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Central Research Labs (CRL)

PLAN PROPOSAL

CRL Subgroup Report to the
Parnassus Master Planning Steering Committee

April 27, 2018

2017 CHANCELLOR'S ANNUAL ADDRESS

State of the University

"Excellence"

"Now is the time to start"

"Impassioned engagement of the Parnassus Heights-based faculty"

"Incredibly exciting ideas"

"World-class modern facilities"

"Big and **bold**"

CRL SUBGROUP COMMITTEE

Mandate

- Design a **new model** for central lab resources
  - Capitalizes on **critical personnel** and **cutting-edge methods & technologies**
  - Drives **collaboration** across disciplines
- Produce high level plans for **contiguous space** housing all CRL components
  - Integrates core activities into one centralized place, *e.g.* sample processing, high-dimensional imaging, cell separation/sorting, genomic analysis
- Maximize **impact & engagement**
- Launch within a **2-year timeline**

CRL SUBGROUP COMMITTEE

Membership and Process

NADAV AHITUV, PHD
Bioengineering & Therapeutics

DIANE KAY
Space & Capital Planning

PATTI MITCHELL
Capital Programs

JIMMIE YE, PHD
Epidemiology & Biostatistics

VINCENT CHAN, PHD
Pathology

MAX KRUMMEL, PHD
Pathology

ELIZABETH SINCLAIR, PHD
Research Resource Program

KARIN WONG
Space Strategy

ERIC CHOW, PHD
Biochemistry & Biophysics

TIPPI MACKENZIE, MD
Surgery

MATTHEW SPITZER, PHD
Microbiology and Immunology

HUGH COTTER, AIA
Oculus Architects, Inc.

LINDSEY CRISWELL, MD, MPH
Medicine

ALEX MARSON, MD, PHD
Microbiology and Immunology

SAUL VILLEDA, PHD
Anatomy

DAVID ERLE, MD
Medicine

MICHAEL MCMANUS, PHD
Diabetes Center

KATHERINE YANG, PHARMD, MPH
Clinical Pharmacy

SINCE JANUARY 2018:

- 5 committee meetings
- 7 task forces
- Website
- Email announcements
- Existing facility inventory
- Site visits

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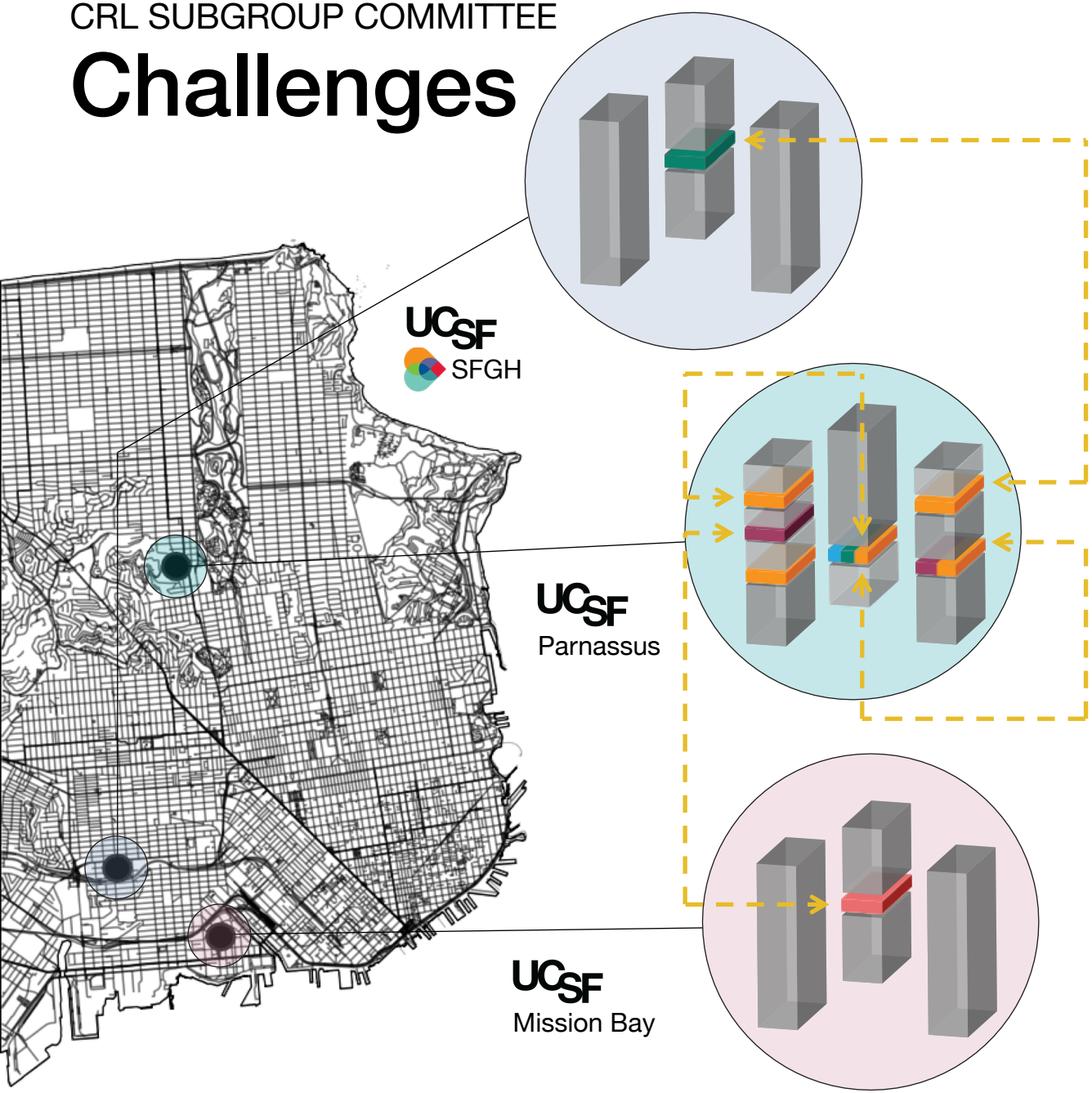
Challenges



- **Fragmented** facilities
  - Difficult to find and use cores
  - Limits collaboration and synergies
  - Inefficient use of space and equipment
- **Lagging investments** in transformative methods & technologies
  - Data sciences
  - Genomics
- **Unreliable** long-term financial support
  - Inefficiencies
  - Inadequate institutional support for cores (9% versus 27% nationally)
- **Retention** of world-class staff

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Goals & Opportunities

- ## Rejuvenating Parnassus
  Complete promptly a **highly-visible model for developing big and bold initiatives** at Parnassus

- ## Building on Parnassus' strength
  Emphasize **Parnassus' unique strengths** by exploring the biological basis of disease in transformative new ways and by complementing resources available elsewhere

- ## Fostering collaboration
  Enhance a sense of community by moving beyond the traditional "core" model and facilitating the **communization of resources, expertise, and data**

- ## Creating excellence, responsiveness, and sustainability
  Recruit and retain **excellent people who are engaged and nimble** in recognizing emerging opportunities, and who can promote the sharing of ideas and tools developed in individual labs

