

# Sharing equipment and space avoids costs and benefits science: an in-depth case study of the Biochemistry Cell Culture Facility at the University of Colorado Boulder

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Boulder



# Objectives

- ▶ Identify the driving factors that led to the establishment of the Biochemistry Cell Culture Facility at CU Boulder and how similar conditions can be encouraged at another institution.
- ▶ Know the key characteristics of the Biochemistry Cell Culture Facility that were examined for this case study.
- ▶ Recognize the many benefits a Facility Manager brings to a shared equipment facility.
- ▶ Understand the avoided costs and wide variety of benefits a shared facility or core provides to an institution, both to scientists directly and to the university as a whole.

# Managed, shared equipment in collaborative research space benefits scientists and institutions

- ▶ Avoided costs
- ▶ Saves researchers time (Facility Manager)
- ▶ Attracts talent
- ▶ Promotes collaboration
- ▶ More efficient use of lab space
- ▶ Reduced laboratory plug loads
- ▶ In compliance with the Federal Register's Code of Federal Regulations
- ▶ In line with campus sustainability goals



*Ideal timing for sharing  
& high demand*

## BCCF in 1992



- ▶ Faculty-led and inspired
- ▶ 3 labs
- ▶ Biochem Division only
- ▶ Renovated bathroom
- ▶ Hired a technician and student to support the facility
- ▶ 100% funded by PIs and their grant funding

## BCCF in 2016

- ▶ 16 labs, 70 active users
- ▶ 3 Departments
- ▶ 1,554 ft<sup>2</sup> facility in a newer building
- ▶ Full time Facility Manager
- ▶ 50% of Facility Manager's salary funded by the Biochem Division, 50% by PIs/grants

- ▶ Never a fee-for-service core
- ▶ No mark-ups on supplies
- ▶ Supplies ordered in bulk



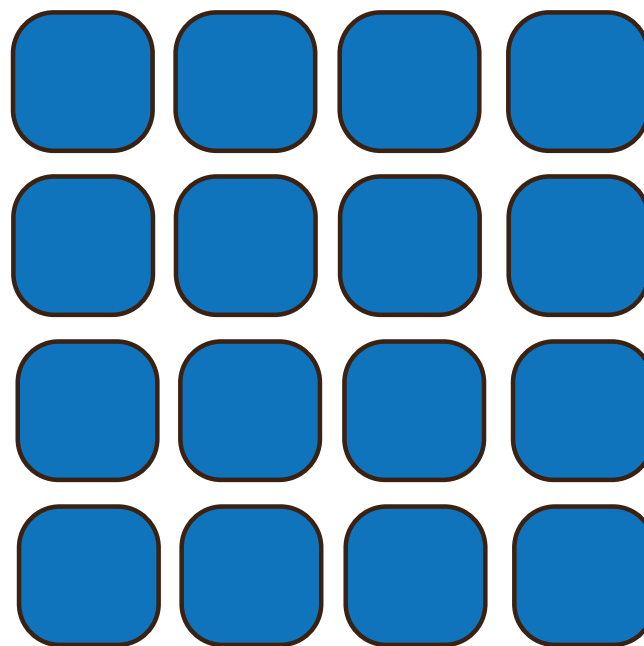


# Case study compares the existing BCCF to a hypothetical scenario where 16 labs are conducting cell culture independently



