

Market Outlook Construction Forum

Summary

as of September 18th, 2020

Presenters

- Richard Vermeulen – Lead Economist, Vermeulens
- Steve Palumbo – Principal, SmithGroup

Economic Update: The Feds “New Normal”, Vermeulens

- Current Economics in the context of Monetary Policy through history
 - Inflation and employment drops buffered by monetary stimulus
 - Unemployment and inflation rate are in the low target range
 - Inflation currently at 0.6% meaning we will experience sectoral inflation higher long term in construction
 - Creation of the Fed and evolution toward independence and transparency
 - Revised policy language means higher employment and inflation averages will be sought
 - Low consumer and energy prices will mean higher inflation in other sectors
 - Construction will continue to be essential and a target for investment dollars
 - Flattening the curve will continue to draw out timelines for the pandemic
 - Work from home will mean high demand for office renovation and detached homes
 - A cellular structure in the built environment will aid resiliency and sustainability

Labs of the future, SmithGroup

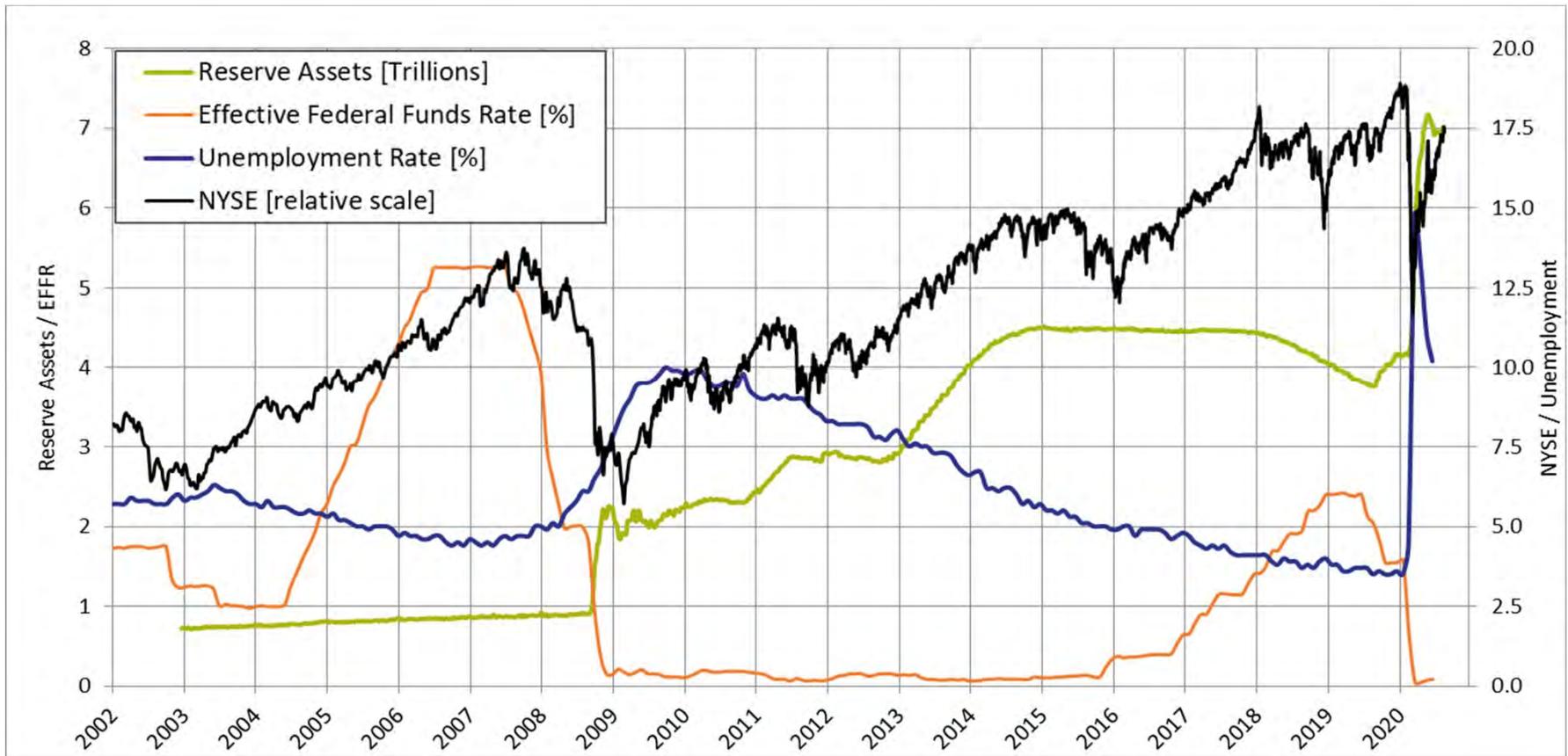
- Future Projections
 - Separation between data acquisition spaces and collaboration hubs is anticipated
 - Scientific community will be decentralized; global and virtual
 - Building systems will move away from “zone sensed HVAC systems to more Intelligent building systems
 - Ideas such as stack-lab are being explored (utilizing drone technology throughout new construction)
 - Pods on demand: more focused level structures that can be attached to collaborative zones
 - Elimination or a reduction of office spaces within new structures is a possibility
- Key takeaways
 - Lab survey results indicate that the priority is people’s wellbeing and team mobility
 - Sustainability and resiliency strategies are key
 - Re-examine space programming and real estate portfolios with current and future needs in mind
 - Future lab environments will need to support quickly evolving research and foster health and wellbeing
 - Successful research enterprises, business continuity, and facility development must be agile and responsive to continuous change

Future Agenda

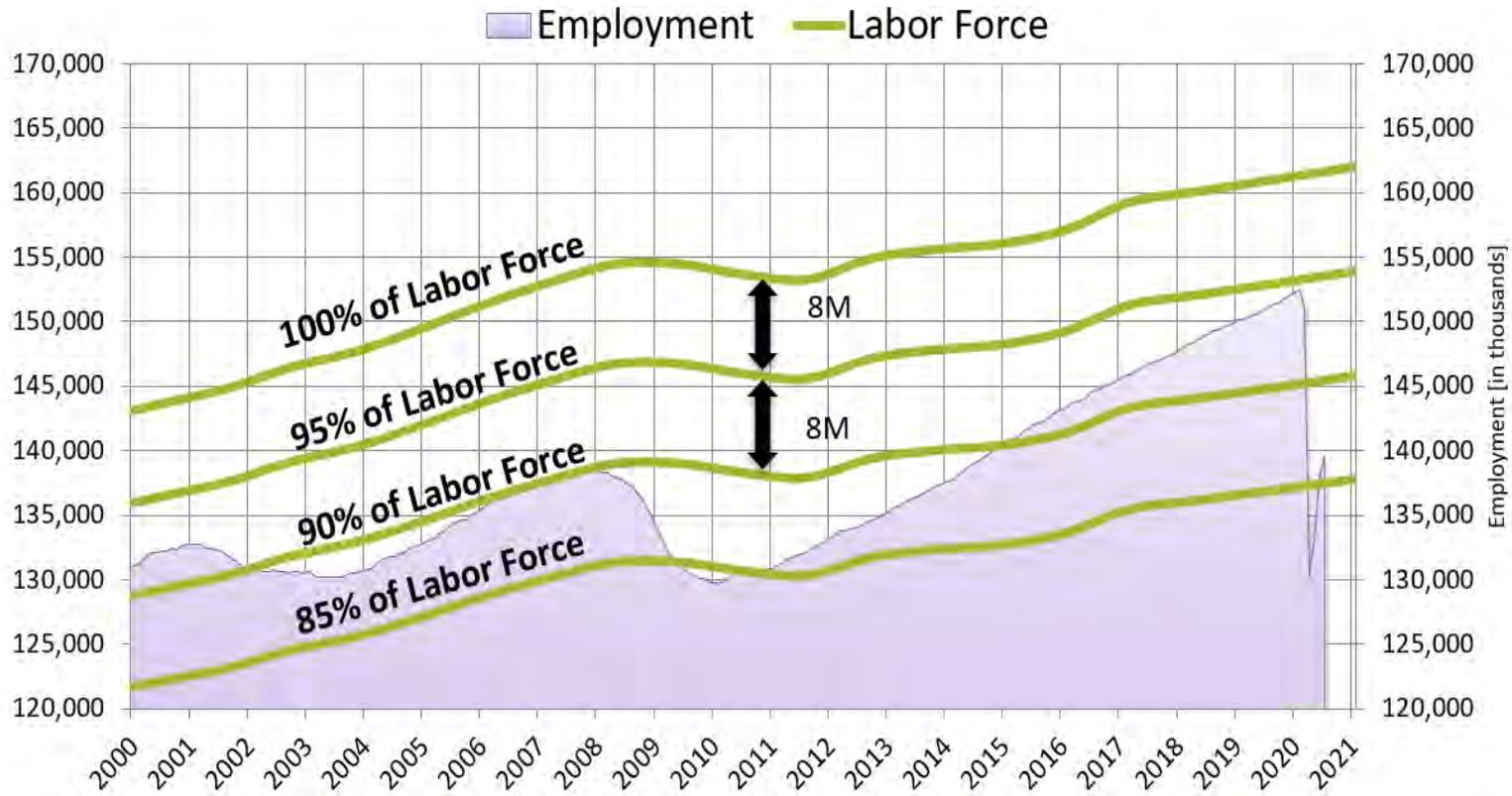
- Economic Update
- Adjusting to the New Normal