- ## Supporting education and training

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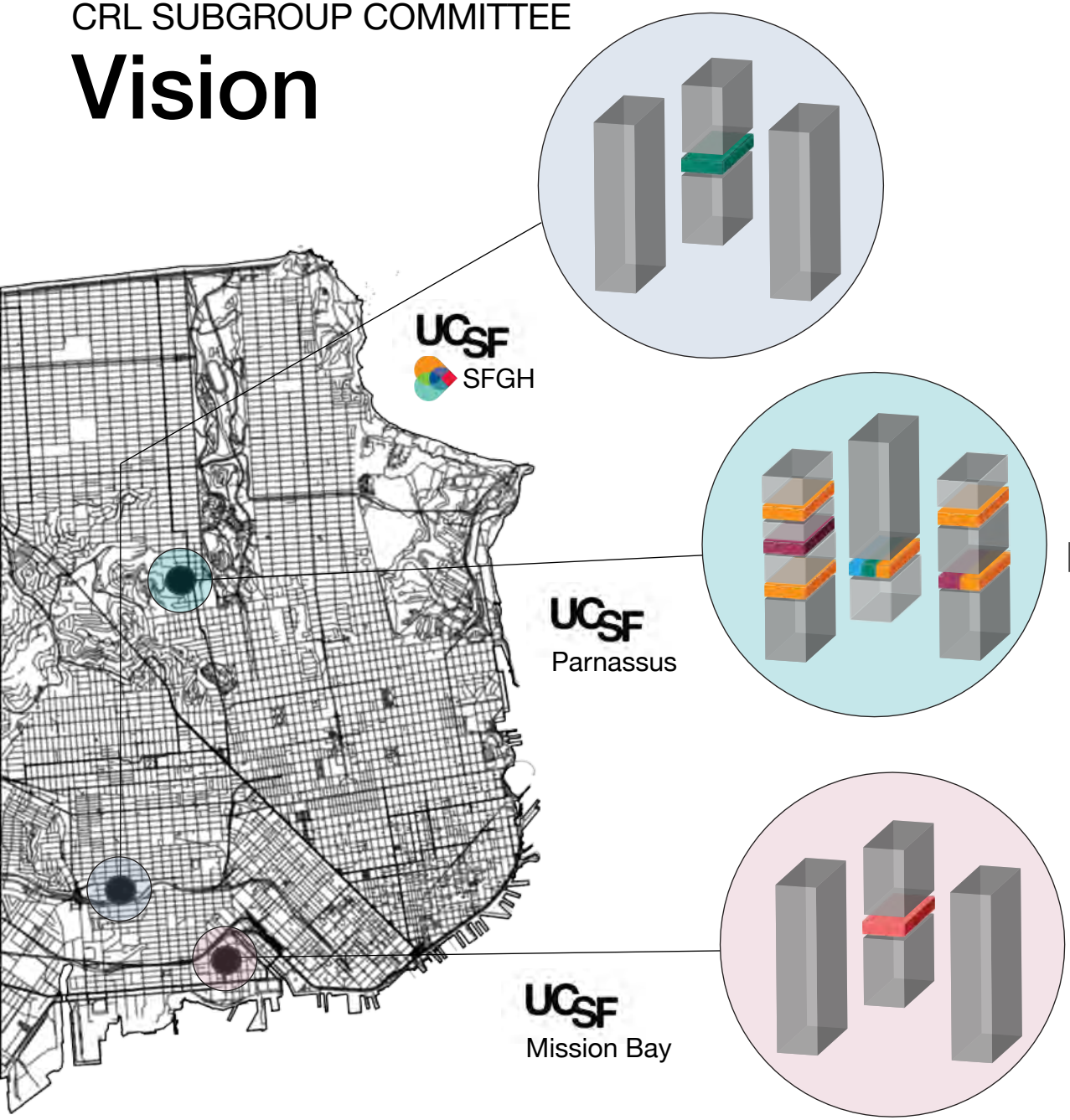
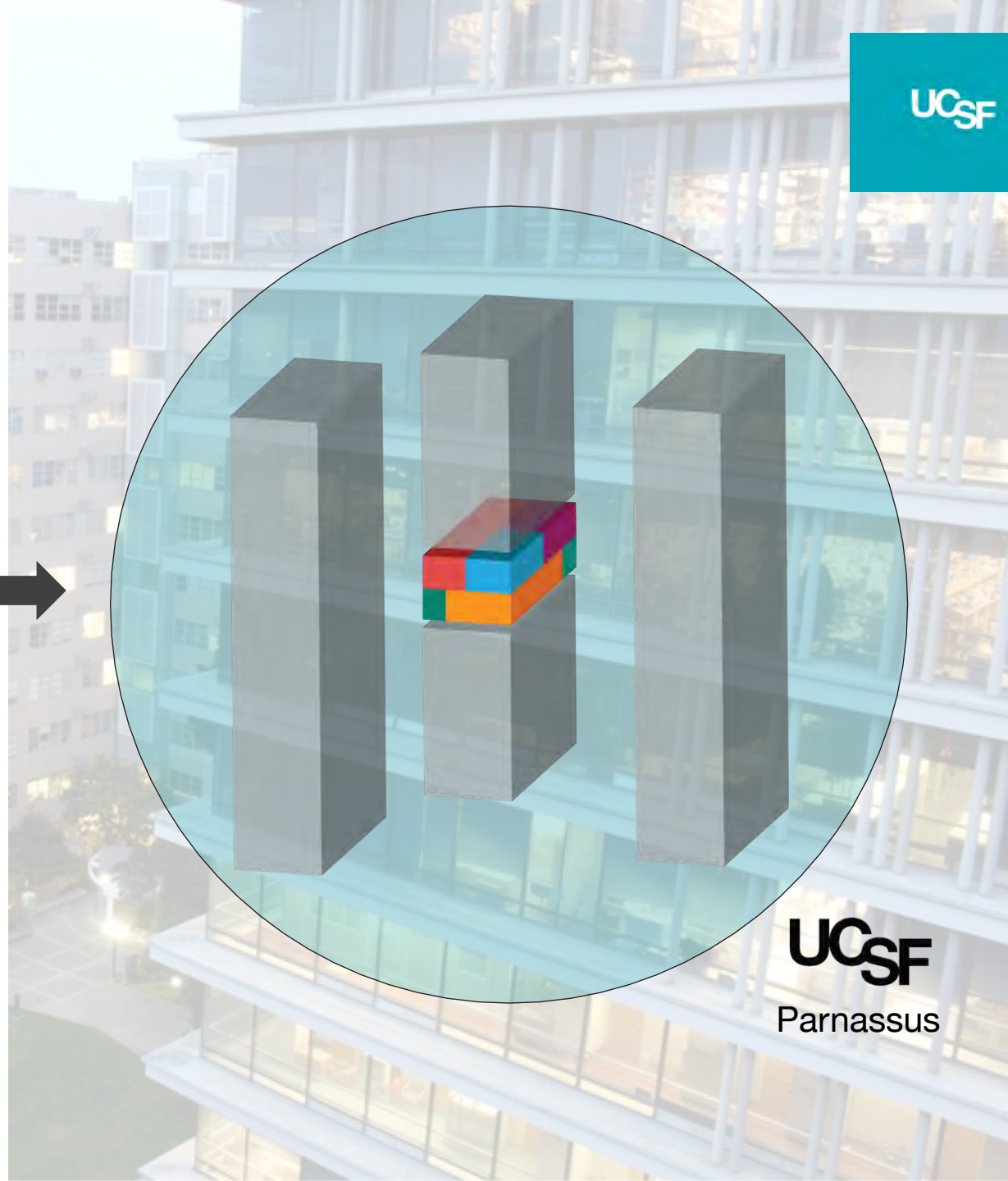
Vision





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Design Concept

COLABS

AT PARNASSUS

UCSF

Parnassus

The “C” is a multi-faceted representation of CoLabs: as a logomark; as an interconnected space of shared labs; as an open “ring of collaboration” that will mirror the eventual rejuvenation and space concept at Parnassus.