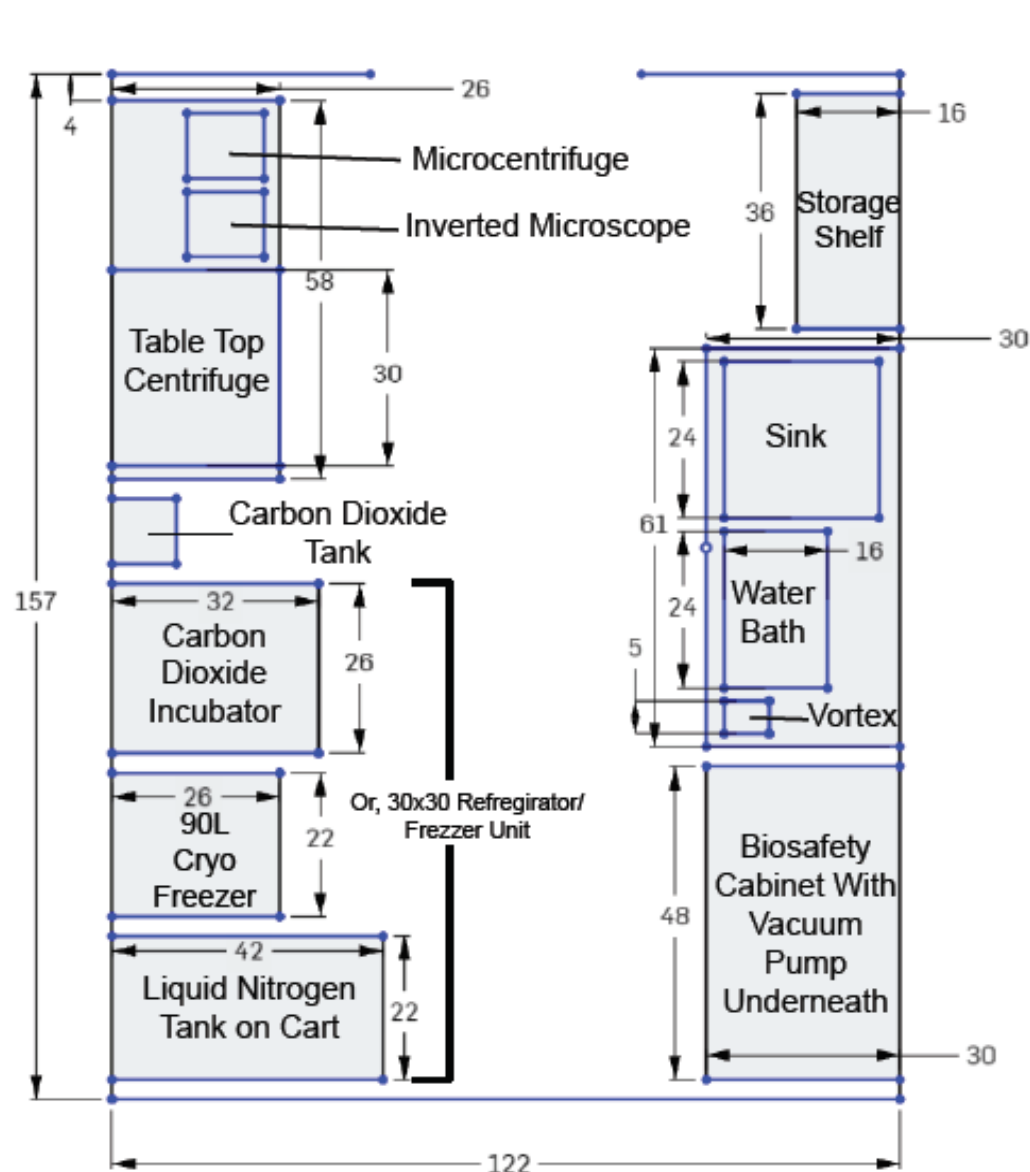
1,554 ft<sup>2</sup>

vs.

