Consortium Science

HuBMAP and HTAN

Michael Snyder
Stanford University
November 17th

- ***Many NIH consortium projects have been initiated***
- *Human Genome Project*
- *ENCODE, modENCODE, mouse ENCODE, psychENCODE*
- *MoTrPAC, HMP, CPTAC*
- *Altas Building: HTAN, HuMAP*
- *NASA Twins Study*

Consortium Science

Opportunities

- *Bring in experts to tackle a lofty goal.*
- *Reduce redundancy and foster collaborations*

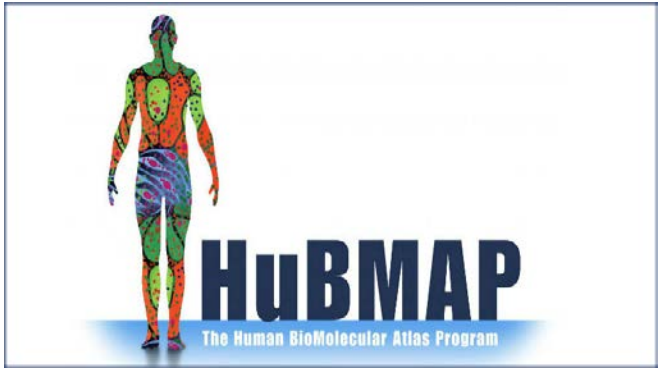
- *Lots of committees to coordinate activities*