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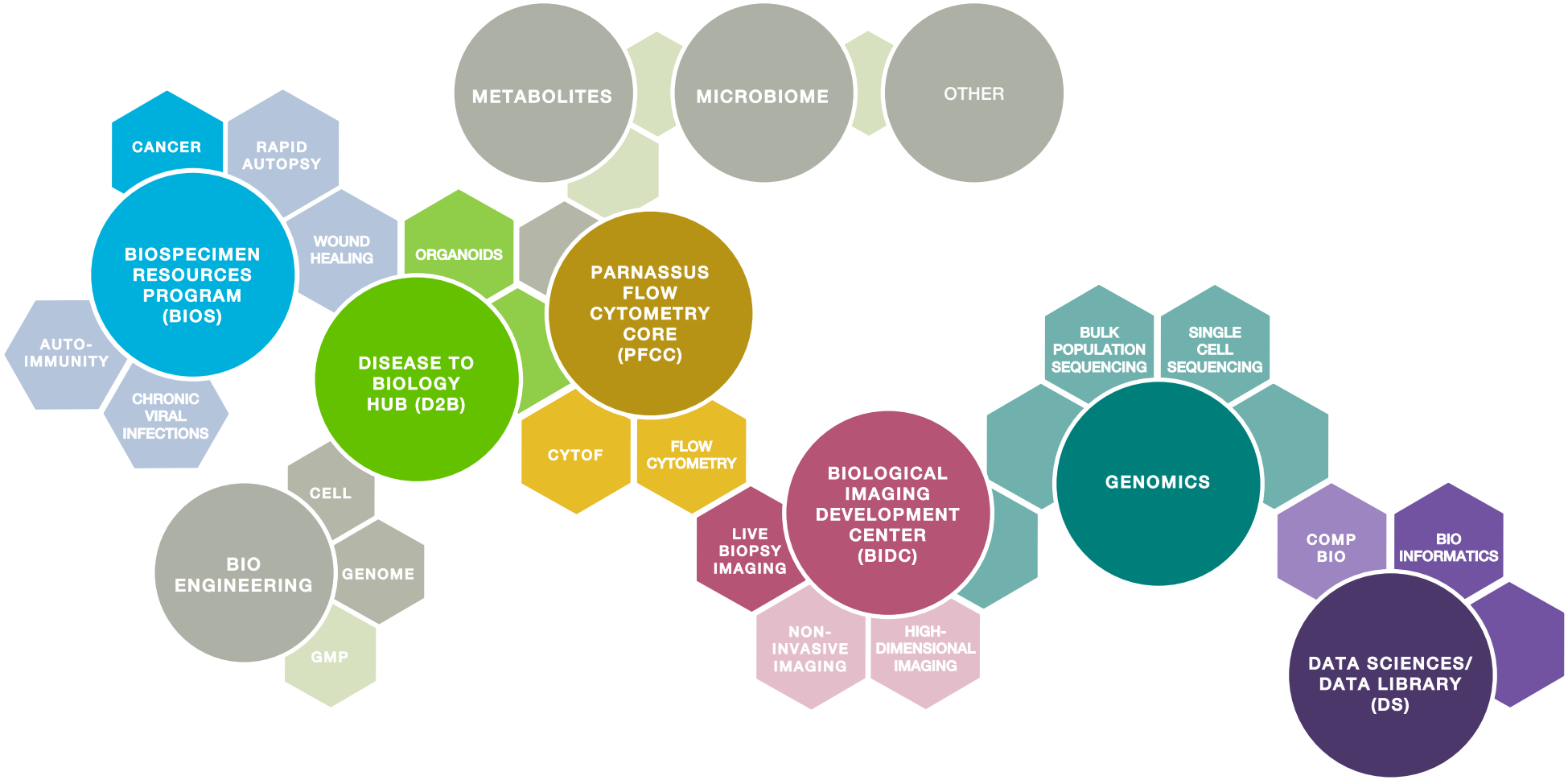
CoLabs at Parnassus



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Benefits to Parnassus and UCSF

Dramatically lower barriers for interdisciplinary collaborations

- Allows access to sophisticated approaches essential for cutting-edge science
- Especially important for early stage investigators and clinical-scientists

Drive more efficient use of costly sharable resources

- Reduce costs and need for space in other Parnassus projects that will follow
- Data sharing ensures maximizes benefits of patient-based research

Reduce glaring inequities between Parnassus and MB

- Improve Parnassus morale and build excitement about the future of Parnassus
- Decrease need to travel to MB for important services

Enable a new financial model

- Attract a broader range of funders
- Leverage large project funding to benefit the whole community

Provide a visible center for researchers at Parnassus

- Build a sense of community
- Provide new facilities and personnel for training and innovation

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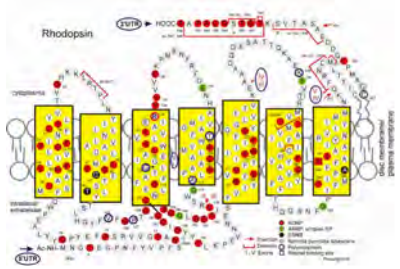
Single CoLab Use Case

Doug Gould, PhD and **Scott Oakes, MD** want to use gene editing to cure inherited forms of blindness. They are looking for mouse models for assessing the efficacy of editing a relevant target gene in the retina. Doug and Scott consult with Michael McManus who provides advice about suitable tools. They can develop the required transgene constructs in their own labs or travel to the MB Cell and Genome Engineering Core to work with them. For generation of transgenic mice from ES cells, Parnassus investigators can use either the Gladstone core or an off-campus service provider. Mice are then shipped to Doug and Scott, who genotype them and deliver some mice to the LARC Rederivation Core for preservation. Therapeutic CRISPR AAVs can be produced with help from the UCSF ViraCore.



BIOLOGICAL IMAGING DEVELOPMENT CENTER

GENOMICS

DATA SCIENCES/ DATA LIBRARY

SINGLE COLAB PROJECT

Step 1. Doug and Scott work with the Genomics **CoLab** director to design the experiment, offering new technologies that raise impact and often save both time and money.

Step 2. The Genomics **CoLab** performs ES gene targeting, microinjects ES cells, helps genotype animals and offers a phenotyping service via UCD liaison.

Step 3. The Genomics **CoLab** biobanks locally or with a UCD liaison.

Step 4. The Genomics **CoLab** produces the CRISPR AAV construct and coordinates with the ViraCore to produce therapeutic AAV.

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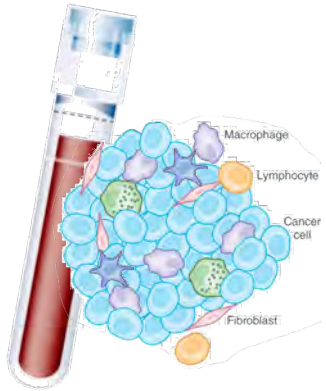
CoLabs Projects



Jocelyn Chapman, MD is keen to understand the immune diversity of gynecological tumors that she is obtaining in the clinic. Like many clinician-scientists, she does not have her own lab with the capacity to undertake this work. Instead, she is able to contribute tumor and blood specimens and a clinical research coordinator FTE to CoLabs.

BIOSPECIMEN RESOURCES PROGRAM

DISEASE TO BIOLOGY HUB

PARNASSUS FLOW CYTOMETRY CORE

BIOLOGICAL IMAGING DEVELOPMENT CENTER

GENOMICS

DATA SCIENCES/ DATA LIBRARY

COLABS PROJECT

Step 1. Jocelyn works with the **CoLabs** director to define pilot project of 12 ovarian samples in the pipeline. **BIOS** works with Jocelyn to identify, consent, and acquire tissue & blood from patients.

Step 2. **BIOS** transfers tissue & blood to **D2B** technician. **D2B** technician takes a tissue slice for H&E/IF and dissociates the rest; the technician also isolates PBMCs from blood.

Step 3. **D2B** technician works with **PFCC** personnel to reserve FACS, sort tumor/immune cells for multi-omic analyses, and runs several stain panels to understand the immune composition.

Step 4. **BIDC** personnel receives tissue slices from **D2B** technician and uses multiplexed IF imaging techniques and quantification methods to understand spatial interplay of tumor/immune cells.

Step 5. **Genomics** personnel receives sorted tumor/immune cells from **D2B** technician and isolates RNA & DNA for transcriptomic & genomic sequencing of tumor/immune compartments.

Step 6. **Bioinformaticians** receive, curate, and store all data (including clinical) in the **UCSF Data Library**, and work with Jocelyn to develop analytical tools to mine the ovarian tumor dataset. Data is “freed” to all UCSF investigators after set determined time.