Macro to Micro – Fed Watch

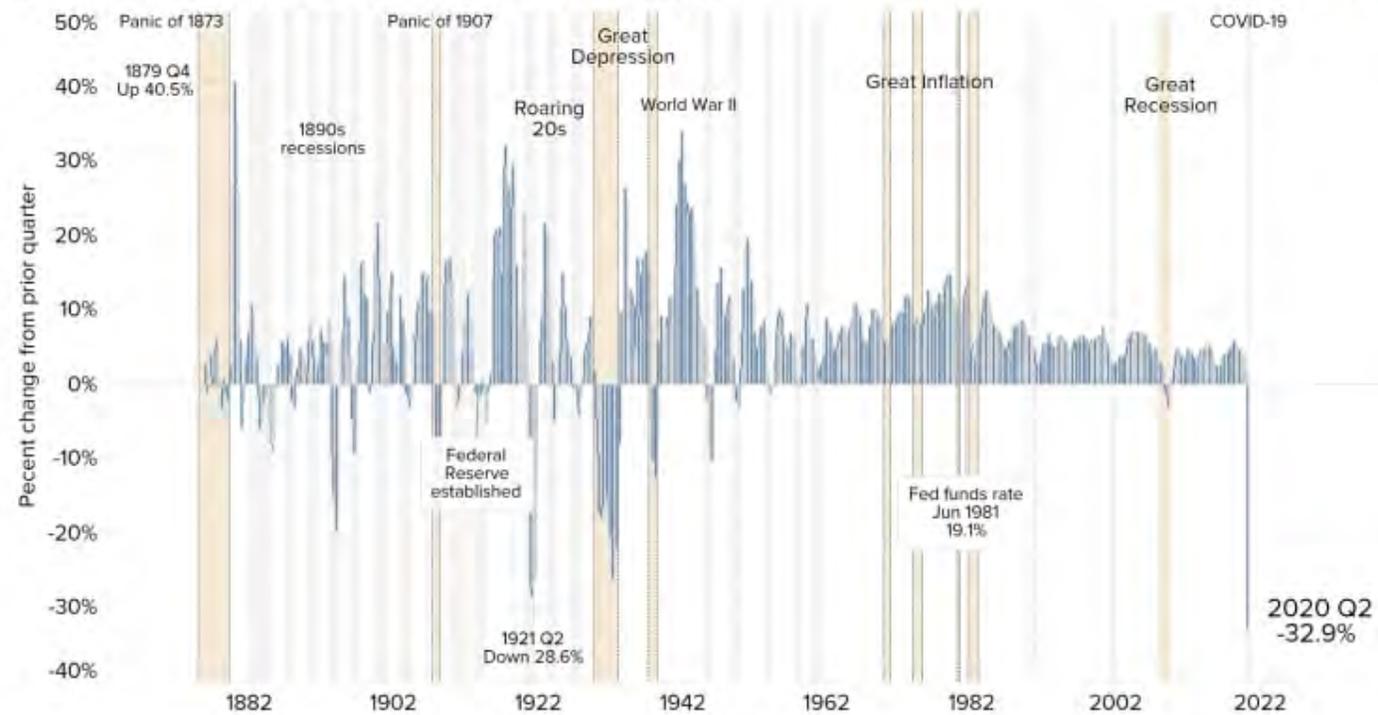


Macro to Micro - Job Creation and Labor Force



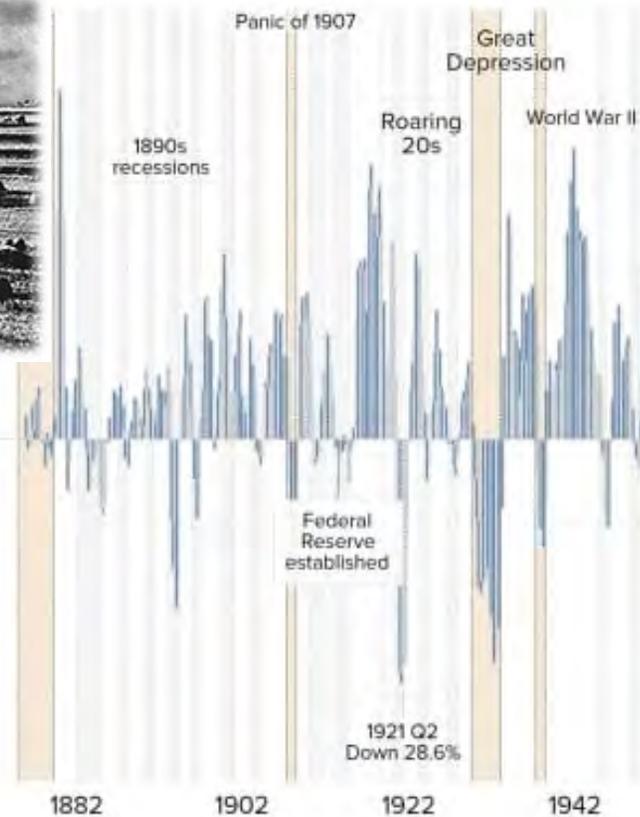
Macro to Micro – GDP

U.S. economic booms and busts



SOURCE: NBER (GNP, 1895-1948), St. Louis Federal Reserve (GDP, 1948-present). Data are not seasonally adjusted or adjusted for inflation.

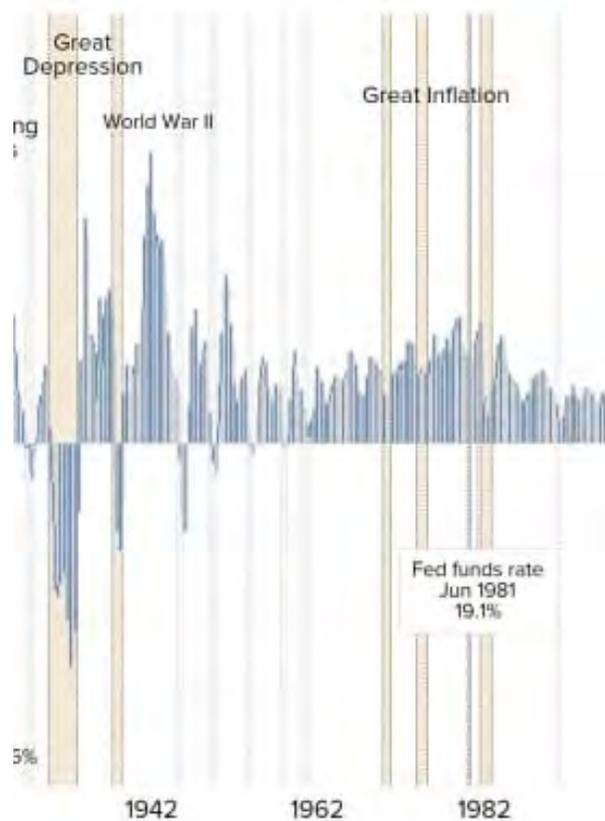
Macro to Micro – GDP



The Great Deflation
The Gold Standard in a rapidly
expanding
agrarian and industrial age



Macro to Micro – GDP

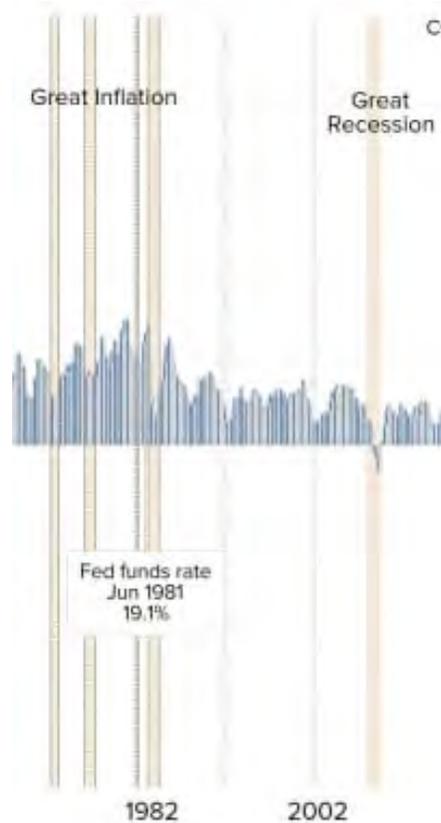


War and Inflation

The rise of fiat money and government spending in a service economy



Macro to Micro – GDP



The Great Moderation
Volcker and Greenspan bring inflation to around 2 percent through a series of asset booms and busts



Macro to Micro – GDP



High Labor/Low Inflation Targeting 2 percent leads to sub 2 percent average

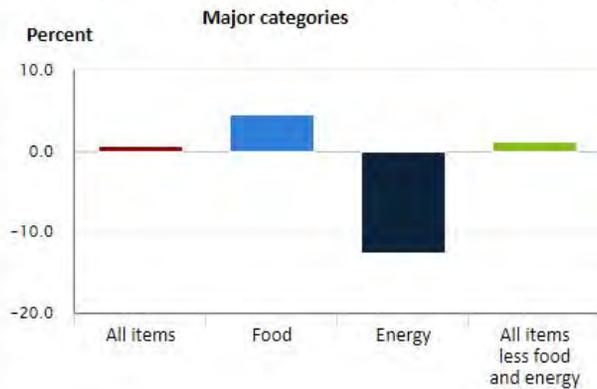
our revised employment statement says that our policy decision will be informed by our "assessments of the **shortfalls of employment from its maximum level**" rather than by "*deviations* from its maximum level" as in our previous statement

our new inflation statement indicates that we will seek to achieve inflation that **averages 2 percent over time**. Therefore, following periods when inflation has been running below 2 percent, appropriate monetary policy will likely aim to achieve inflation moderately above 2 percent for some time

Macro to Micro – Consume Price Inflation

CHARTS

12-month percentage change, Consumer Price Index, selected categories, June 2020, not seasonally adjusted



Source: U.S. Bureau of Labor Statistics.

[read more »](#)

LATEST NUMBERS

+0.6% Consumer Price Index (CPI): in Jun 2020



[read more »](#)

NEWS RELEASES

CPI for all items rises 0.6% in June as gasoline index rebounds, food indexes increase

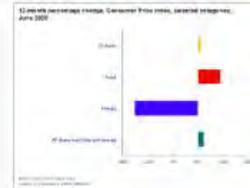
07/14/2020

In June, the Consumer Price Index for All Urban Consumers rose 0.6 percent on a seasonally adjusted basis; rising 0.6 percent over the last 12 months, not seasonally adjusted. The index for all items less food and energy rose 0.2 percent in June (SA); up 1.2 percent over the year (NSA).

[HTML](#) | [PDF](#) | [RSS](#) | [Charts](#) | [Local and Regional CPI](#)

PUBLICATIONS

THE ECONOMICS DAILY



Consumer prices increased 0.6 percent for the year ended June 2020

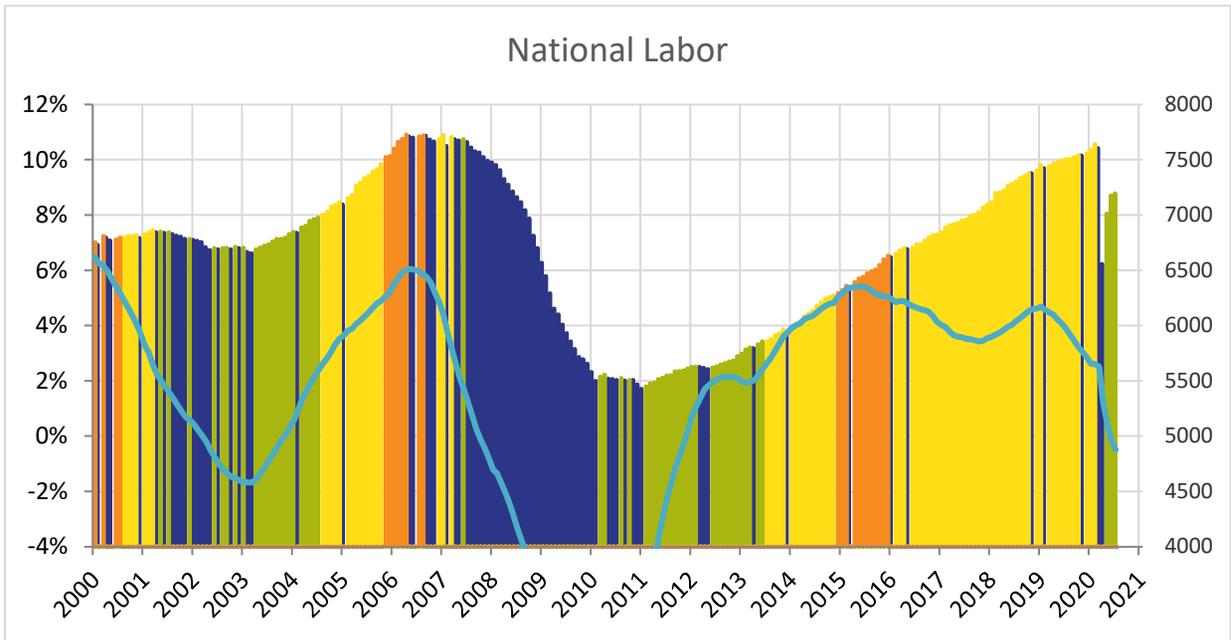
The Consumer Price Index for All Urban Consumers increased 0.6 percent from June 2019 to June 2020. [read more »](#)