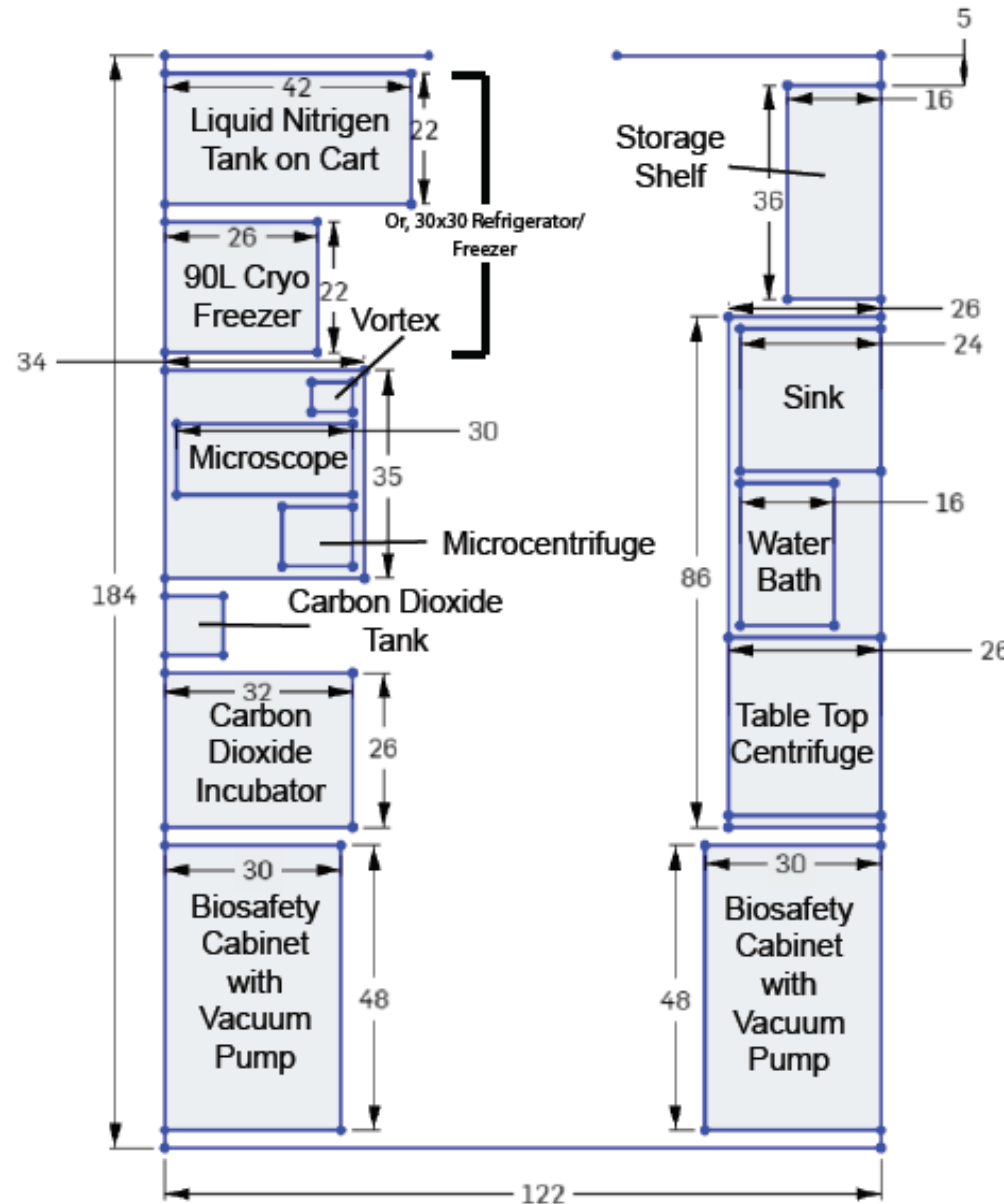


Hypothetical Scenario:  
Independent cell culture in 16 labs;  
no sharing of equipment or space

2,220 ft<sup>2</sup>



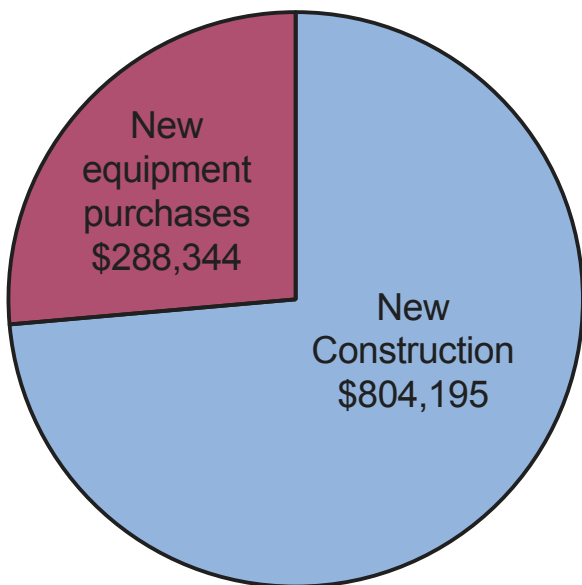
Hypothetical Scenario  
Individual Cell Culture Space with one biosafety cabinet  
12 labs would have this floor plan  
133 ft<sup>2</sup>



Hypothetical Scenario  
Individual Cell Culture Space with two biosafety cabinets  
4 labs would have this floor plan  
156 ft<sup>2</sup>

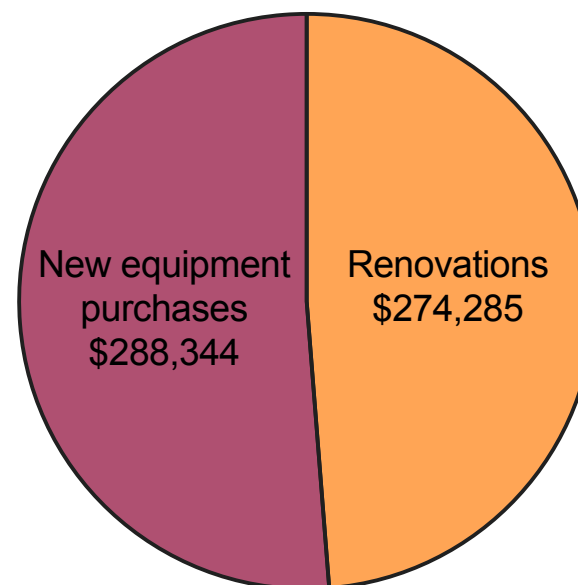
# Upfront Cost Avoidance Summary

Avoided costs by creating the BCCF on a new build instead of the Hypothetical Scenario



Total= \$1,092,539

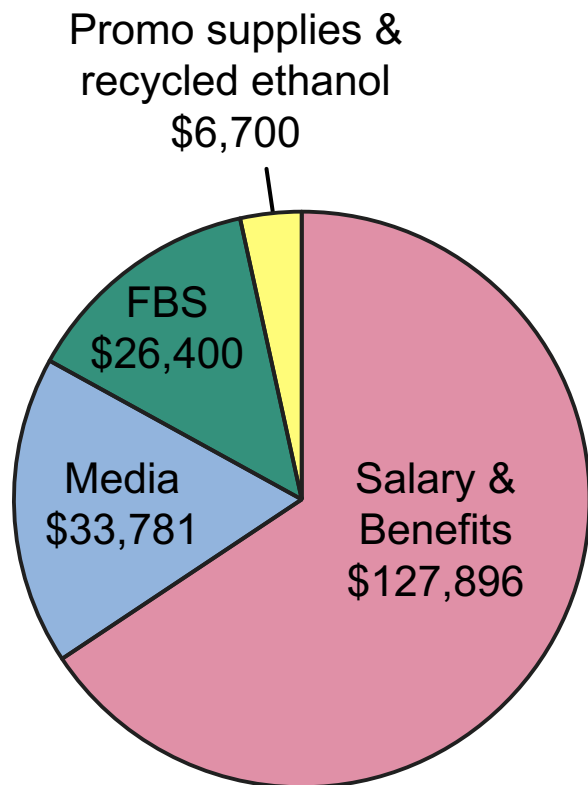
Avoided costs by creating the BCCF as a lab building renovation instead of the Hypothetical Scenario