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Impact on Researchers

Improve services for existing users of Parnassus cores

- **PFCC (Flow Cytometry)** 140 PIs
- **BIDC (Imaging)** 51 PIs, 19 departments
- **CTSI CRS Sample Processing Core** 59 PIs
- **IHG Core Single Cell RNA-seq** ~50 PIs
- **Parnassus Center for Advanced Technology** ~15 PIs
- **Immunoprofiler Flow/Sequencing and Allied Projects** ~25 PIs

Provide on-site access to key services now only available elsewhere

- **Nikon Imaging Center in Genentech Hall** 191 PIs, ~15% at Parnassus
- **Center for Advanced Technology in Genentech Hall** 150 PIs, ~15% at Parnassus
- **Transgenic Core at Gladstone** ~35 UCSF PIs, >50% at Parnassus
- **Functional Genomics Core in Rock Hall** 55 PIs, 49% at Parnassus
- **Clinical Immunology Lab at ZSFG** 27 PIs, all would benefit from access to PFCC

Unlock access to transformative technologies for existing and new users

- **Data sciences** for storage and analysis of large datasets (including genomics)
- New **imaging** and **single cell analysis** methods
- **Advanced gene editing** (CRISPR and beyond)
- **Massively parallel functional assays**

New User Access

New users can enter the CoLabs in one of several ways:

- **Direct access:**
  Access by interacting directly with the CoLabs Director. The new user will typically be the PI and the project will largely be managed by personnel determined by the Director.
- **Sponsored access:**
  Access through collaboration with an existing user (Sponsor). The project will largely be managed by personnel “linked” to the Sponsor’s existing project.
- **Recharge/subscription access:**
  Each CoLab will retain its traditional “core” capacities, *e.g.* daily users who use a single-piece of equipment

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CoLabs OrgChart

COLABS AT PARNASSUS

COLABS DIRECTOR

D2B
COLABS AT PARNASSUS

D2B STEERING COMMITTEE

D2B DIRECTOR

PFCC
COLABS AT PARNASSUS

PFCC STEERING COMMITTEE

PFCC DIRECTOR

BIDC
COLABS AT PARNASSUS

BIDC STEERING COMMITTEE

BIDC DIRECTOR

GENOMICS
COLABS AT PARNASSUS

GENOMICS STEERING COMMITTEE

GENOMICS DIRECTOR

DS
COLABS AT PARNASSUS

DS STEERING COMMITTEE

DS DIRECTOR

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D2B OrgChart

TISSUE PROCESSING LAB

- Franz Villaroel, PhD — Imaging-Specific Embed #1
- Clinician/Scientist TBD — Imaging-Specific Embed #2
- Arjun Rao, PhD — Data Science-Specific Embed
- Clinician/Scientist TBD — Flow-Specific Embed
- Alexis Combes, PhD — Embedded Scientist
- Kevin Barry, PhD — Embedded Scientist
- Amar Patel, MD — Embedded Clinician

Embedded Researchers

- Gabi Reeder — 100/20 Technician
- Karen Tolentino — 100/20 Technician
- Jasmine Sjarif — 100/20 Technician
- Evans Shao — 100/20 Technician
- Jessica Tsui — 100/20 Technician
- Joy Hsu — 100/20 Technician
- Arun Burra — 100/20 Technician

Technicians

ORGANOIDS LAB

- Michelle Oghenekevwe — Organoids Lead
- Taymour Hammoudi, MD — Organoid-Specific Embed #1
- Clinician/Scientist TBD — Organoid-Specific Embed #2

Embedded Researchers

- Technician TBD — 100/20 Technician
- Technician TBD — 100/20 Technician

Technicians

EXPANSION PROJECTS

- Clinician/Scientist TBD — Mouse-Specific Embed
- Clinician/Scientist TBD — Embedded Scientist
- Clinician/Scientist TBD — Embedded Scientist
- Clinician/Scientist TBD — Embedded Scientist
- Clinician/Scientist TBD — Embedded Scientist

Embedded Researchers

- Technician TBD — Mouse Technician
- Technician TBD — 100/20 Technician
- Technician TBD — 100/20 Technician
- Technician TBD — 100/20 Technician
- Technician TBD — 100/20 Technician

Technicians

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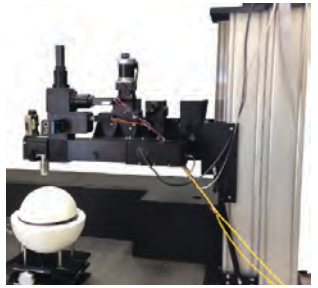
Space Programming

01/ 02 wet labs - 31 knee holes

05/ 06 tissue culture rooms - 20 BSC

01 large shared microscope room

05 small microscope rooms



01 large flow cytometry room

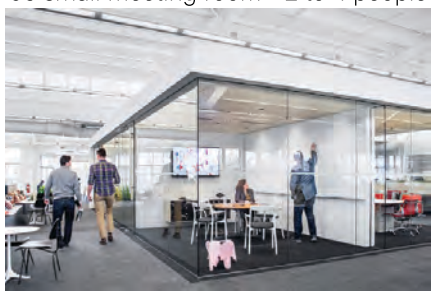
01/ 02 equipment rooms

01/ 02 dry labs - 46 desks

03 private offices - 3 desks

03 shared offices - 12 desks

06 small meeting room - 2 to 4 people



02 small conference rooms - 4 to 6 people

01 conference room - 12 to 16 people

01 seminar/ training room - 20 people

01/ 02 break rooms

Estimated program space needs:
19,251 SQFT

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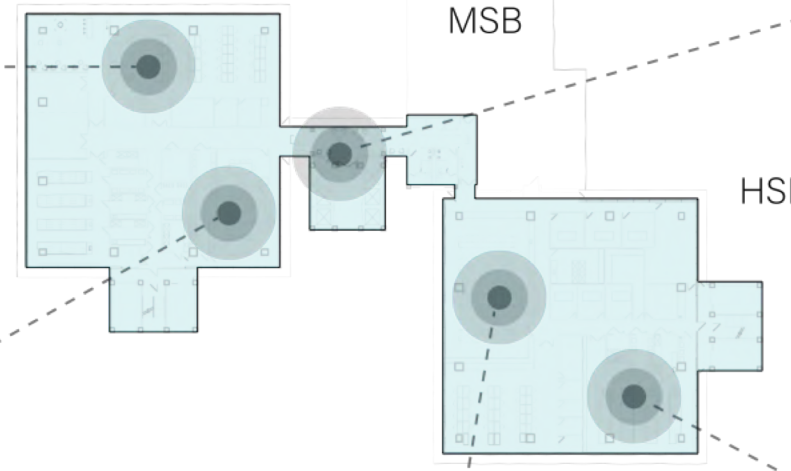
Design Considerations