1 2



May - National Construction Labor (Thousands)



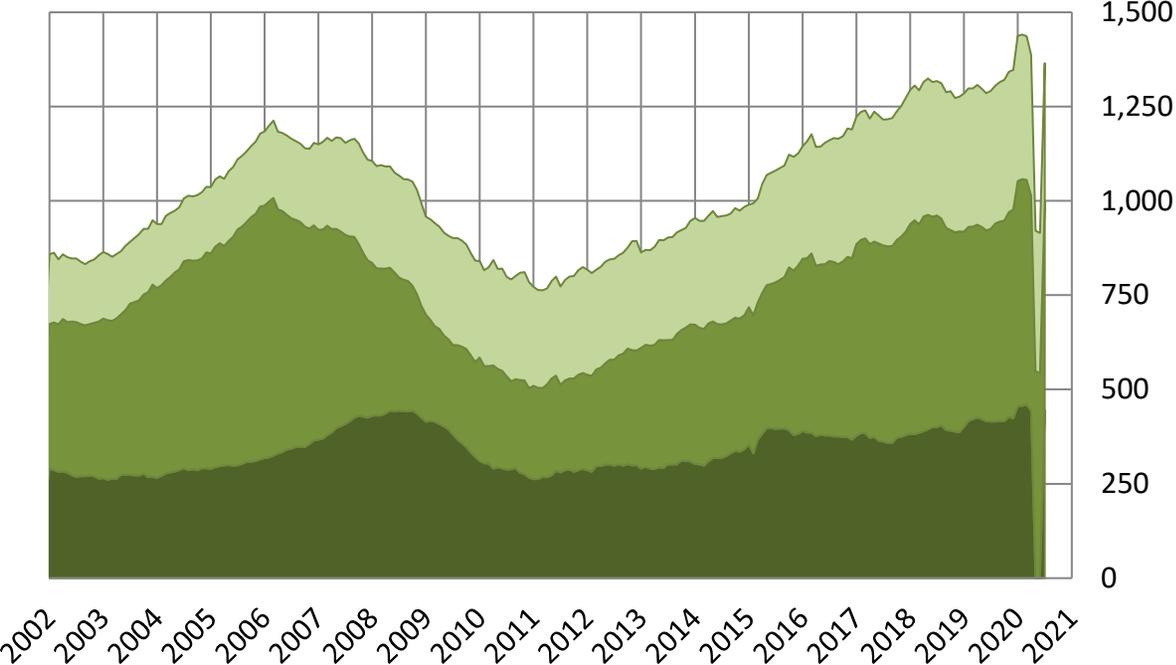
Year-Over-Year Growth

- High Growth
- Above Average Growth
- Average Growth
- Below Average Growth
- Contracting Market

Market Expansion National
(+41% -6%)

Put In Place Construction (Annualized Billions)

■ Non Residential ■ Residential ■ Infrastructure



High to Low

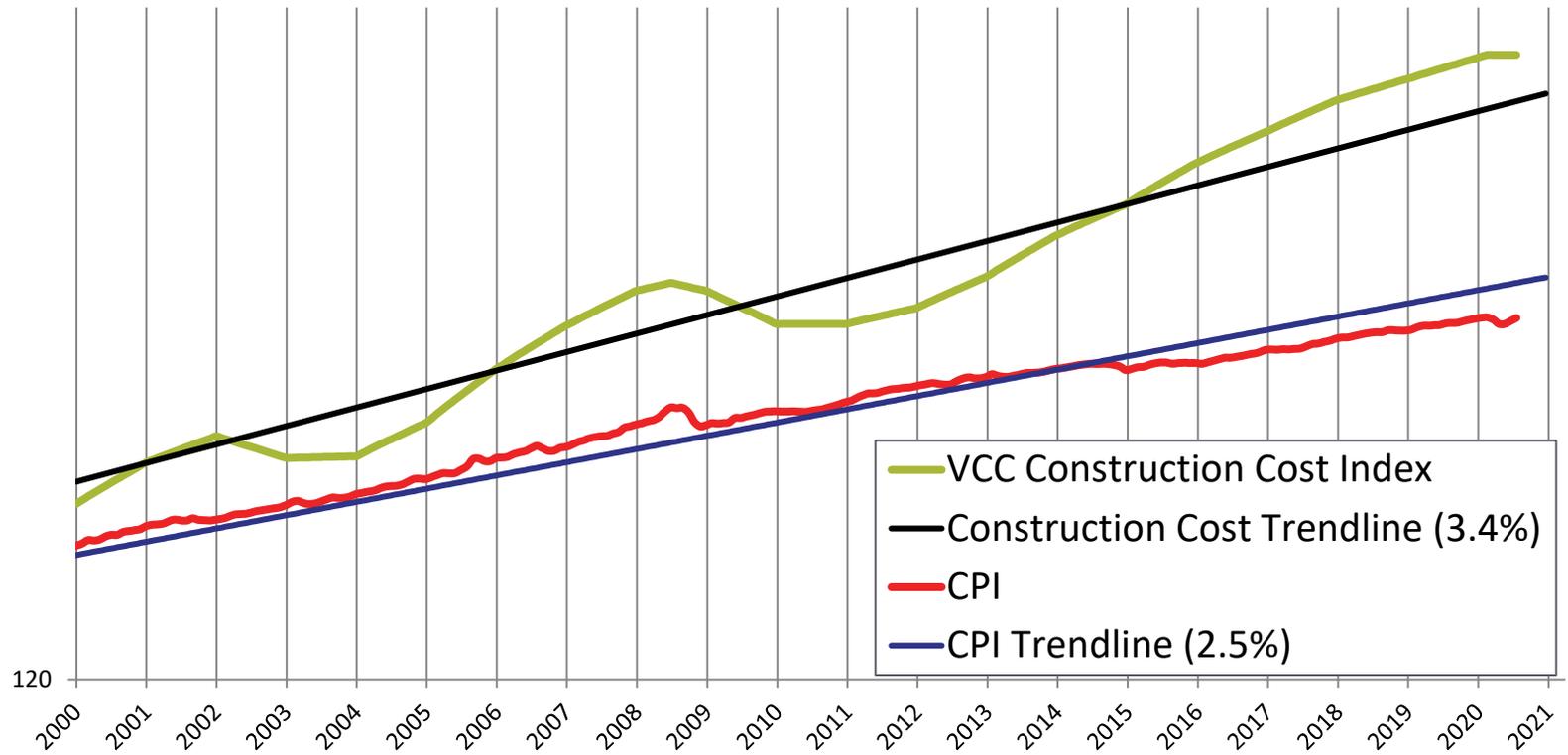
Total	-37%
Infra	-12%
Res	-66%
Non Res	-28%

Low to Current

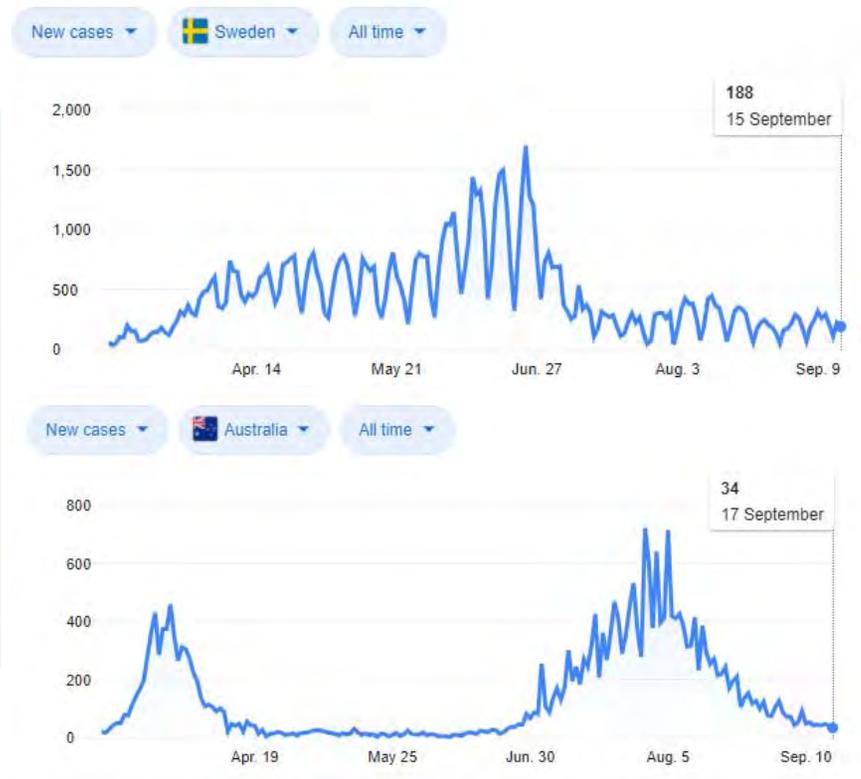
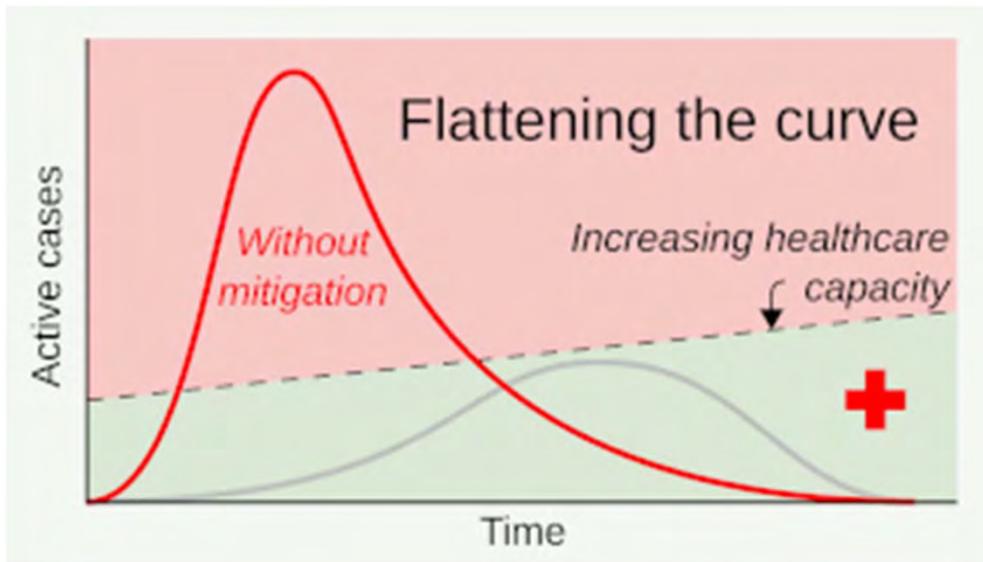
Total	+79%
Infra	+44%
Res	+138%
Non Res	+55%

Vermeulens Construction Cost Index

2000 - Current



Macro to Micro – Macro Flattening?