Total= \$562,629

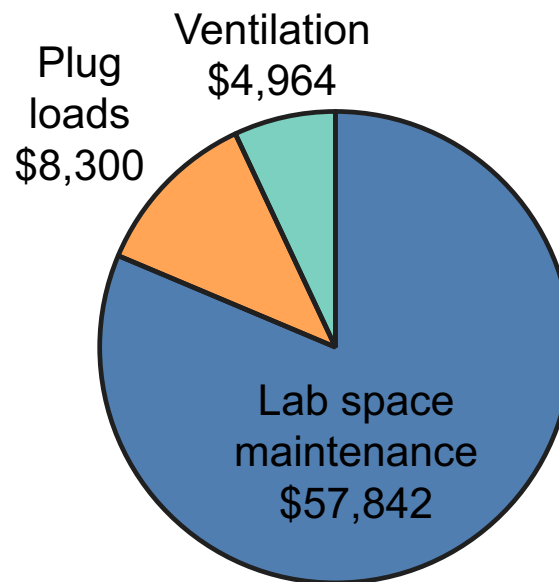
# Annual Cost Avoidance Summary

## Costs avoided for Biochemistry Division & scientists



Annual cost avoidance = \$194,777

## Costs avoided for Facilities Management, JSCBB, & CU Boulder



Annual cost avoidance = \$71,106

Total annual cost avoidance made possible by the BCCF = \$265,883



# Qualitative Benefits of a Facility Manager

- ▶ Standardized training of new users
- ▶ Mycoplasma testing
- ▶ FBS lot testing
- ▶ In-house media prep
- ▶ Connections & networking
- ▶ Expertise
- ▶ Equipment maintenance, certifications, repairs
- ▶ Ordering, stocking of supplies



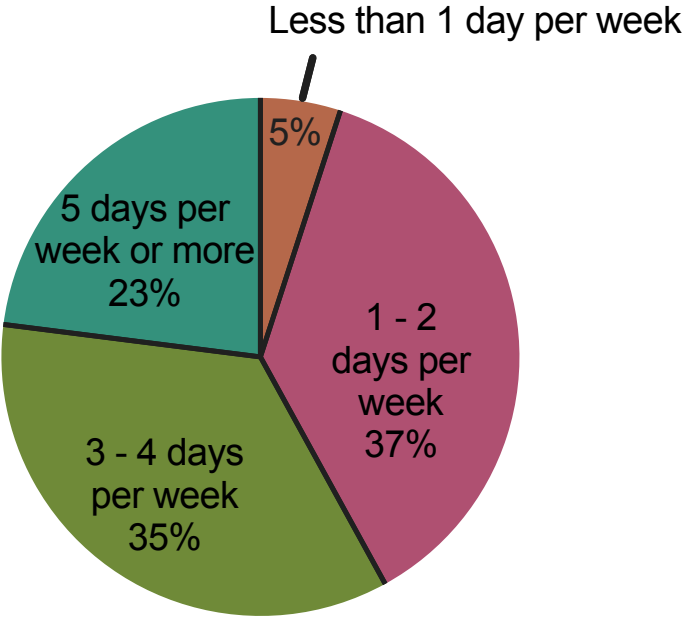
# Qualitative Benefits of the BCCF



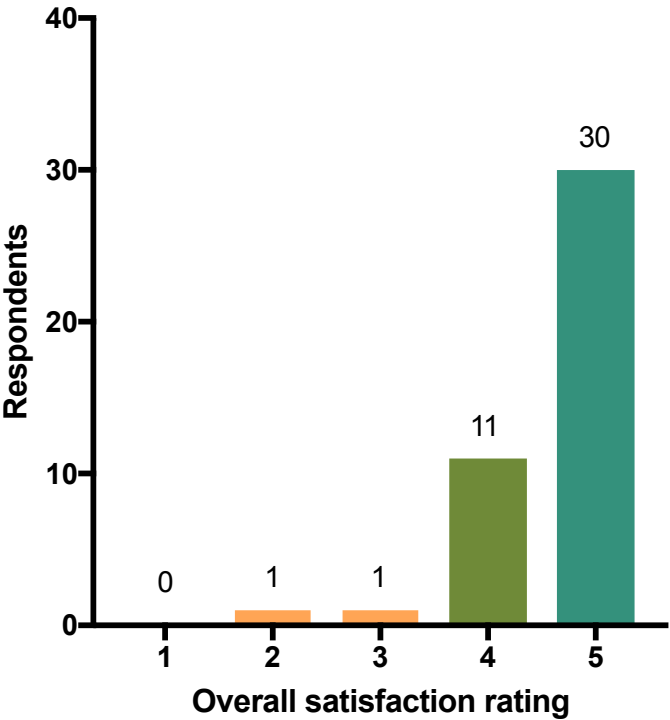
- ▶ Many eyes and ears in the facility
- ▶ No over-purchasing of consumables
- ▶ More efficient use of space
- ▶ No abandoned equipment
- ▶ Vibrant work environment
- ▶ Speed at which a new lab could begin cell culture work