Collaborating

HSW

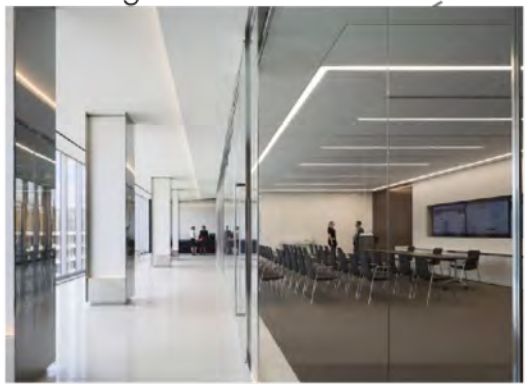
MSB

HSE



Socializing

Learning



Visual connection

Flexibility

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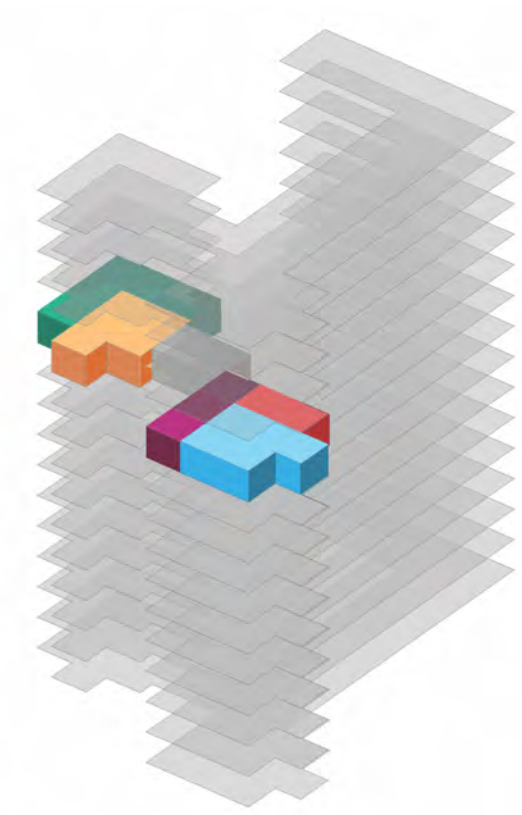
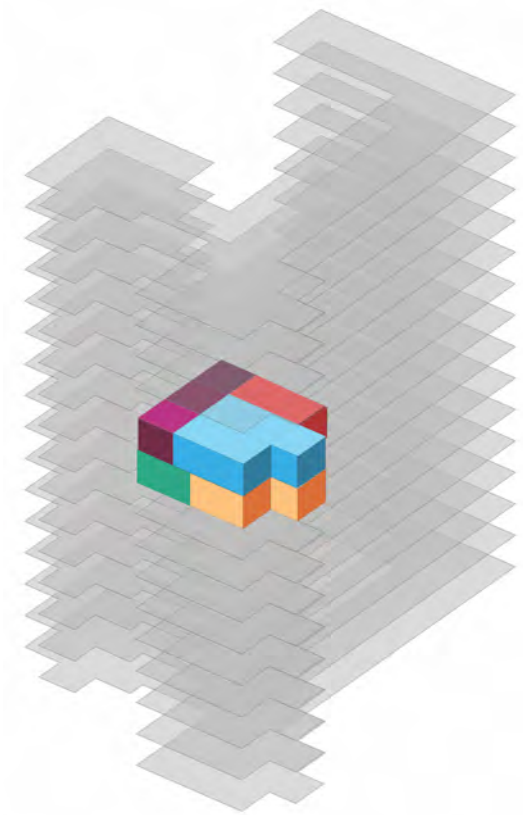
Space Options Considered

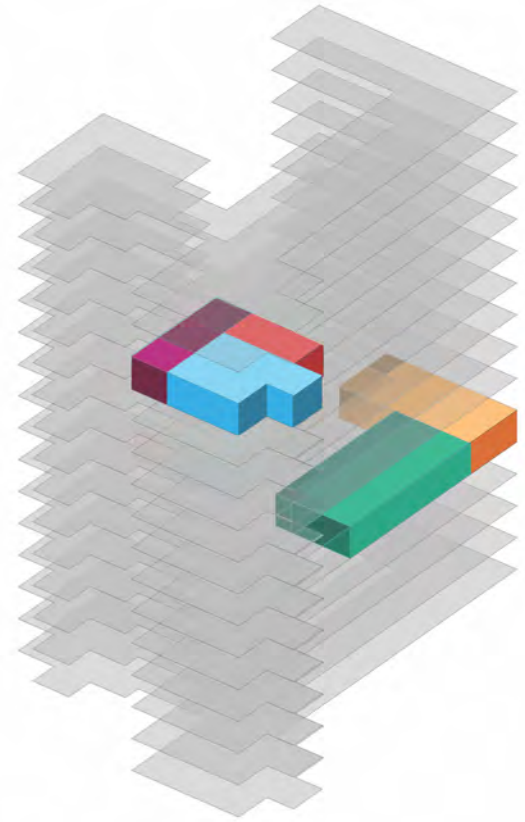
Adjacent



Stacked



Separated



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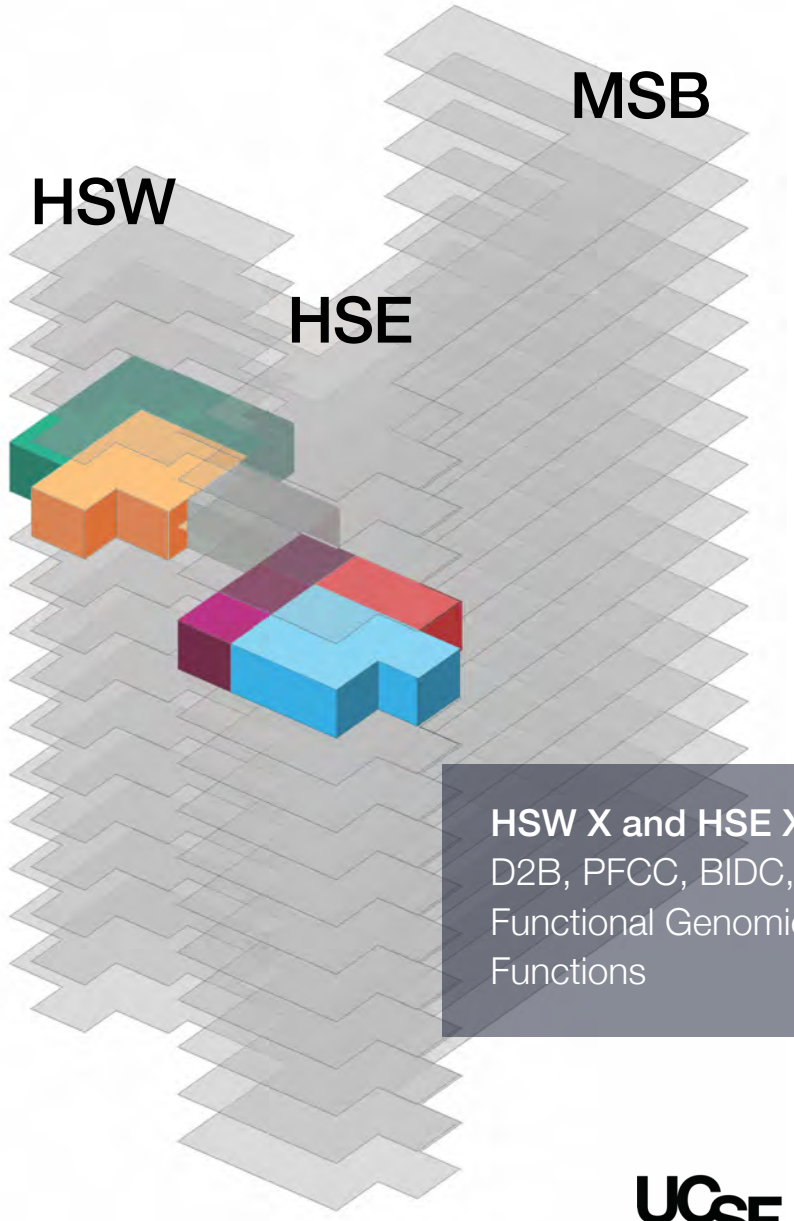
Space Options

Adjacent Floors

- **Pros**
  - Optimal for integration of all CoLabs
  - Maximizes chance “human collisions” designed to spark innovation and collaboration
  - Enables development of space between HSE & HSW for interaction area
  - Maximizes visibility of the CoLabs
- **Cons**
  - There are no HSIR levels with two floors (HSE & HSW) that are both in urgent need of renovation



HSW X and HSE X
D2B, PFCC, BIDC, Data Sciences, Functional Genomics, and Communal Functions