Macro to Micro – Work and Work Travel Post COVID?

Work from home increases to 2.5 days per week globally

Office space $30\$/\text{sf} \times 200\text{sf}/\text{worker} = \$6,000$ per office worker per year

Home space $10\$/\text{sf} \times 100\text{sf}/\text{worker} = \$1,000$ per home worker per year

$60\text{M} \times .5 \text{ workers} \times \$5\text{k savings} = 150\text{B}$ per year

Work travel decreases 2.5 hours per week globally

Travel time value $30\$/\text{hour} \times 2.5\text{days} \times 40\text{weeks} = \$3,000$ per office worker per year

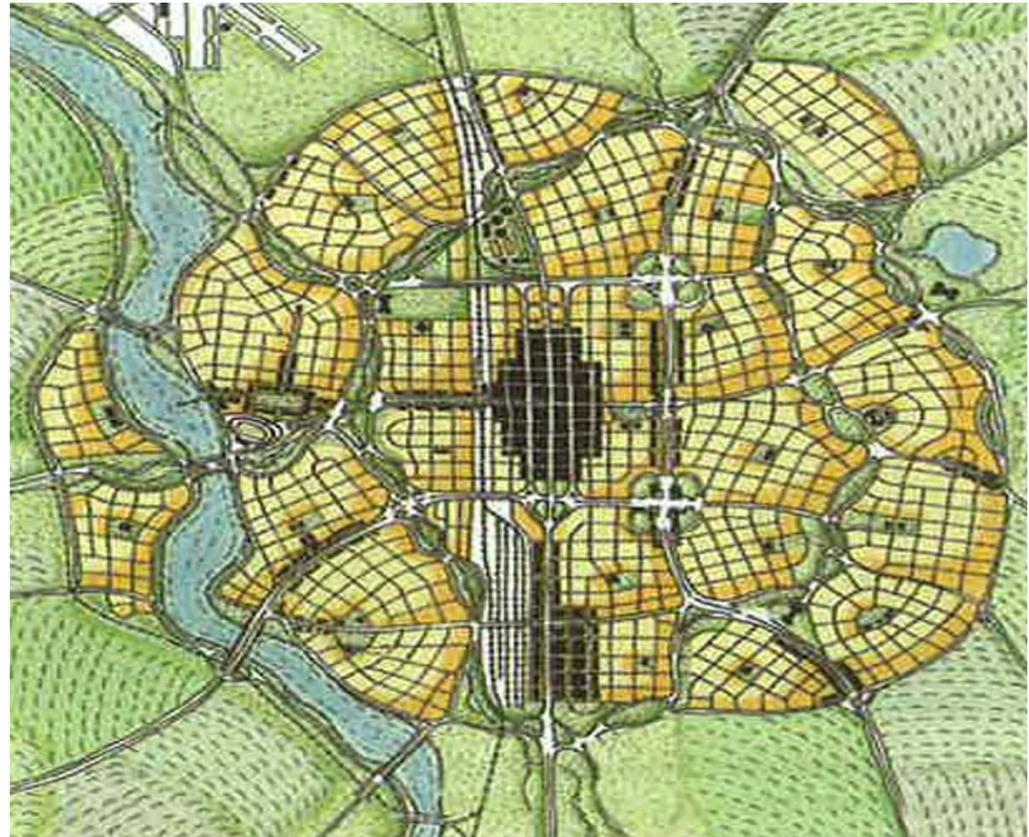
$60\text{M workers} \times \$3\text{k savings} = 180\text{B}$ per year

Work from home total benefit

$150\text{B office} + 180\text{B travel} = 330\text{B}$ per year

$330\text{B} / 20\text{T GDP} = 1.65\% \times 2 \text{ hedonics?} = 3.3\%$

**Green at No Cost
Integrated Design**



A black and white photograph of a modern building facade with a grid of windows and balconies. The text is overlaid in white.

LAB²⁰₅₀

VERMEULENS MARKET
OUTLOOK CONSTRUCTION
FORUM
9.18.2020

SMITHGROUP

Since 1972

SPACE	Open Labs Prevalent	Open Labs / High Visibility	
PROCESS	Increased Automation	Clinical Dry Research	
TECHNOLOGY	Increased Computerization	Bioinformatics / Cloud	
	More Intense Equipment (SEM)	Imaging Cores (NMR, TEM)	
	Mirco, Mobile, Computational	Molecular Modeling / Proteomics	
LABS	Flexible Wet to Dry	Mobile, Flexible, Data	
COLLABORATION	Collaboration Areas	Interactive Commons	
	Interactive Cross Disciplinary	Interdisciplinary / Virtual	
SYNERGIES	Intellectual v. Process	Science with Engineering	
SUSTAINABILITY	Sustainable Buildings	Net-Zero / Net-Positive	
SYSTEMS	Zone Sensored HVAC Systems	Real-time Monitoring Systems	
	LAB2020	LAB2030	LAB2050