# End users appreciate the BCCF (61% responded)

**BCCF frequency of use by end users**

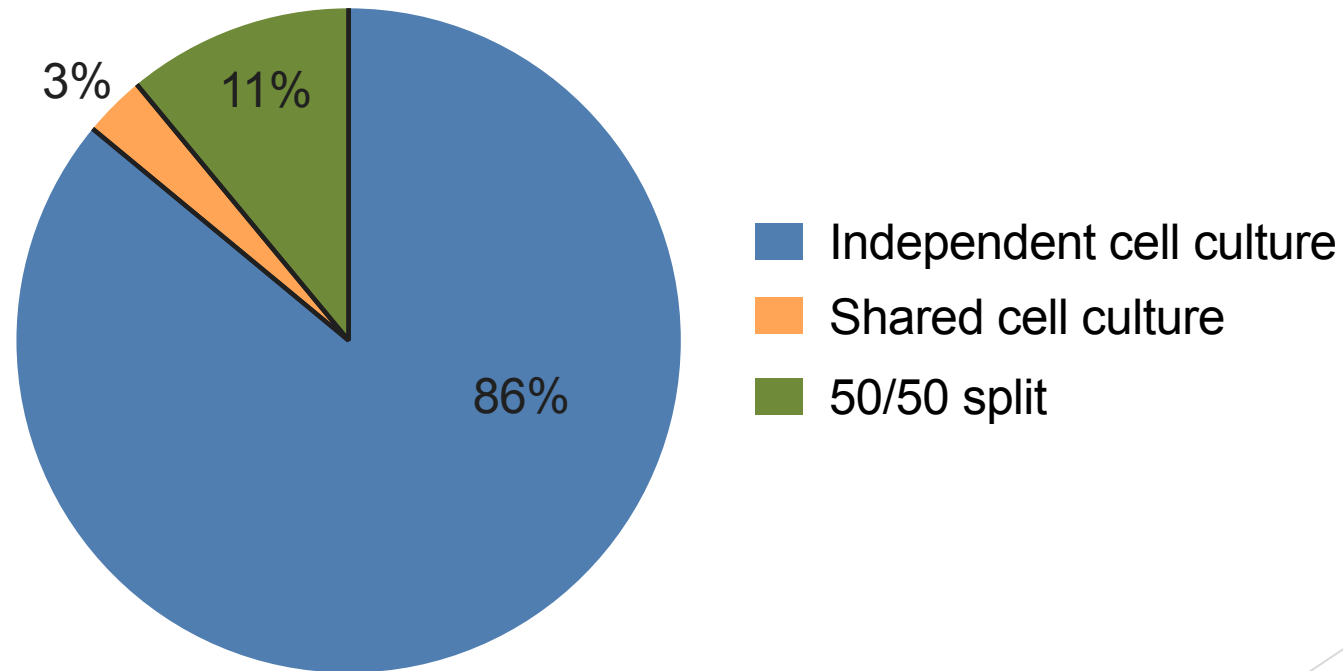


**Use the below scale to identify your overall satisfaction with the BCCF**



Phone survey of biosafety officers at AAU institutions shows individual cell culture is more prevalent than shared, but shared is growing