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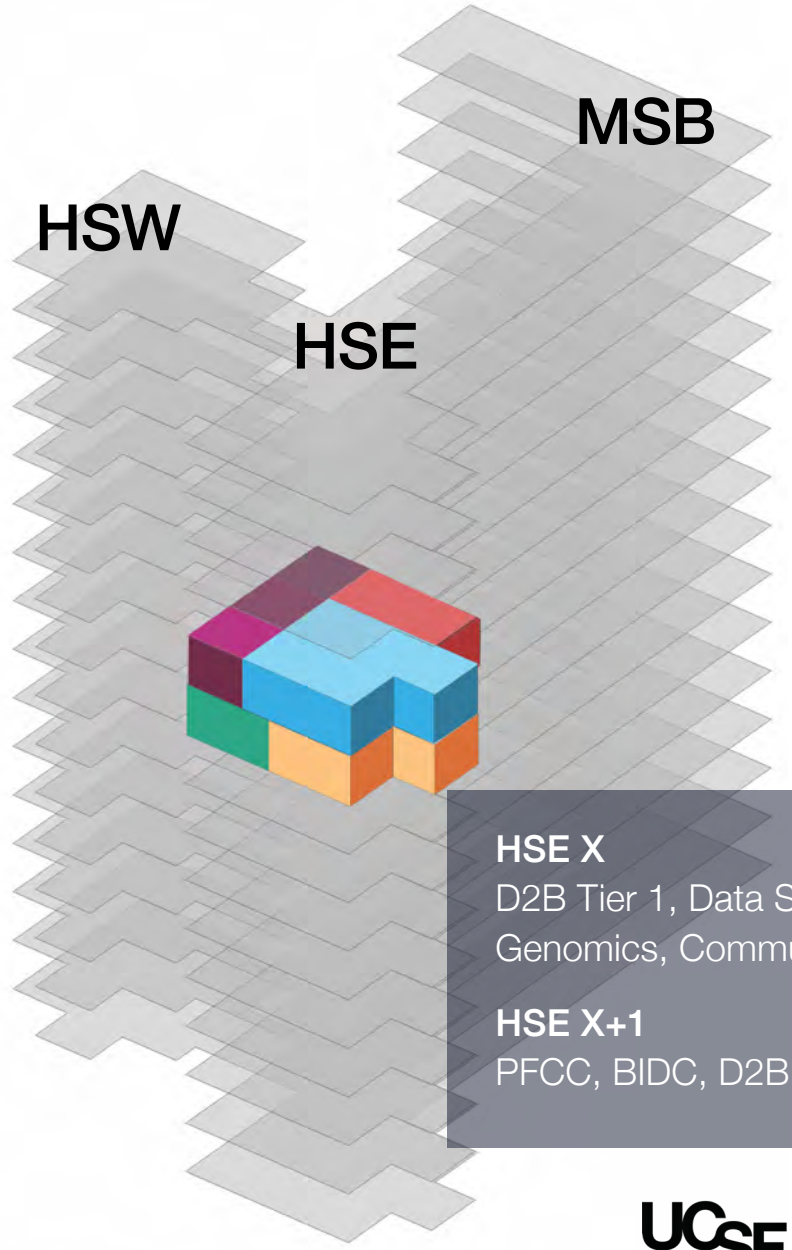
Space Options

Stacked Floors

- **Pros**
  - Sets of stacked HSIR floors are in need of renovation (HSE4/5/6, HSE11/12/13, HSW14/15/16)
  - Could be developed as functionally contiguous space with inclusion of an internal staircase and an atrium
- **Cons**
  - Does not promote interactions as well as a single-level design
  - Internal stairs/atrium sacrifices space
  - Does not leverage underutilized space between HSE & HSW



HSE X
D2B Tier 1, Data Sciences, Functional Genomics, Communal Functions

HSE X+1
PFCC, BIDC, D2B Tier 2 & 3

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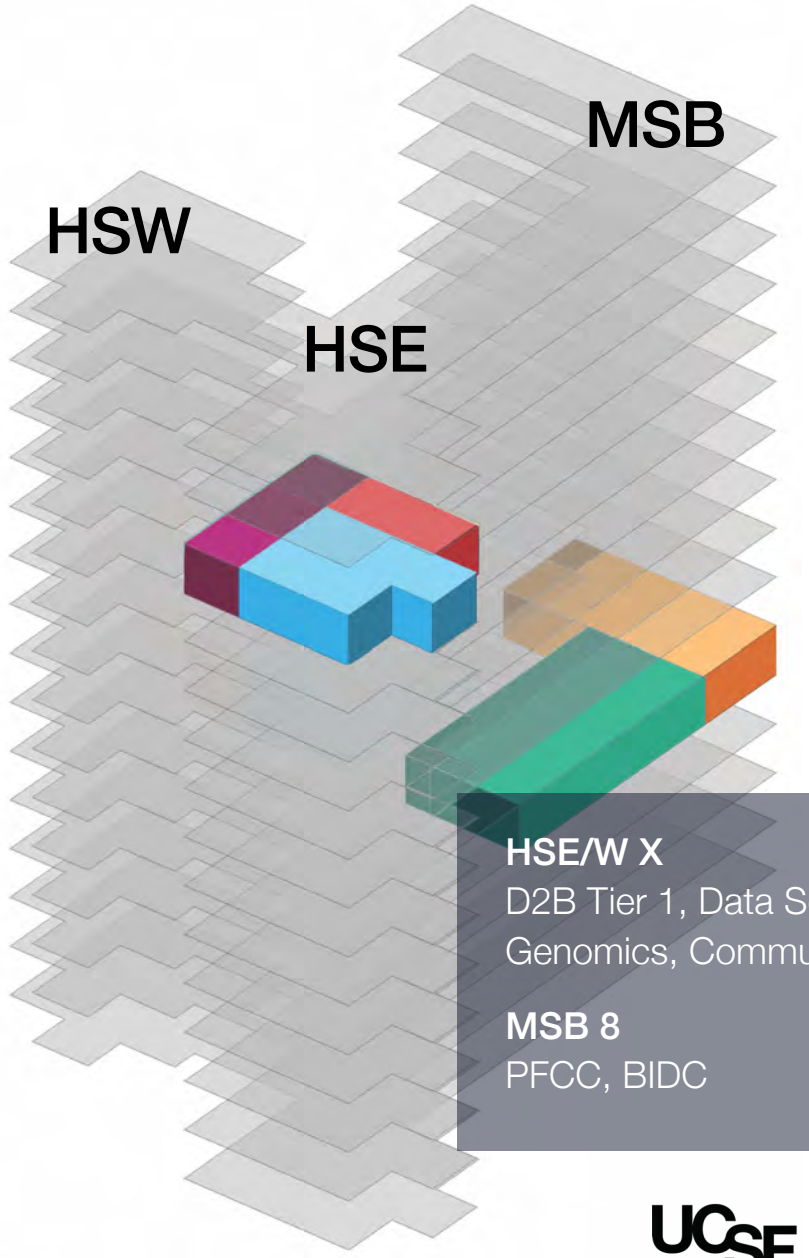
Space Options

Separated Floors

- **Pros**
  - Retains PFCC in existing space
  - Only need to relocate occupants of one floor
- **Cons**
  - Non-contiguous space
  - Discourages interactions
  - Less ability to adapt to new demands for space
  - Requires some duplication of space program elements
  - Requires development of additional space outside of the main CoLabs HSIR floor to accommodate expansion of PFCC and a new BIDC facility



HSE/W X
D2B Tier 1, Data Sciences, Functional Genomics, Communal Functions

MSB 8
PFCC, BIDC

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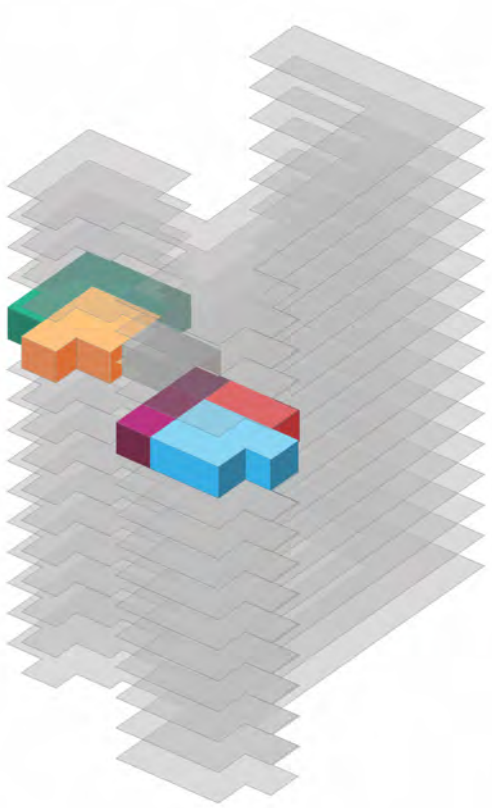
Space Options Recommendations