LAB2050 | Evolution

THE ORIGINAL LAB2050

DIG

deep into the scientific trends

EXPLORE

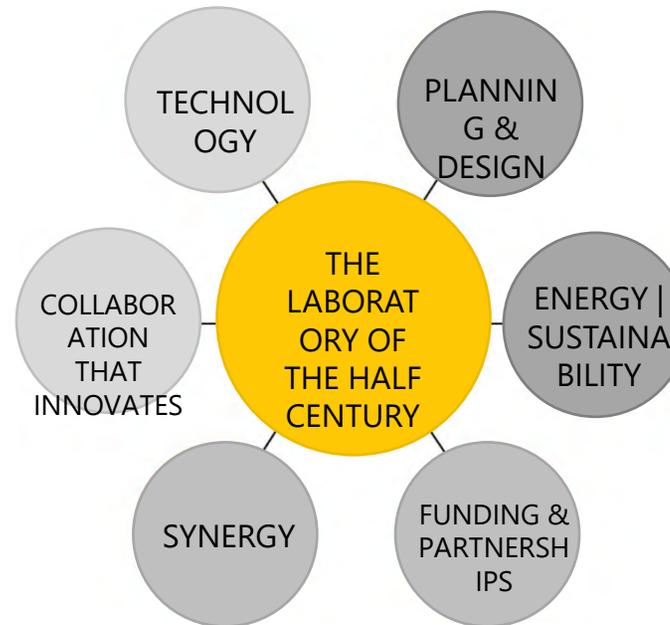
new technologies and economics

FOCUS

on 6 key drivers

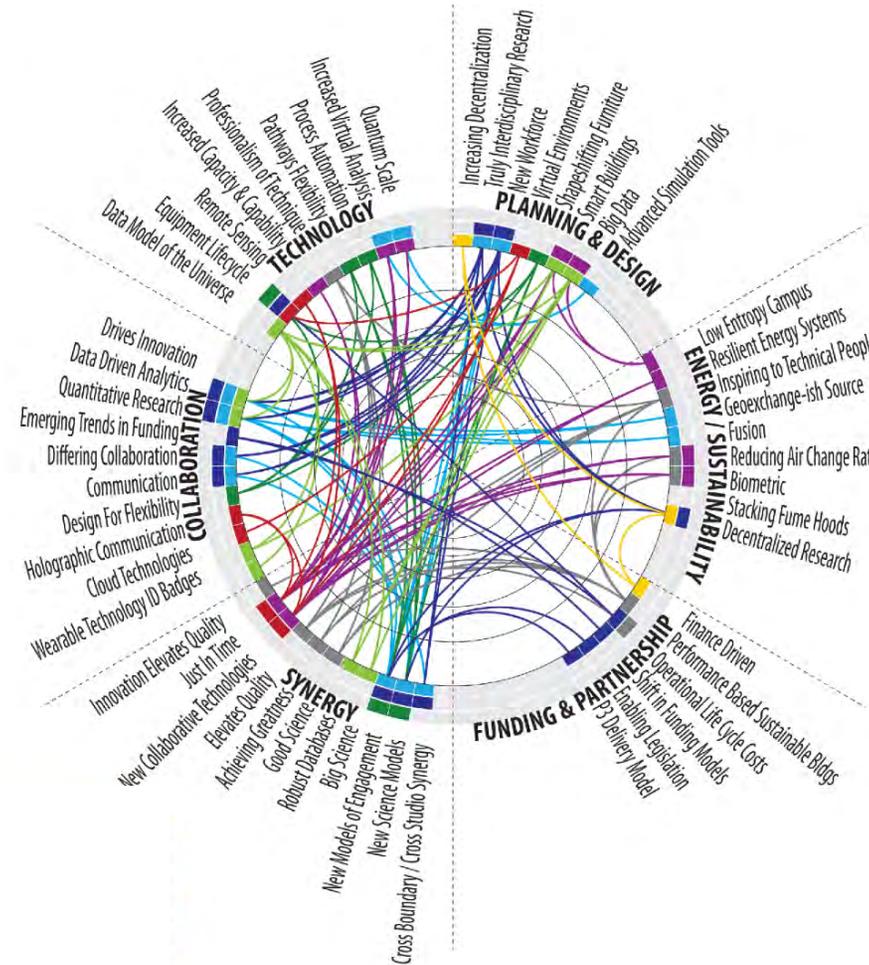
UNDERSTAND

what will shape our future planning
and design concepts

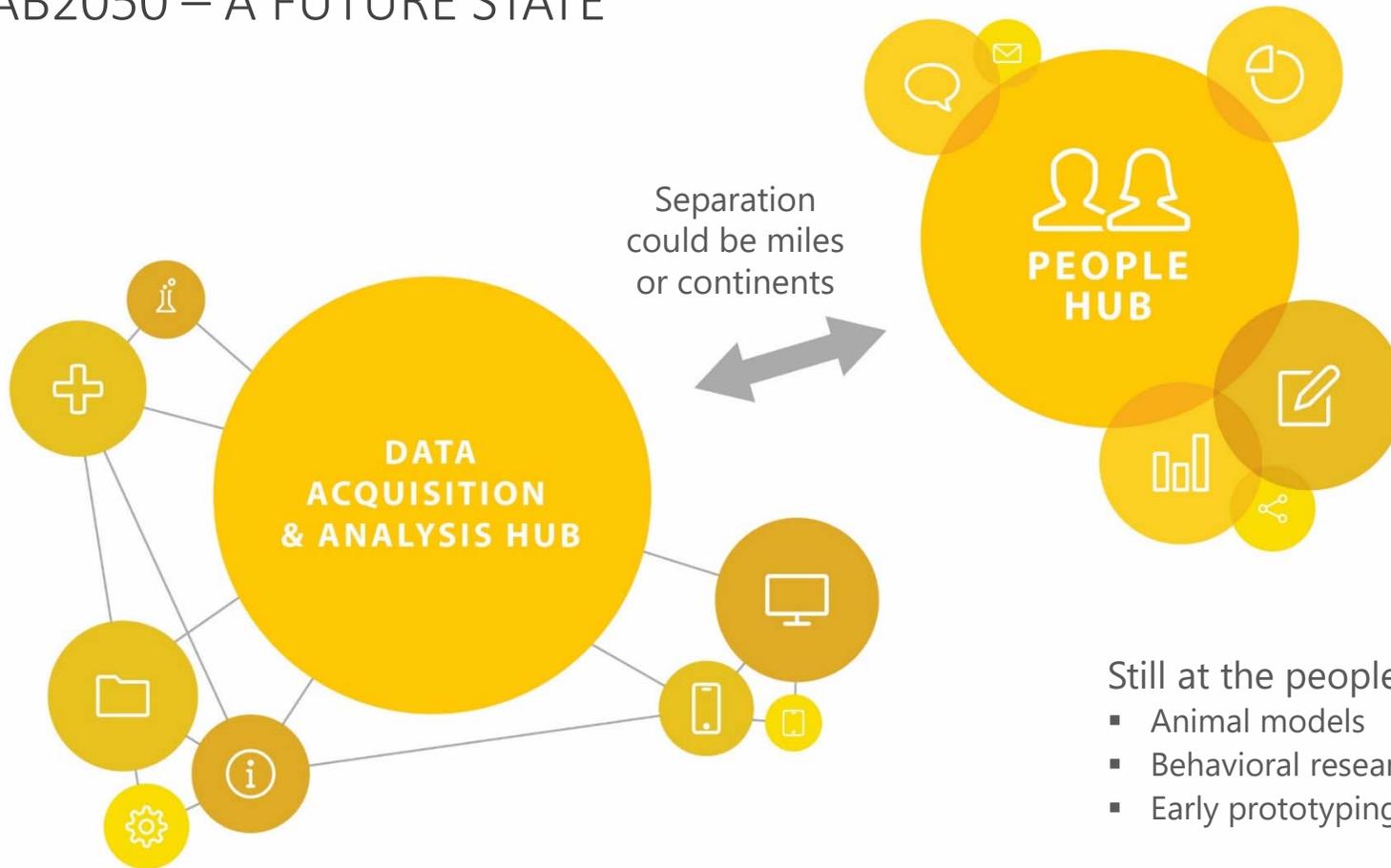


LINKAGES AND KEY TAKEAWAYS

- Design for Agility
- Automated and Decentralized Experiments
- Partnerships
- Centers for Collaboration
- Finance Driven
- Big Data
- Place Will Matter
- Global Access to Information
- Intelligent Space
- Efficiency and Resiliency



LAB2050 – A FUTURE STATE



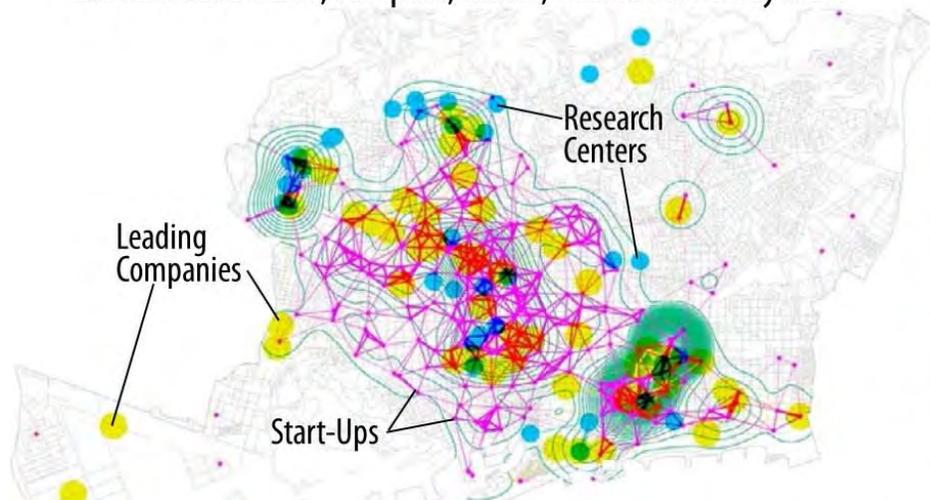
Still at the people PLACE?

- Animal models
- Behavioral research
- Early prototyping (3D print)

WHERE THE PLACE IS WILL MATTER

- Scientific community will be decentralized, global & virtual
- Innovation Happens at the Intersections – Disciplines, Groups and Populations

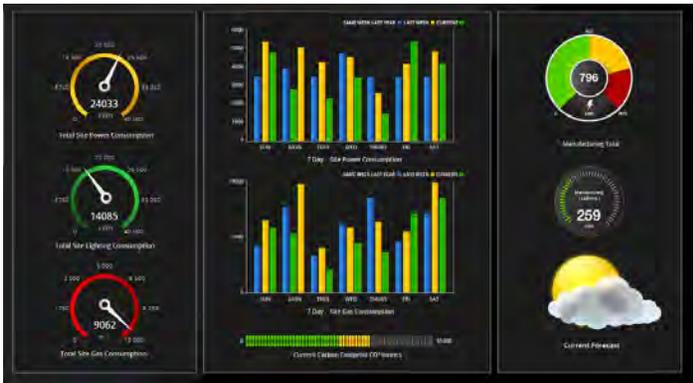
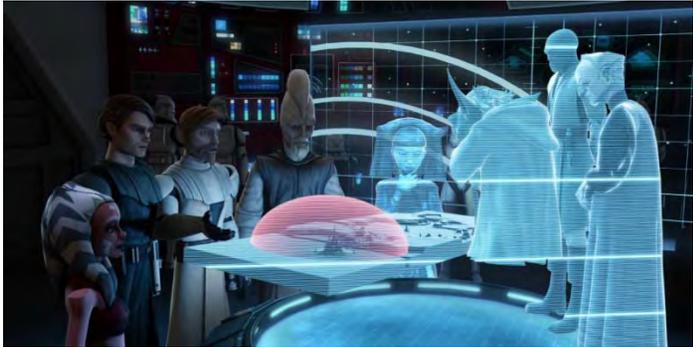
Barcelona's diverse, compact, urban, innovation ecosystem



WHAT THE PLACE DOES WILL MATTER

“You need to have the computer scientist to help with developing those technologies that can utilize these data, but then you need the scientist to answer the questions.”

- Judy Pa, assistant professor of neurology , USC Stevens Neuroimaging Informatics Institute