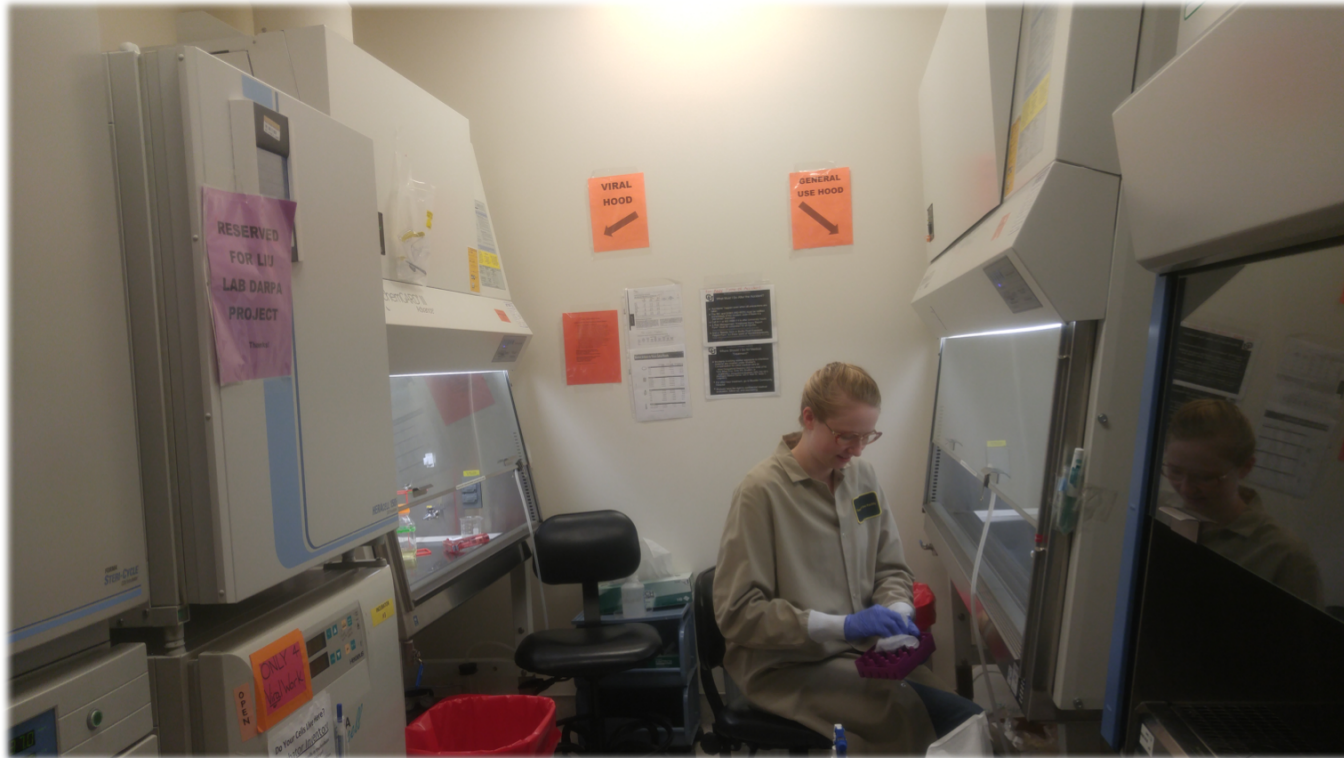
**Most prevalent cell culture arrangement among the 35 institutions surveyed**





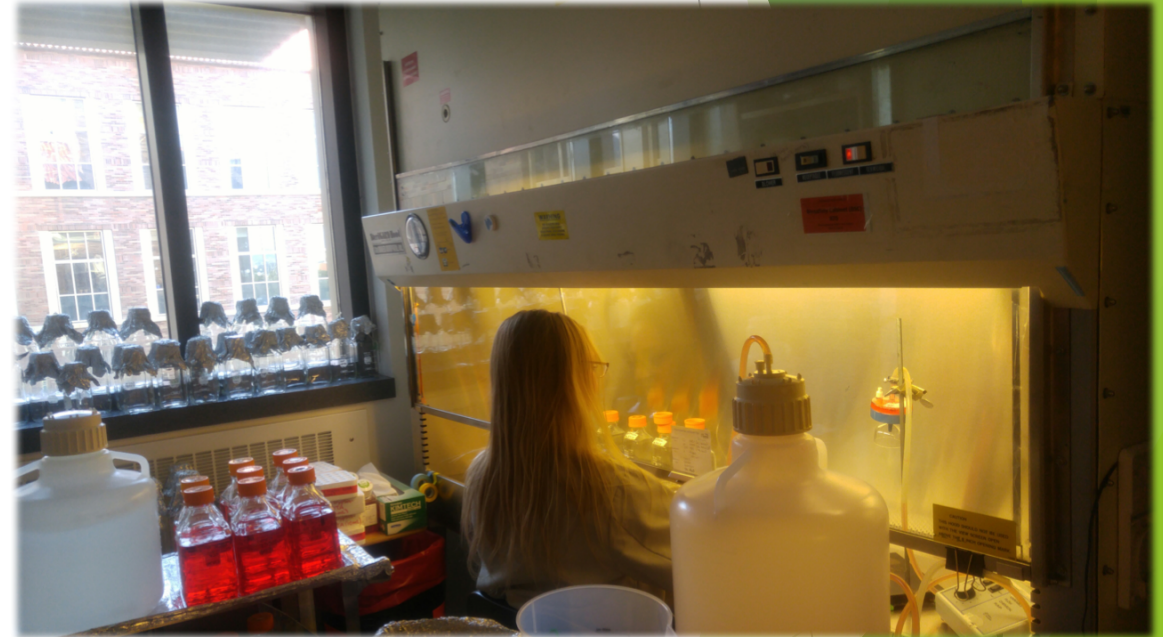
# Addressing and Overcoming Concerns

- ▶ Contamination
- ▶ “Tragedy of the commons”



# Does a shared cell culture facility still seem out of reach for your campus?

- ▶ Consider sharing one Facility Manager between two small facilities in close proximity to one another
- ▶ Think about the financial threshold at which it is cheaper to pay a Facility Manager to take care of cell culture tasks instead of graduate students and post docs