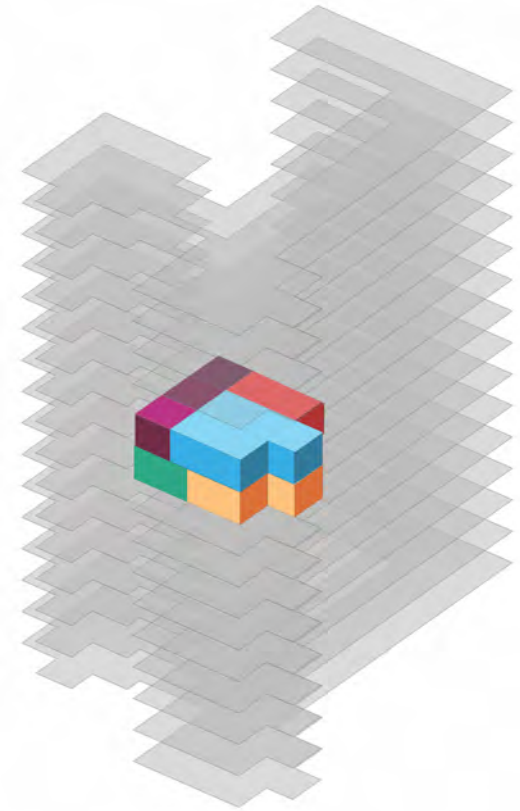
Adjacent

HIGHLY RECOMMENDED



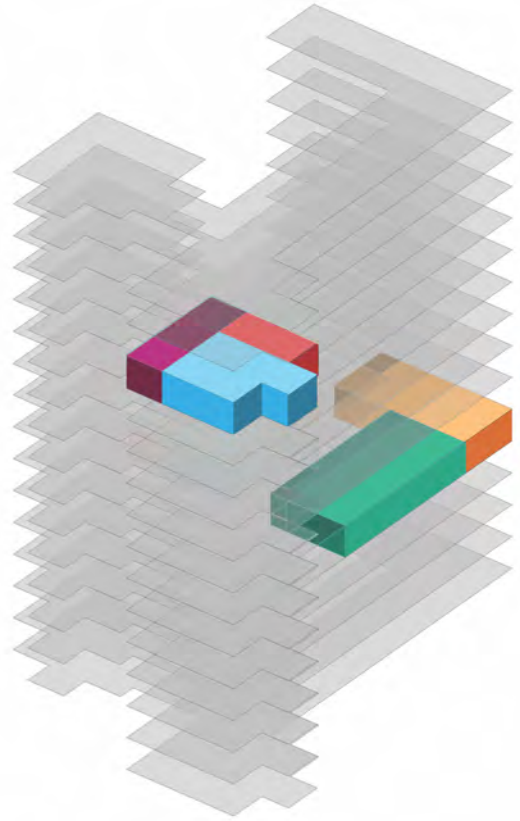
Stacked

VIABLE OPTION



Separated

NOT RECOMMENDED



Adjacency issues

- **Should be centrally located**
  - Increased visibility
  - Better access for those in multiple buildings including the HS towers, MSB, and the Dolby Regeneration Medicine Building
  - Encourages more interactions
- **Uncertainties about future locations of other facilities is a challenge**
  - More information about Parnassus plans could help
  - Waiting for a complete Parnassus plan would introduce major delays
  - The CoLabs design should be flexible enough to allow repurposing of CoLabs space as needed

Financing

- ## Start-up costs
  - **CoLabs construction costs:**

    Working estimate is $30M for 2 tower floors
  - **CoLabs equipment costs:**

    Large majority of equipment already exists and can be relocated to CoLabs
  - **Displaced labs relocation costs:**

    Estimated relocation budget is between $400 asf and $2,000 asf

- ## Operating costs
  - **Funding sources:** Recharge, subscription, grants, 100/20 model, & campus support ($400K/year)
  - **Launch:** 2018-2019

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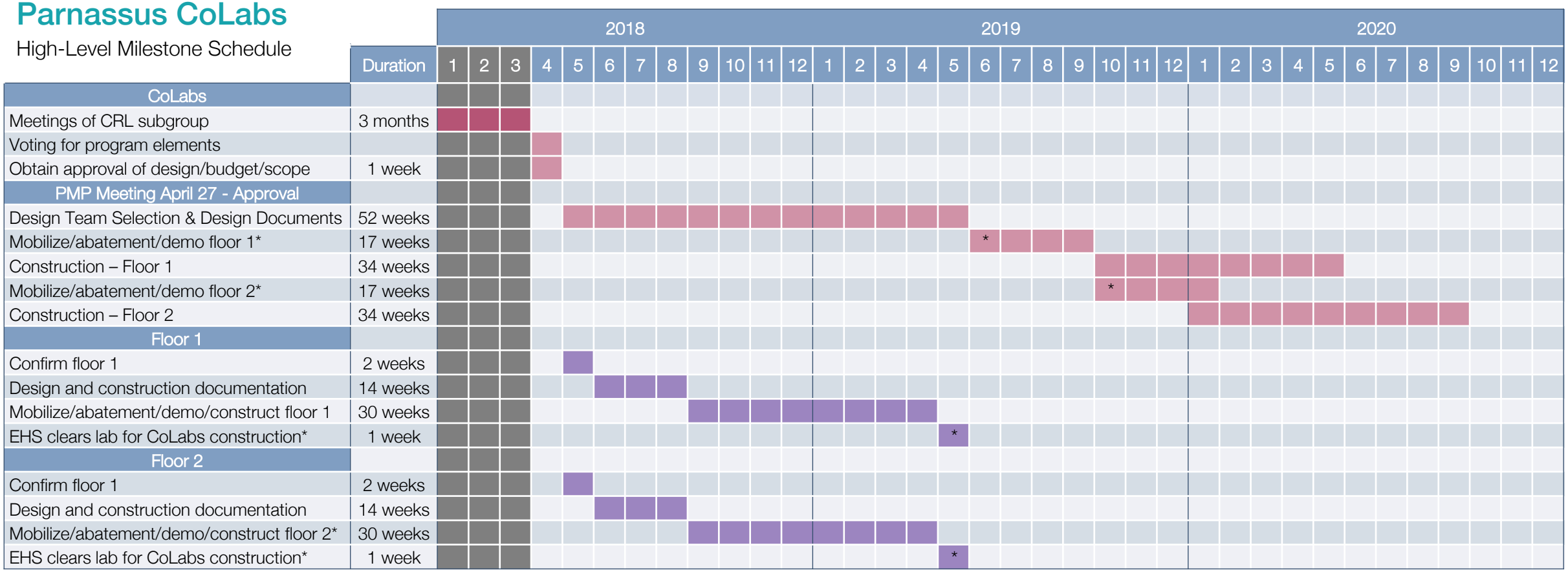
Timeline (subject to change)

Parnassus CoLabs

High-Level Milestone Schedule



	Duration
CoLabs	
Meetings of CRL subgroup	3 months
Voting for program elements	
Obtain approval of design/budget/scope	1 week
PMP Meeting April 27 - Approval	
Design Team Selection & Design Documents	52 weeks
Mobilize/abatement/demo floor 1*	17 weeks
Construction – Floor 1	34 weeks
Mobilize/abatement/demo floor 2*	17 weeks
Construction – Floor 2	34 weeks
Floor 1	
Confirm floor 1	2 weeks
Design and construction documentation	14 weeks
Mobilize/abatement/demo/construct floor 1	30 weeks
EHS clears lab for CoLabs construction*	1 week
Floor 2	
Confirm floor 1	2 weeks
Design and construction documentation	14 weeks
Mobilize/abatement/demo/construct floor 2*	30 weeks
EHS clears lab for CoLabs construction*	1 week

** Dependent events*

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CoLabs and the Future of Parnassus