WHAT THE PLACE DOES WILL MATTER

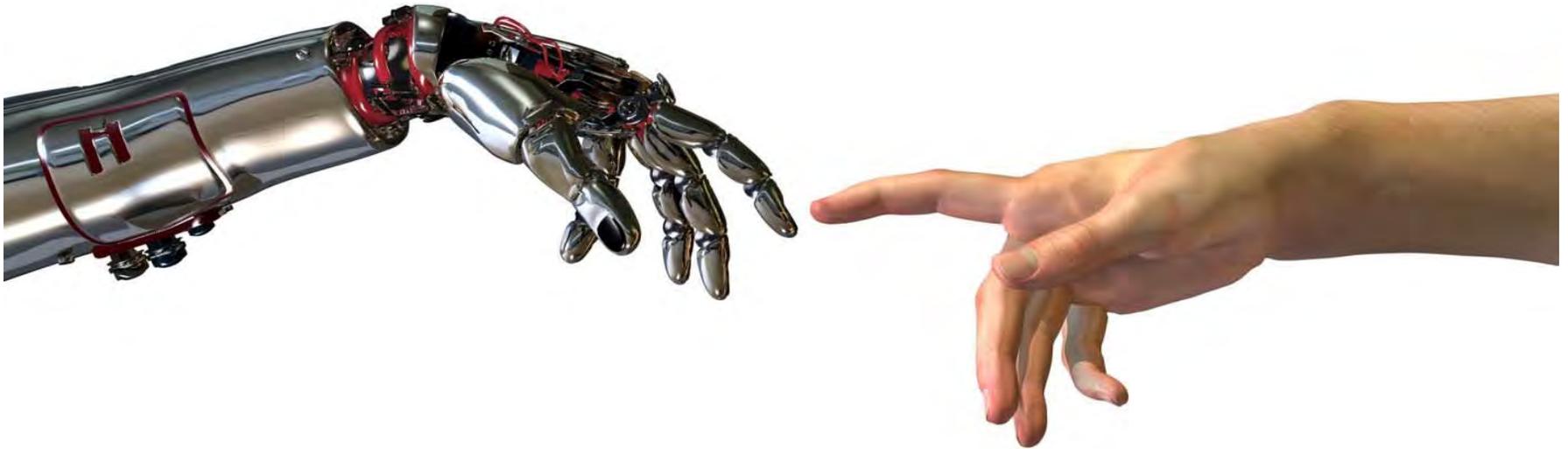
AUTOMATED RIGHT SIZED LABORATORY IN A RESILIENT AND SUSTAINABLE LOCATION



Since 1972

SPACE	Open Labs Prevalent	Open Labs / High Visibility	Open Labs / Computational
PROCESS	Increased Automation	Clinical Dry Research	Robotic Science Partners
TECHNOLOGY	Increased Computerization	Bioinformatics / Cloud	Big Data Driven
	More Intense Equipment (SEM) Mirco, Mobile, Computational	Imaging Cores (NMR, TEM) Molecular Modeling / Proteomics	Biomarkers / Biobots Precision Medicine / Genomics
LABS	Flexible Wet to Dry	Mobile, Flexible, Data	Less Bench, More Touch Down
COLLABORATION	Collaboration Areas	Interactive Commons	Integrated Collaboration Zones
	Interactive Cross Disciplinary	Interdisciplinary / Virtual	Partnerships v. Solo
SYNERGIES	Intellectual v. Process	Science with Engineering	Science / Business / Marketing
SUSTAINABILITY	Sustainable Buildings	Net-Zero / Net-Positive	Low-Entropy Campus
SYSTEMS	Zone Sensored HVAC Systems	Real-time Monitoring Systems	Intelligent Building Systems
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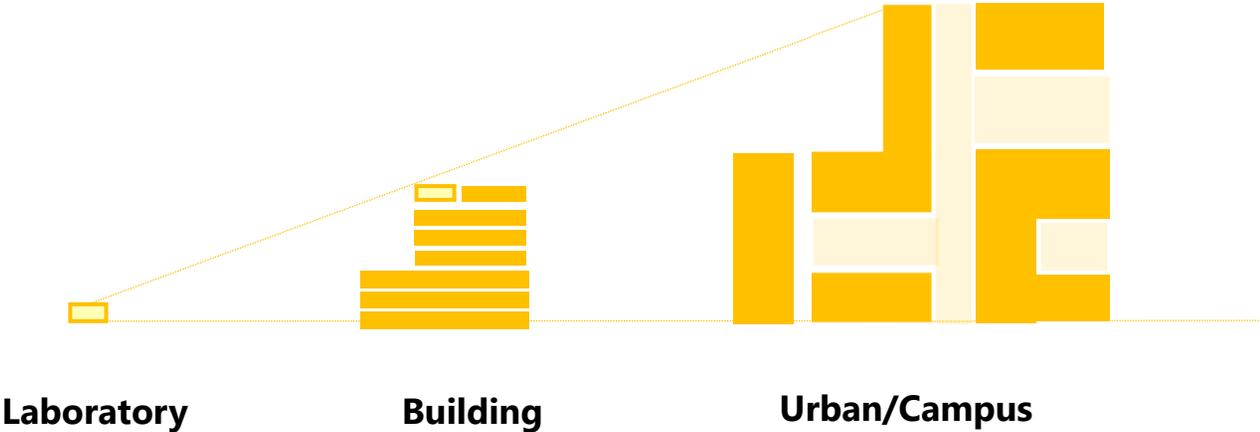
LAB2050 | Evolution



LAB 2050

PHYSICAL MANIFESTATION

IMAGINING THE FUTURE. THREE SCALES





LABORATORY SCALE

LAB²⁰₅₀

Physical Manifestation

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THE SPACE INVENTORY MIX CHALLENGE



HAZARDOUS RESEARCH ENVIRONMENTS



Chemical



Biological



Radiation



Physical



Electrical



Mechanical



Airborne



Ergonomic

STACK LAB

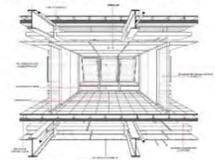
STACK-LAB



DRONE-ZONE



PNEUMATIC TUBE REENVISIONED



VERTICAL LAB



AUTOMATED SUPPORT BELOW



FLY ZONE

- AUTOMATED SUPPORT AREA ABOVE
- DRONE FLY AREA
- ACCESSED FROM BELOW
- IN-OUT PRIVILEGES
- LAB DOCUMENTATION
- FLEXIBLE
- EVOLVABLE

PEOPLE ZONE

- VERTICAL ORGANIZATION
- HAZARD FREE
- UNIVERSAL DESIGN
- WALL-BOT AREA
- FLUID ORGANIC PLANNING
- RECONFIGURABLE
-

FLOOR BOT ZONE

- AUTOMATED SUPPORT AREA BELOW
- EFFICIENT FOOTPRINT
- HAZARD AREA
- AUTOMATED SUPPORT
- SELF-DOCUMENTING LAB
- FLEXIBLE
- EVOLVABLE