HuBMAP

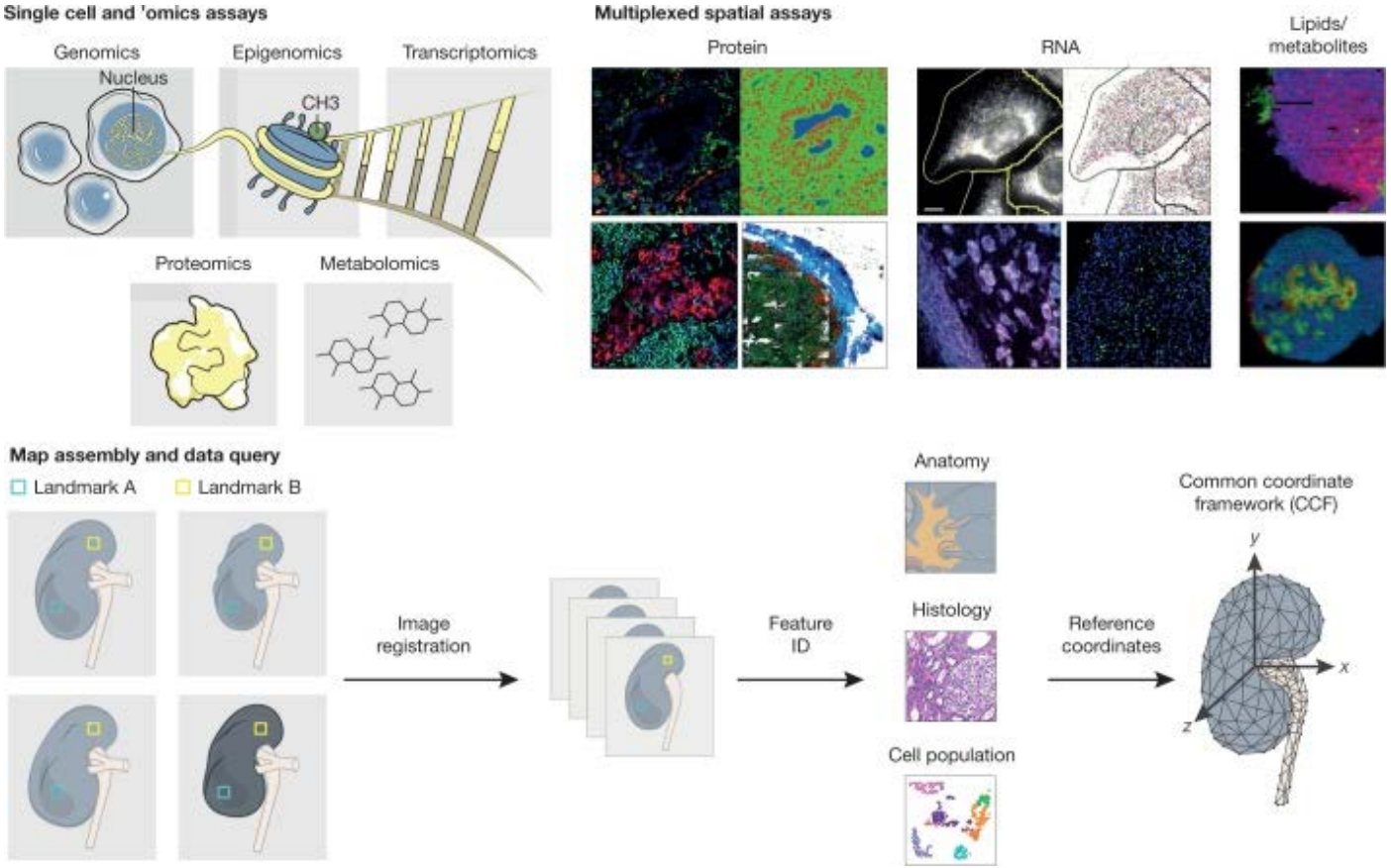
- NIH Common Funded Project

- Human Biomolecular Atlas Program (HuBMAP) intends to develop a widely accessible framework for comprehensively mapping the human body at single-cell resolution by supporting technology development, data acquisition, and detailed spatial mapping.