# Cost Analysis 1

## KEY:



BCCF Facility Manager  
serving 16 labs  
Salary & Benefits: \$82,620/year  
40 hours per week for cell culture

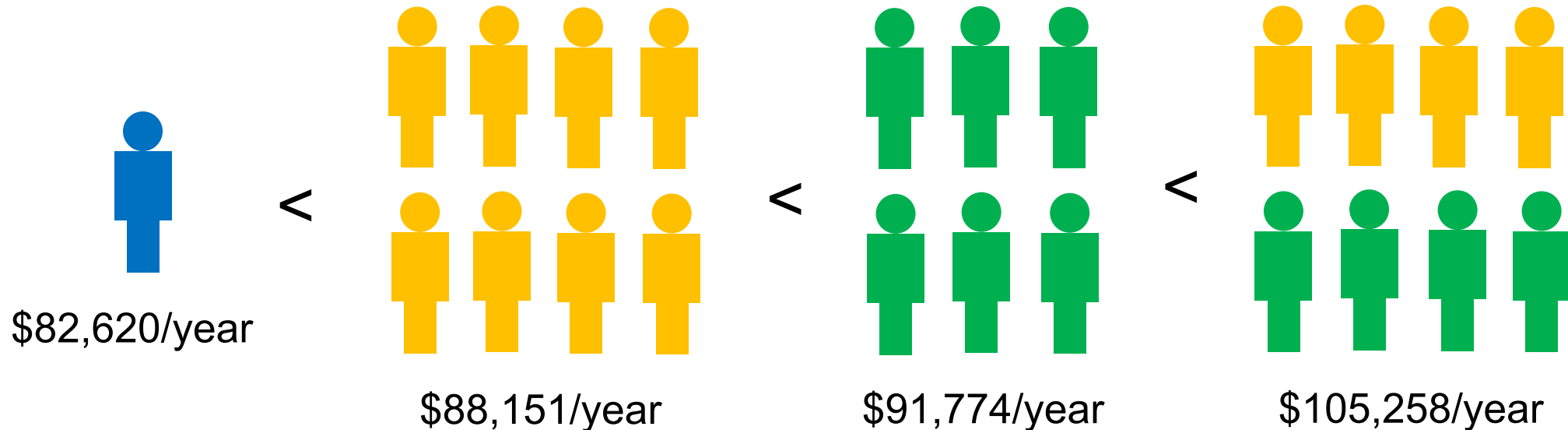


Postdoctoral Researcher  
serving a single lab  
Salary & Benefits: \$65,088/year  
9.4 hours per week for cell culture



Graduate Student  
serving a single lab  
Salary & Benefits: \$46,889/year  
9.4 hours per week for cell culture

## Cost analysis based solely on salary, benefits, and time spent on cell culture-related tasks:



# Cost Analysis 2

KEY:



BCCF Facility Manager  
serving 16 labs  
Salary & Benefits: \$82,620/year  
40 hours per week for cell culture

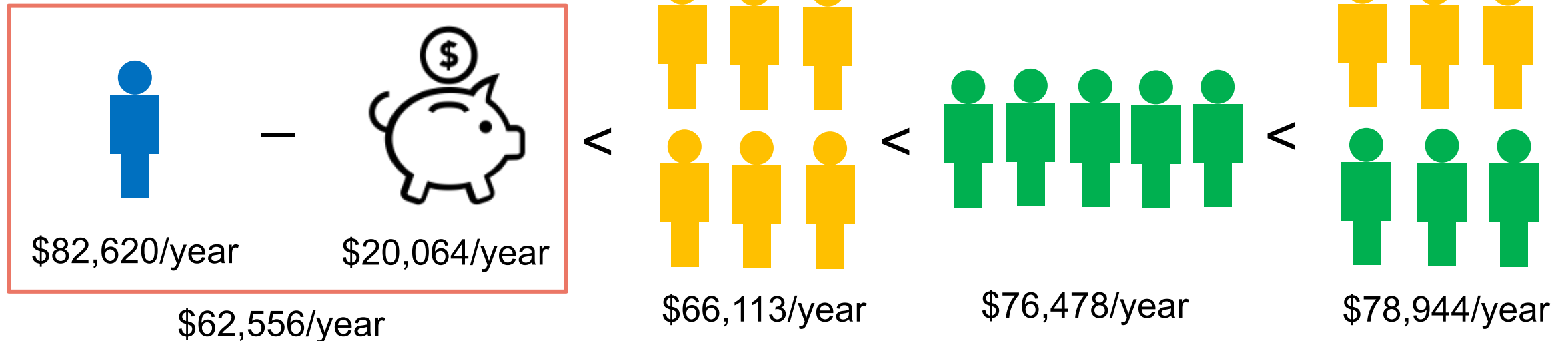


Postdoctoral Researcher  
serving a single lab  
Salary & Benefits: \$65,088/year  
9.4 hours per week for cell culture



Graduate Student  
serving a single lab  
Salary & Benefits: \$46,889/year  
9.4 hours per week for cell culture