STACK-LAB MODULE

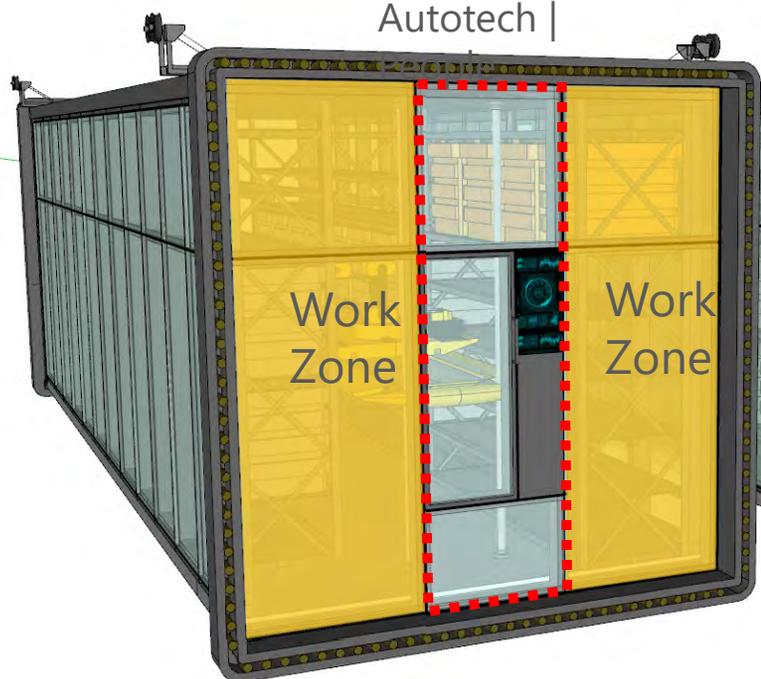


Fly Zone

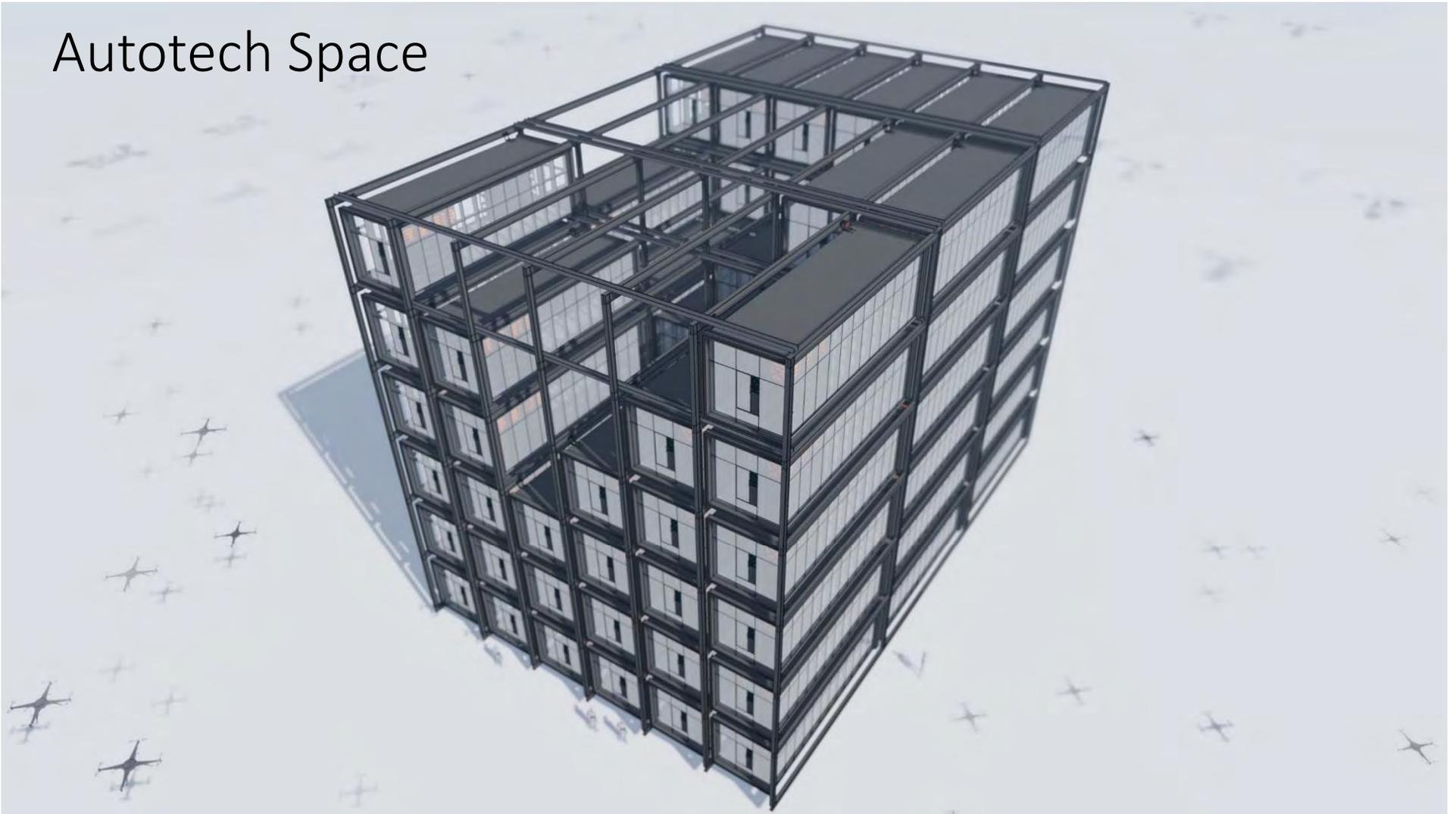
People Zone

Bot Zone

PODS ON DEMAND



Autotech Space



AUTONOMOUS MODULE





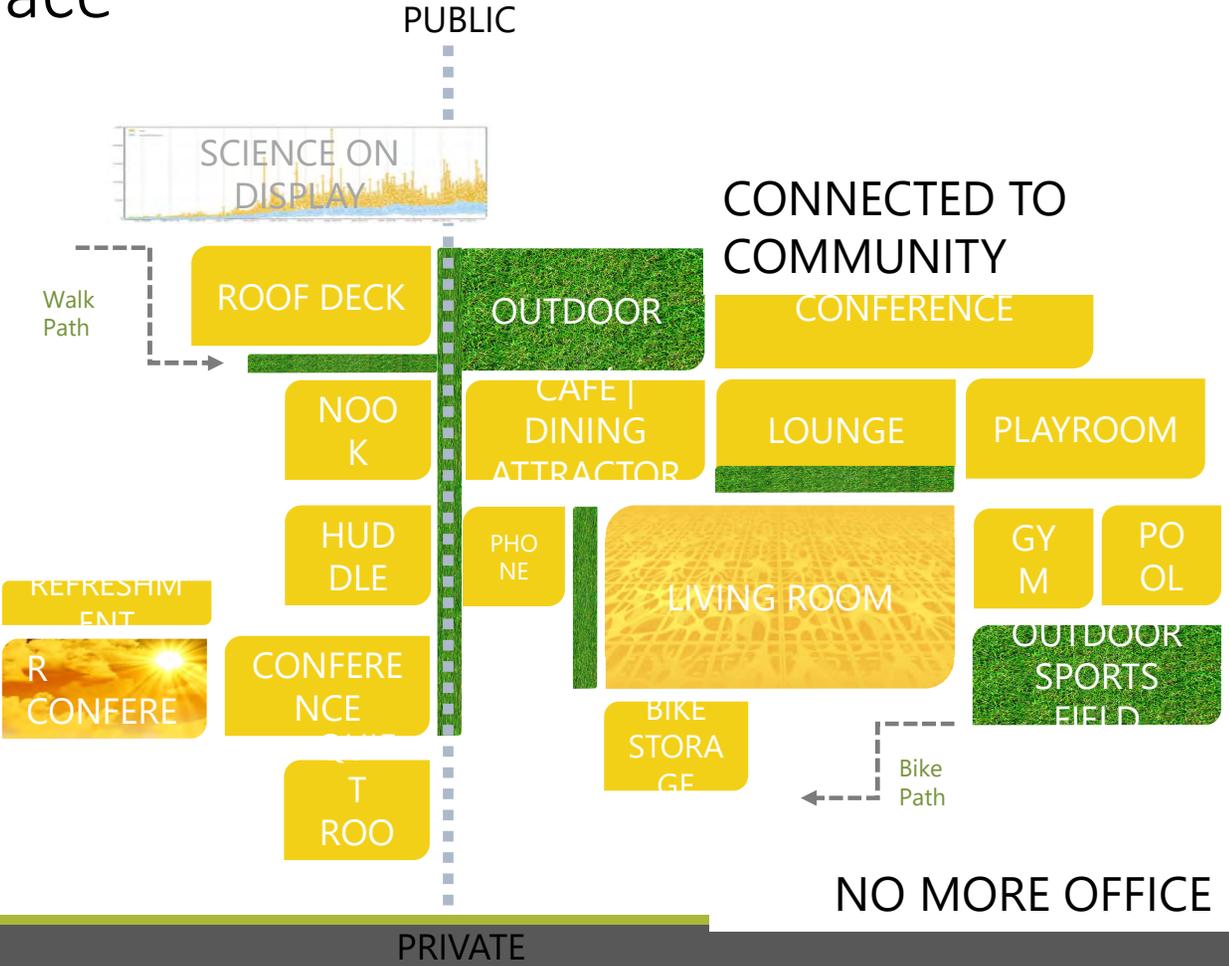
BUILDING SCALE

LAB²⁰₅₀

Physical Manifestation

SMITHGROUP

People Space



PUBLIC

SCIENCE ON DISPLAY

Walk Path

ROOF DECK

OUTDOOR

CONNECTED TO COMMUNITY CONFERENCE

NOOK

CAFE | DINING ATTRACTOR

LOUNGE

PLAYROOM

REFRESHMENT CONFERENCE

HUD DLE

PHONE

LIVING ROOM

GYM

POOL

OUTDOOR SPORTS FIELD

CONFERENCE

BIKE STORAGE

Bike Path

TRIO

NO MORE OFFICE

PRIVATE

People Space



URBAN CENTER



Urban Center





URBAN/CAMPUS SCALE

LAB²⁰₅₀

Physical Manifestation

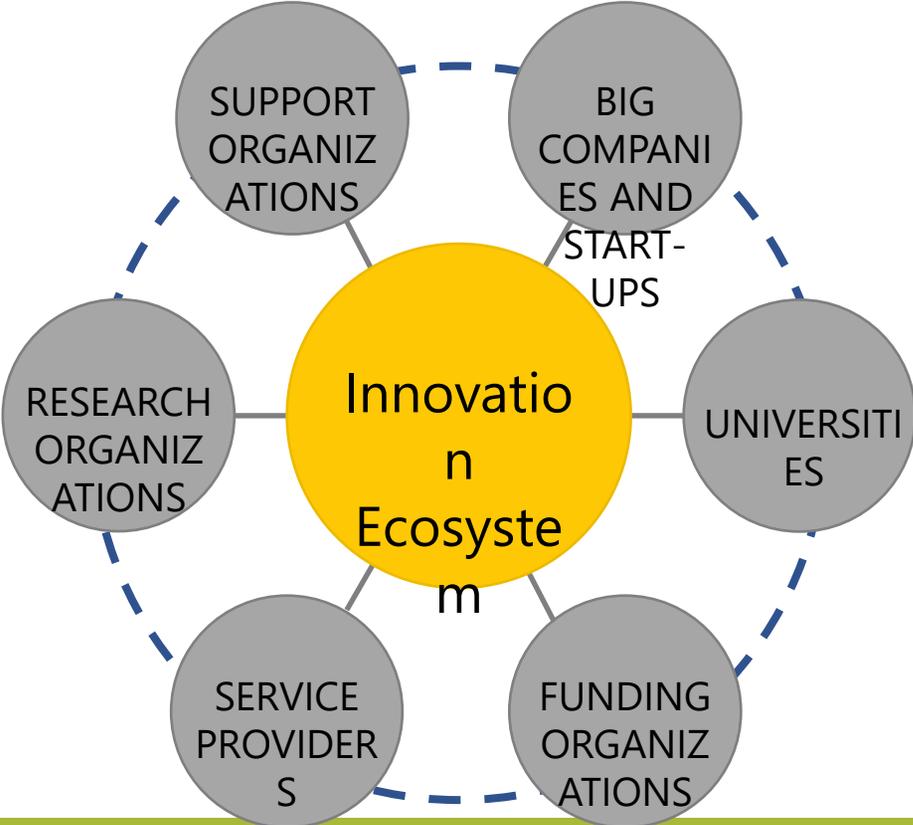
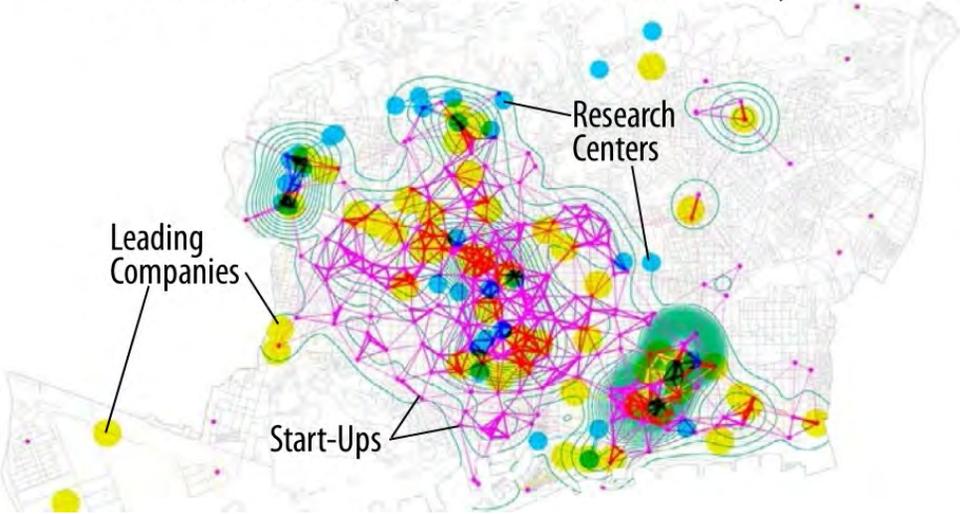
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THE SPACE INVENTORY MIX CHALLENGE – URBAN EDITION

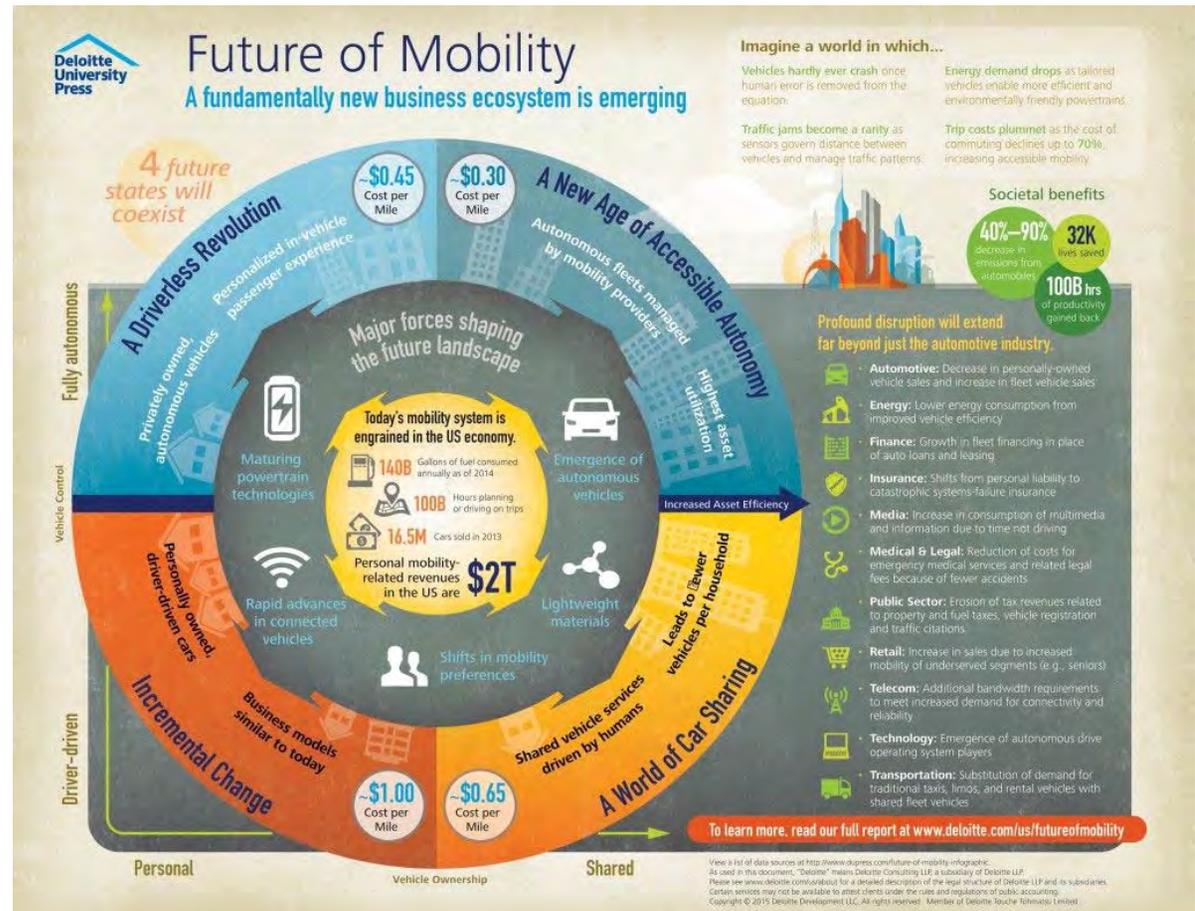


CREATING A THRIVING INNOVATION ECOSYSTEM?

