neighborhoods.

Strategy 1: Near Term

TRANSLATIONAL
BIOMEDICAL TO SOUTH

PLANNING STEPS

- ① Biological & Physical Sciences**
Level 1: Relocate Animal Imaging to **Clinical A**
- ② Biological & Physical Sciences**
Level 4 & 5: Physiology research labs migrate to **Clinical A** upon its renovation
- ③ Biological & Physical Sciences**
Level 4 & 5: Backfill with Physical Science and Wet Engineering, Applied Isotopes, etc. (*Wet 1, Wet 2, Flex 1, Flex 2*)



Strategy 1: Long Term

SPEC. ENVIRONMENTS
AT PHYS./BIOMEDICAL

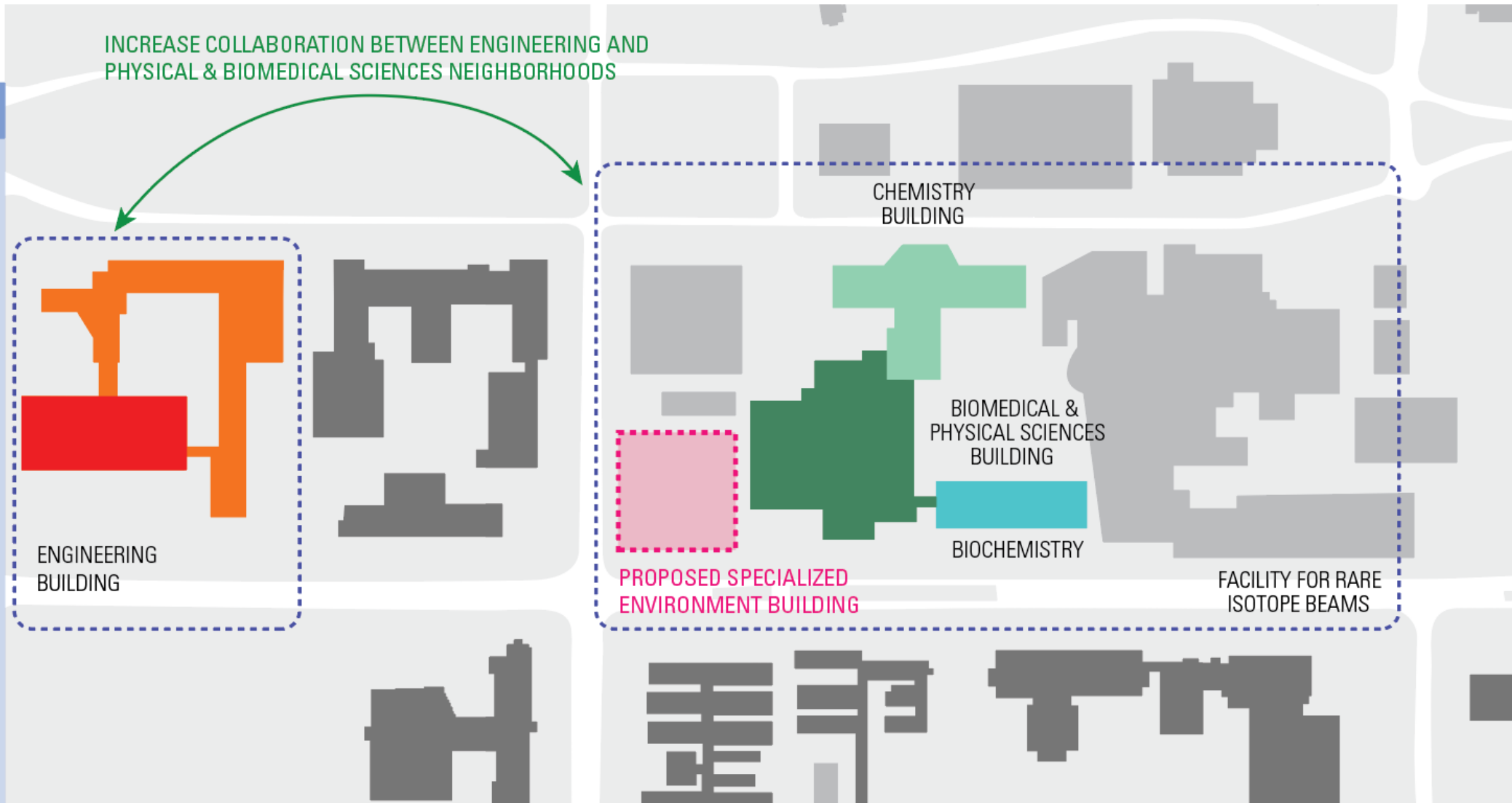
PLANNING STEPS

- ① Replace obsolete MEP systems in existing 1960s wings of **Engineering Building** (new systems should accommodate fewer hoods and less stringent operating conditions)
- ② Existing 1960s wings of **Engineering Building** to be downgraded from hood-intensive *Wet 2* & *Wet 3* labs to *Dry* & *Flex* labs





Location encourages collaboration between Engineering and Physical /Biomedical Sciences Neighborhoods.

Construction on empty site does not require displacement of existing program or demolition of existing buildings

INCREASE COLLABORATION BETWEEN ENGINEERING AND PHYSICAL & BIOMEDICAL SCIENCES NEIGHBORHOODS



Strategy 1: Building Impacts

BUILDINGS	 BIOMEDICAL & PHYSICAL SCIENCES	 CHEMISTRY	 BIOCHEMISTRY	 SITE WEST OF BPS
NEAR TERM (0-5 YEARS)	<p>MIGRATIONS</p> <p><u>Level 1:</u></p> <ul style="list-style-type: none"> - Backfill Physics teaching labs (after migration to STEM) with <i>Spec 1- Spec 3</i> labs. Creates additional capacity for hires. - Backfill Neuroscience labs 	<p>MIGRATIONS</p> <p><u>Level 1:</u></p> <ul style="list-style-type: none"> - Relocate existing classrooms & support spaces to use entire Level 1. Backfill Chem. teaching labs. Creates additional capacity. - Relocate Material Sciences 		
MID TERM (5-10 YEARS)	<p><u>Level 1:</u></p> <ul style="list-style-type: none"> - Relocate Animal Imaging to Clinical A <p><u>Level 2 & 3:</u></p> <ul style="list-style-type: none"> - Physiology research labs to Clinical A following renovation; backfill for future research 			
LONG TERM (10+ YEARS)		<p>Reinvest in Chemistry Building after completing new Specialized Environment Building.</p> <ul style="list-style-type: none"> - Downgrade labs to less hood-intensive uses (assume <i>Wet 2</i> moves to new S.E. Building) - Relocate key core facilities 		<p>Planning and construction of Specialized Environments building/addition that contains high performance space that cannot be easily retrofit into existing buildings.</p>

Ensuring Research Resilience Through Programmatic & Facilities Alignment

RESEARCH SPACE & FACILITIES STRATEGIC PLAN
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