The CoLabs project is important both as a resource and as a symbol

Many are deeply skeptical that Parnassus is the best place to do science and acutely aware of the lack of parity with Mission Bay

CoLabs can help by:

- Making Parnassus a better, more exciting place to do research
- Providing a highly visible early example of how UCSF is reinvesting in Parnassus

The success of the CoLabs will require a real commitment

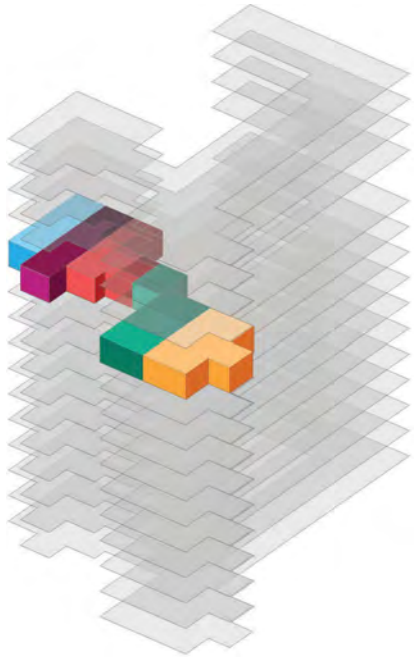
There are competing demands for space, funds, and attention

Finding a suitable CoLabs site will be hard

Detailed CoLabs planning must continue over the coming months

An ongoing investment will be required

Summary



Key principles

- Be “big and bold”
- Start now, maintain a sense of urgency, communicate clearly
- Continue to engage the faculty since many want to help solve problems and identify opportunities
- Make the CoLabs a transformational resource for Parnassus

Major recommendations

- Focus on site selection since this is currently the rate-limiting step
- We strongly recommend a centrally located, contiguous space (~20,000 sq. ft. or two tower floors)
- Develop a system for working with displaced groups to find good relocation solutions for them
- Funds will be required for ongoing CoLabs operations as well as CoLabs construction (including relocation)
- Many CoLabs activities should begin before the new space is completed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CRL Task Force Members

Disease-to-Biology (D2B)
Saurabh Asthana
Vincent Chan (lead)
Hugh Cotter, Oculus Architects
Diane Kay
Max Krummel (lead)
Tippi Mackenzie
Patti Mitchell
Jeff Mulish
Jeroen Roose
Elizabeth Sinclair
Matt Spitzer
Scott Vandenberg

Biological Imaging Development Center (BIDC)
Hugh Cotter, Oculus
Diane Kay
Max Krummel
Diana Laird
Delaine Larsen
Mark Looney
Patti Mitchell
Matt Spitzer
Val Weaver
Torsten Wittmen
Katherine Yang (lead)

Flow Cytometry
Hugh Cotter, Oculus
Diane Kay
Max Krummel
Mike Lee
Cliff Lowell
Patti Mitchell
Matt Spitzer (lead)
Qizhi Tang

Transgenic
Nadhav Ahituv
Hugh Cotter, Oculus
Diane Kay
Averil Ma
Alex Marson
Mike McManus (lead)
Patti Mitchell
Elizabeth Sinclair

Physical Environment
Eric Chow (lead)
Hugh Cotter, Oculus
Diane Kay
Patti Mitchell
Elizabeth Sinclair
Matt Spitzer

Genomics
Nadhav Ahituv (lead)
Andrea Barczak
Eric Chow
Hugh Cotter, Oculus
Lindsey Criswell
David Erle
Chun (Jimmie) Ye
Diane Kay
Alberto Marquez
Alex Marson (lead)
Michael McManus
Patti Mitchell
Yin Shen
Elizabeth Sinclair
Ryan Wagner
Pui Yan Kwok

Data Sciences/Data Library (Bioinformatics)
Hugh Cotter, Oculus
Lindsey Criswell (lead)
Walter Eckalbar
Diane Kay
Patti Mitchell
Elizabeth Sinclair
Matt Spitzer
Chun (Jimmie) Ye (lead)

COLABS AT PARNASSUS

Current locations of related facilities (partial)

Disease to Biology/Sample Processing	HSE 3 multiple rooms (Immunoprofiler) MSB 1234 (CTSI Clinical Specimen Processing Lab) Fong, Spitzer, Ye labs at PH ZSFG Building 100 (Core Immunology Lab)
Flow Cytometry	MSB 8 (854a/b, 854, 860) MSB 14 (1456) HSE 3 (301D, 302E) HSW 5 (542) HSW 12 (1209)
Imaging	MSB 11 (1105, 1109/S1109A, 1114, 1121, 1123) HSW 5 (536, 539) MB Genentech Hall (Nikon Imaging Center)
Data Sciences/Data Library	HSE 304 Ye lab at PH MB Rock Hall (Functional Genomics Core Bioinformatics)
Functional Genomics (including Transgenic Animals)	HSW 9 (IHG) and HSW 10 (Diabetes Center/PCAT) Marson, McManus, and Ye labs at PH MB Genentech Hall (Center for Advanced Technologies, Cell & Genome Engineering Core) MB Rock Hall (Functional Genomics Core) Gladstone (Transgenic Core) Ahituv and Erle labs at MB

COLABS AT PARNASSUS

Preliminary Space Program

Group	Perm Staff	Priv. Office	Shared Office #	Shared Office P	Work Desks	Anal. Stats	Wet Lab Stats.	BSC	GSF	Notes
Disease to Biology - D2B										
Tier 1 (Immuno/ Bios/ Organoids)	13	0	0	0	11	0	9	7	1531	
Tier 2- CIL	6	0	1	4	0	0	0	3	520	
Tier 3- CTSI- Specimen Collection	6	0	0	0	4	0	0	2	455	
PFCC Flow Cytometry	10	1	0	0	6	0	2	0	3511	
BIDC	5	0	1	5	0	6	4	0	2426	
Data Sciences/Data Library	6	0	0	0	0	8	0	0	216	
Genomics	9	0	0	0	6	0	16	4	1541	
General Admin/ Shared Support	5	2	1	3	0	0	0	0	3610	Allows for private offices for ImmunoX/ CRL director, RRP director, shared office for Strategic Alliance, D2B and Bios managers (total approx. 330 GSF); shared spaces such as Huddle rooms (6); small Conference (2); Large Conf. (1), Seminar/ Training room; Kitchen/ Break; IDF's; Recycling, Electrical Rms.
Shared Lab Support	0	0	0	0	0	0	0	0	450	Shared functions such as gas bottle storage, shared fume hoods, chemical storage rooms.
Sub-total	60	3	3	12	27	14	31	16	14260	
Circulation @ 35%									4991	May vary from 15% to 35% in lab suites, but calculated at 35% at this time due to design aesthetic and desire to have open spaces which may increase required SF for various program elements and access to them.
ESTIMATED TOTAL GSF									19251	

Notes

1. This program has been developed based on meetings/calls with each of the individual groups and meetings/calls with full sub-committee members.
2. General Admin / Shared Support includes (3) Management Offices (Private offices for CRL Lab Manager, RRP Manager and shared office for Strategic Alliance, D2B and BIOS); (6) Focus/Huddle Rooms; (2) Small Conference Rooms; (1) Large Seminar Room; (1/2) Break Room; (2) IDF; (2) Electrical Rooms; (2) Emergency Supply Rooms
3. Shared Lab Support includes shared (2) Gas Bottle Storage; (2) Chemical Storage Rooms; (2) Fume Hoods.
4. Hoteling stations not added at this stage; multiple "embedded researcher" stations provided.
5. BSL 2* Tissue Culture may not be provided.
6. Wet Lab stations are wet lab knee holes and do not include desks adjacent. Some shared desks will be added.
7. All information here should be considered as preliminary and should be fully verified.

Annual operational support request (first draft)

CoLabs Directors Support	$ 180,000
Technology Development Projects	70,000
General Lab Maintenance	50,000
Operational Support	100,000
Total Annual cost	$ 400,000

Courtesy of Elizabeth Sinclair