Barcelona's diverse, compact, urban, innovation ecosystem

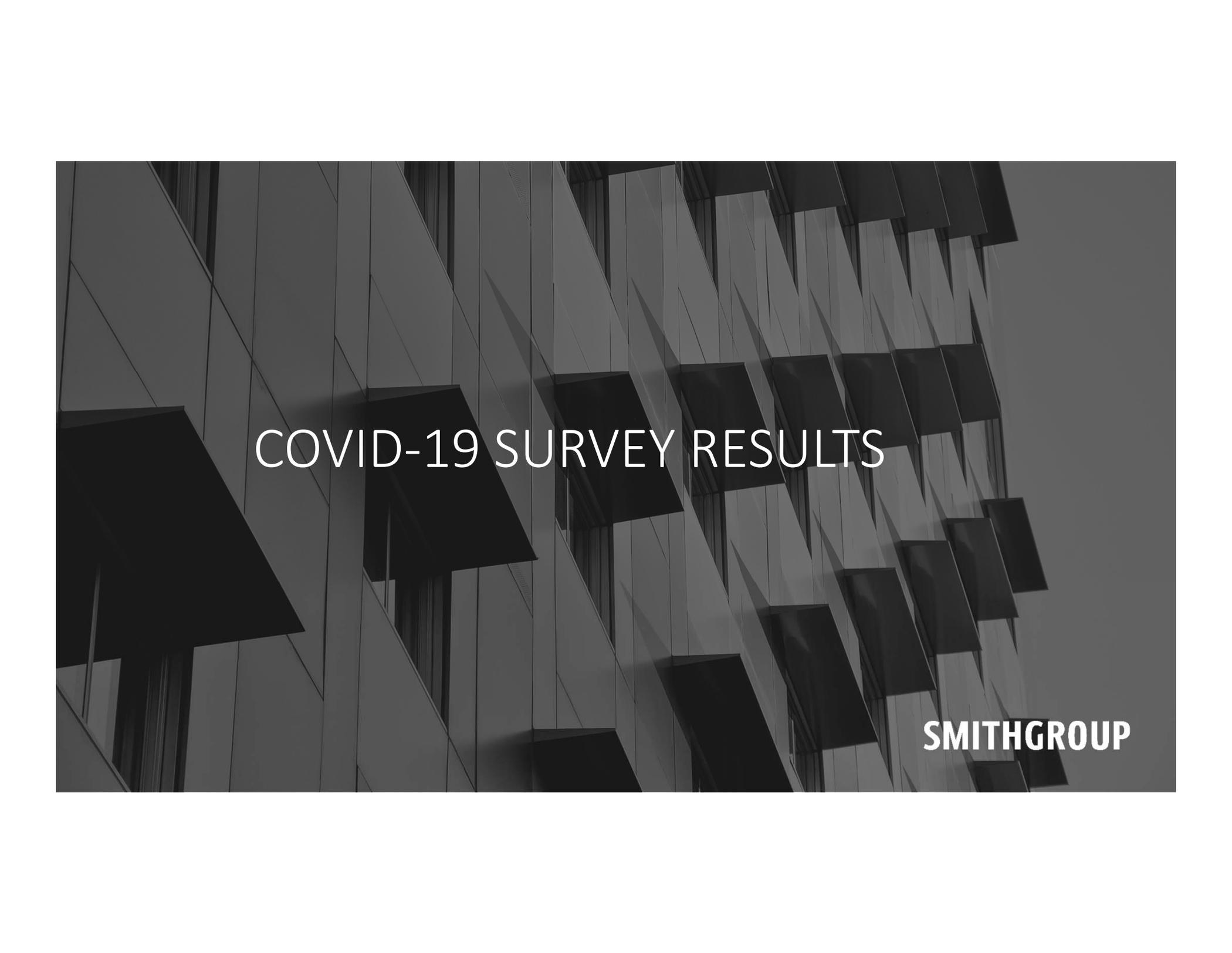


IMPACT ON MOBILITY



IMPACT ON NEIGHBORHOODS – KENDALL, SOUTH BOSTON, BEYOND

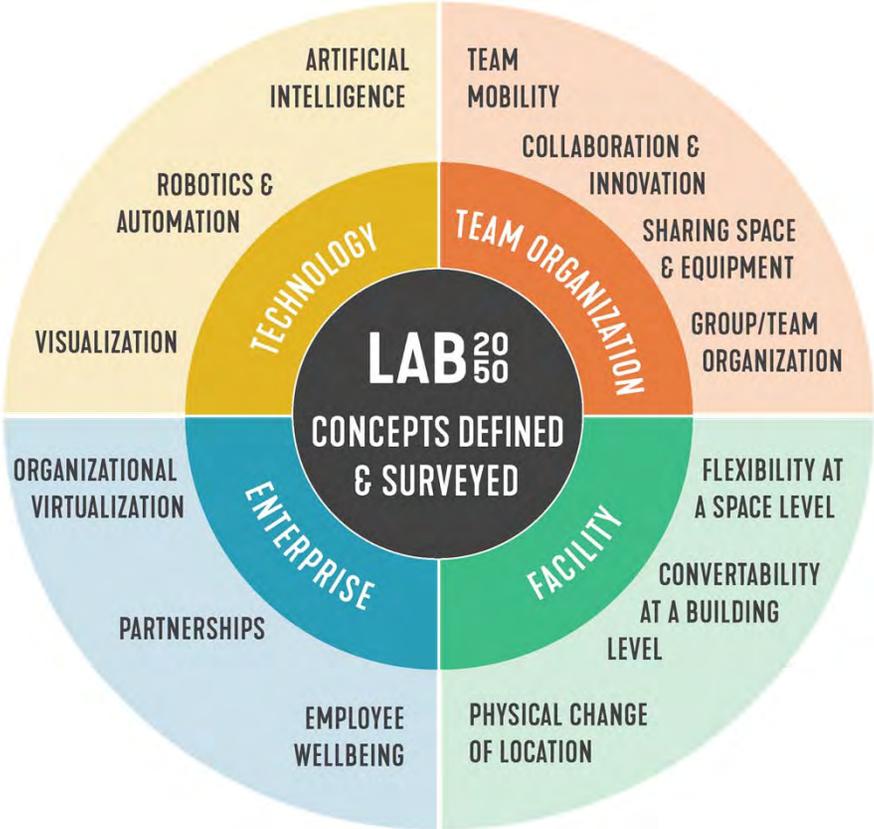




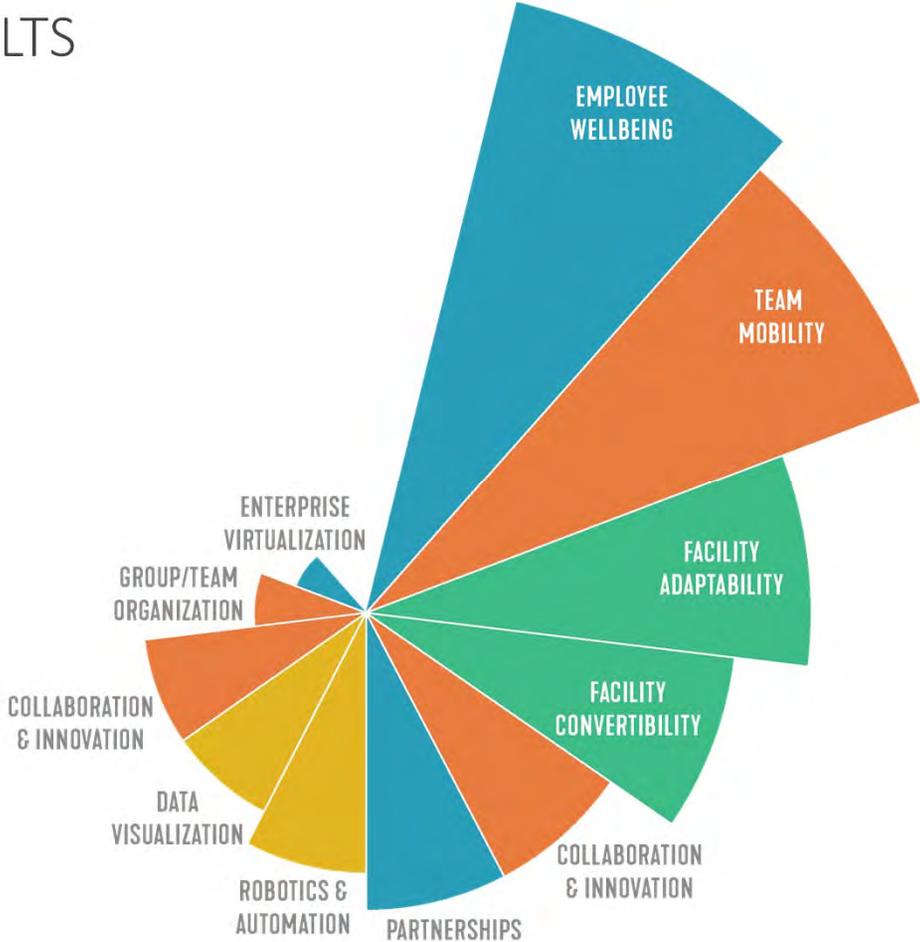
COVID-19 SURVEY RESULTS

SMITHGROUP

HOW WILL COVID-19 INFLUENCE RESILIENCY OF LABORATORIES?



LAB SURVEY RESULTS



LAB SURVEY- TOP PRIORITIES



EMPLOYEE WELLBEING

SUPPORTING HEALTH AND SAFETY TO IMPROVE EMPLOYEE SATISFACTION

- Collaboration will remain critical to research success.
- Preparation for future public health crises will require organizations to find multiple means of collaboration, both in person and virtually.
- Accelerate efforts to decrease employee stress and anxiety in times of upheaval to increase wellbeing and retain workforce.
- Institute new processes, policies and procedures for distancing and biosafety to reduce the threat of viral exposure. Health monitoring becomes a new task for employees.
- Update emergency response plans to include adaptability to future public health crises.



TEAM MOBILITY

CONNECTING TEAMS VIRTUALLY FOR ENHANCED COLLABORATION

- Identify new ways to interact both physically and virtually in experimentation.
- Working remotely, using off-shifts, engineering solutions to still work closely together. This also contributes to employee well-being and work-life balance. This also contributes to employee well-being and work-life balance.
- Less business-related travel, as strides are being made in remote work, online collaboration and decision-making.
- New pandemic procedures will become ingrained in business continuity plans.



FACILITY ADAPTABILITY

PREPARING FOR CHANGE THROUGH DESIGN

- Design agile spaces able to quickly convert laboratories and adapt offices.
- Potentially separate different lab functions that share space.
- Increase distancing of staff in both office and lab functions.
- Introduce technology to limit touching shared surfaces (i.e. automated doors, no-touch automatic faucets, hand towel dispensers, etc.).
- Increase biosafety protections (i.e. protocols, increased PPE, etc.).
- Administration, collaboration and common spaces will become less dense. These support spaces will see more dramatic changes than highly technical laboratory settings.

KEY TAKEAWAYS

1. Maintain a focus on pre-pandemic priorities. Now, more than ever, sustainability and resiliency strategies are key.
2. Re-examine space programming and real estate portfolios with current and future needs in mind.
3. Future lab environments will need to support quickly evolving research and foster health and wellbeing.
4. Successful research enterprises, business continuity, and facility development must be agile and responsive to continuous change.



THANK YOU!

SMITHGROUP