**Analysis 1 plus 30% of the cost avoidance from preparing media in-house, bulk purchasing of FBS, promotions, and ethanol reuse (\$20,064/year)**





# Cost Analysis 3

**KEY:**



BCCF Facility Manager  
serving 16 labs  
Salary & Benefits: \$82,620/year  
40 hours per week for cell culture

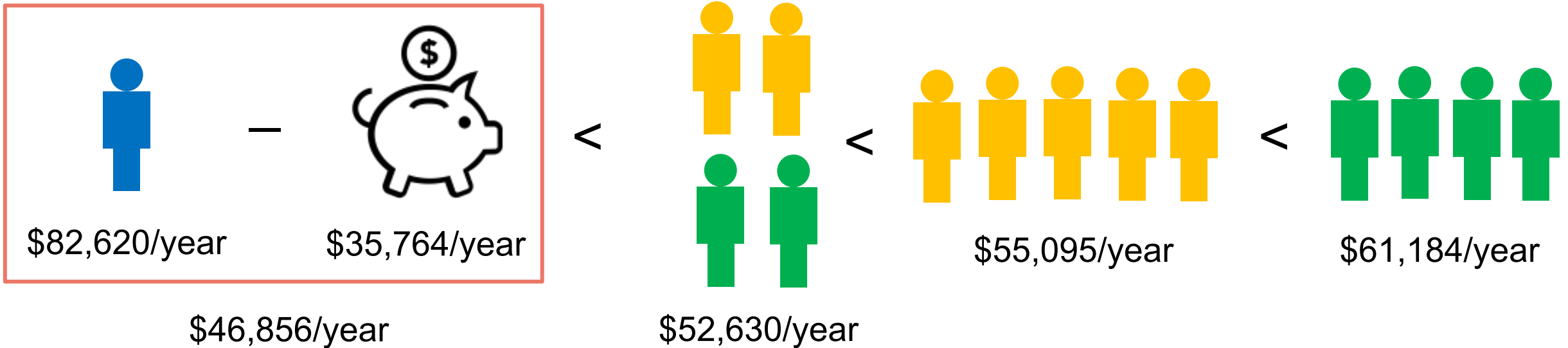


Postdoctoral Researcher  
serving a single lab  
Salary & Benefits: \$65,088/year  
9.4 hours per week for cell culture



Graduate Student  
serving a single lab  
Salary & Benefits: \$46,889/year  
9.4 hours per week for cell culture

**Analysis 2 (\$20,064 cost avoidance) plus a cost avoidance of \$15,700 as a result of four labs participating in a shared facility together**



# Conclusions

- ▶ Tremendous value (<\$265K/year) provided by the BCCF to scientists and the campus
- ▶ Numerous qualitative benefits too
- ▶ Smaller environmental footprint through the BCCF
- ▶ Facility Manager is a critical element to success
- ▶ Saves scientists time

# Conclusions continued...

- ▶ Sharing of space and equipment can be done well
- ▶ Institutional support for departments that share can be critical
  - ▶ Salary support
  - ▶ Admin infrastructure & emergency funding for repairs
  - ▶ Breaking down departmental barriers
- ▶ Encourages more interdisciplinary research
- ▶ More efficient use of time, funds, space, and equipment



# Next Steps



- ▶ Share the case study widely
- ▶ Share this example with additional departments at CU Boulder
- ▶ Find additional faculty champions of shared resources
- ▶ Give more tours of the BCCF
- ▶ This changes culture and normalizes the practice of sharing equipment and using space collaboratively



# Acknowledgments



Kathy Ramirez-Aguilar - CU Green Labs Program Manager  
Theresa Nahreini - Biochemistry Cell Culture Facility Manager

Natalie Ahn, Sessa Pochiraju, Ziyu Liu, Helina Ayalew, Sarah Vander Meulen,  
Wayne Northcutt, Rebecca Fell, Otha Barrow, Pamela Williamson, David Jacobs,  
Thomas Smith, Pieter Diebold, Jeremy Johnson, Shannon Horn, Stephanie Preo,  
Kate Daugherty, Holly Gates-Mayer, Mark Lapham, Joshua Lindenstein, Ellen Edwards,  
Theresa Siefkas, Joe Dragavon, Gretchen O'Connell, and Brenda Petrella.

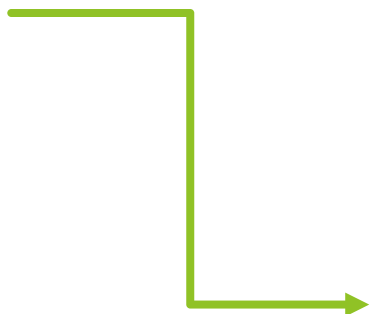
## Questions?

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[www.colorado.edu/ecenter/greenlabs/case-study-biochemistry-cell-culture-facility](http://www.colorado.edu/ecenter/greenlabs/case-study-biochemistry-cell-culture-facility)



On our website under  
“Lab Equipment and Space Sharing”