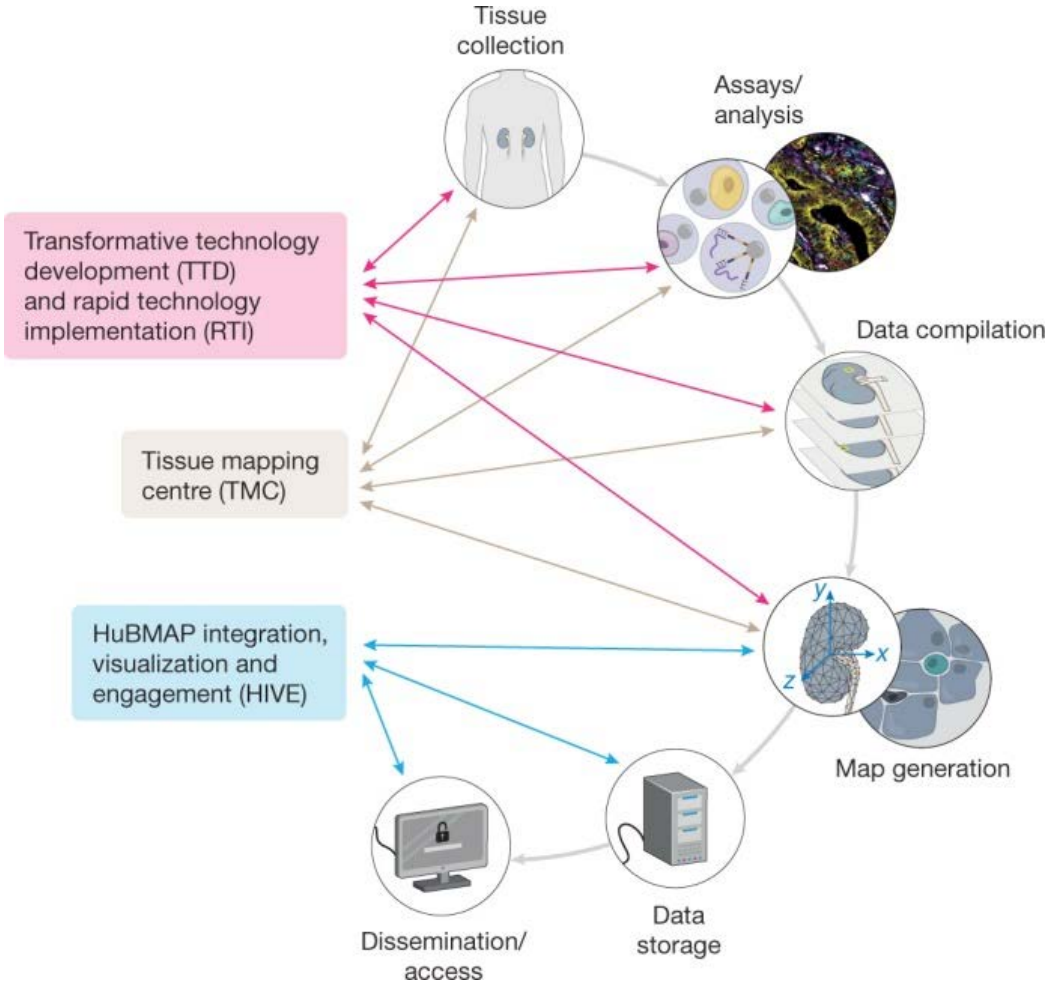
https://commonfund.nih.gov/hubmap



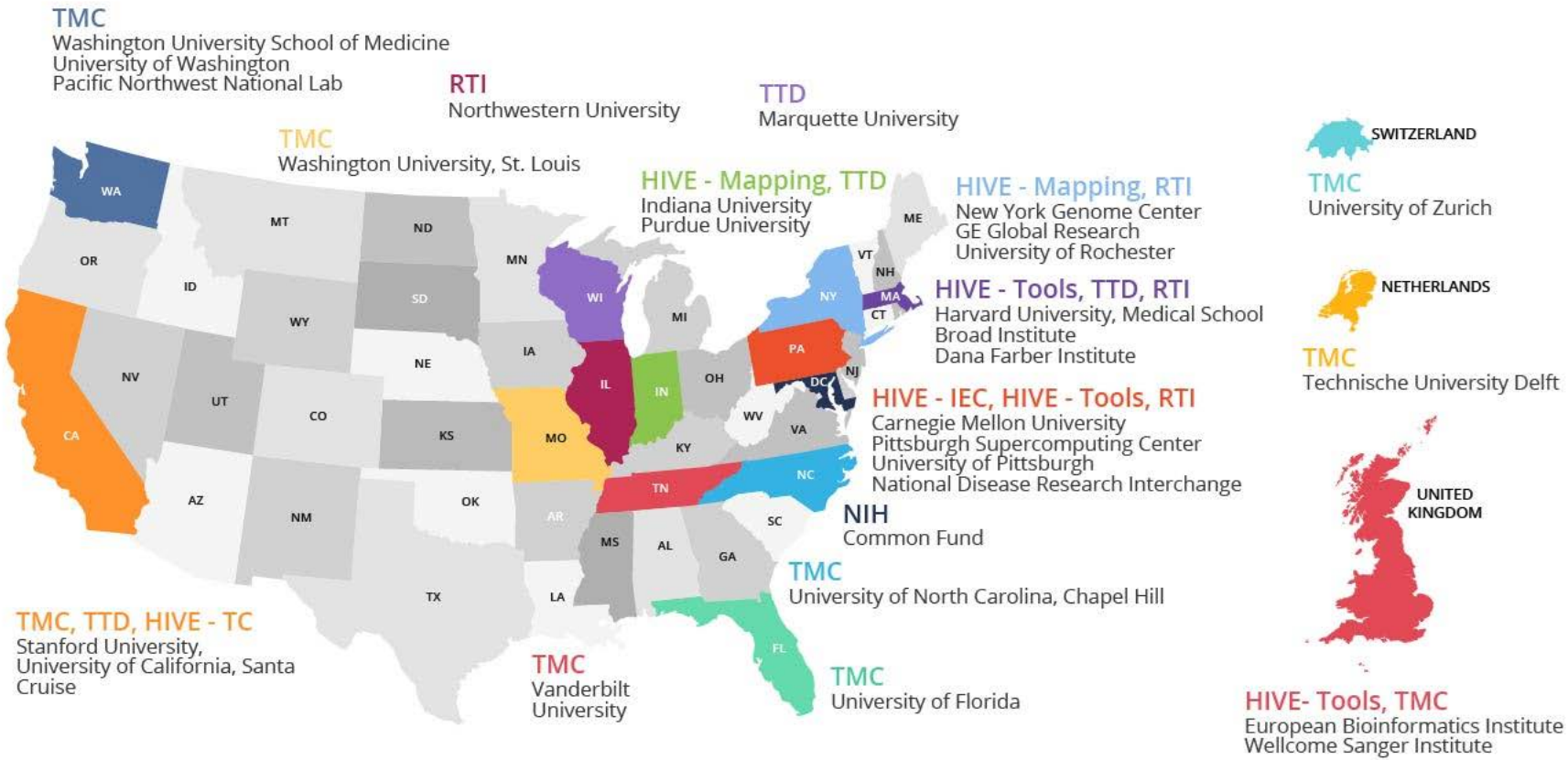
Build 3D Maps



HuBMAP Overview



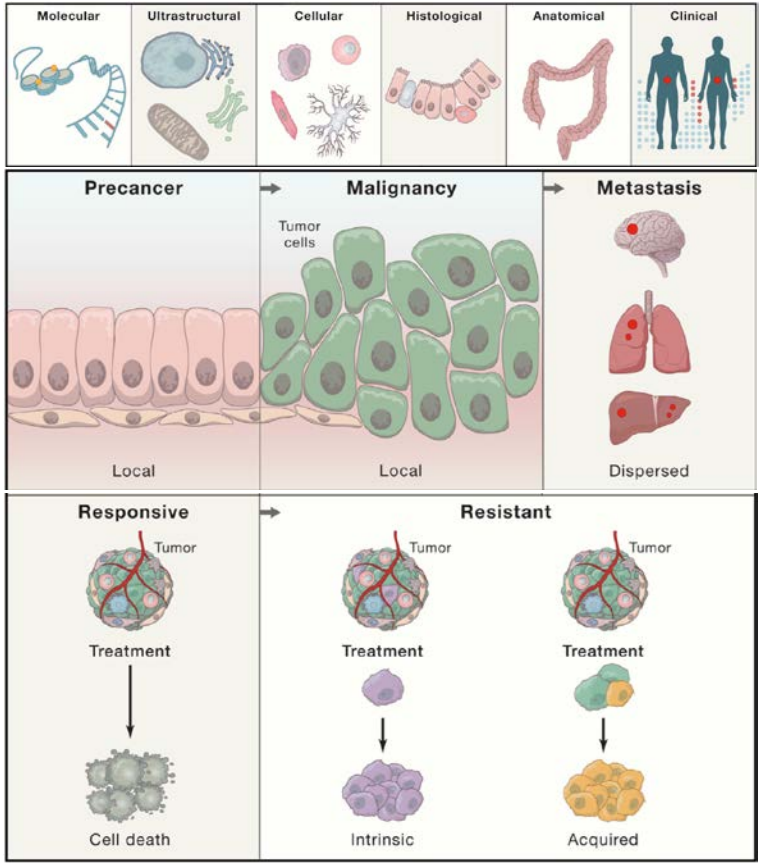
HuBMAP Funded Groups



The NCI Human Tumor Atlas Network

CANCER MOONSHOT

- **Overarching program goal:** Construct dynamic 3D atlases of human cancers
- ***Integrate*** molecular, cellular, and tumor tissue composition and architecture, including the microenvironment and immune milieu
- Describe ***transitions during cancer****:* pre-malignant lesions to malignancy, locally invasive to metastatic cancer



Rozenblatt-Rosen et al., Cell 2020

https://humantumoratlas.org/

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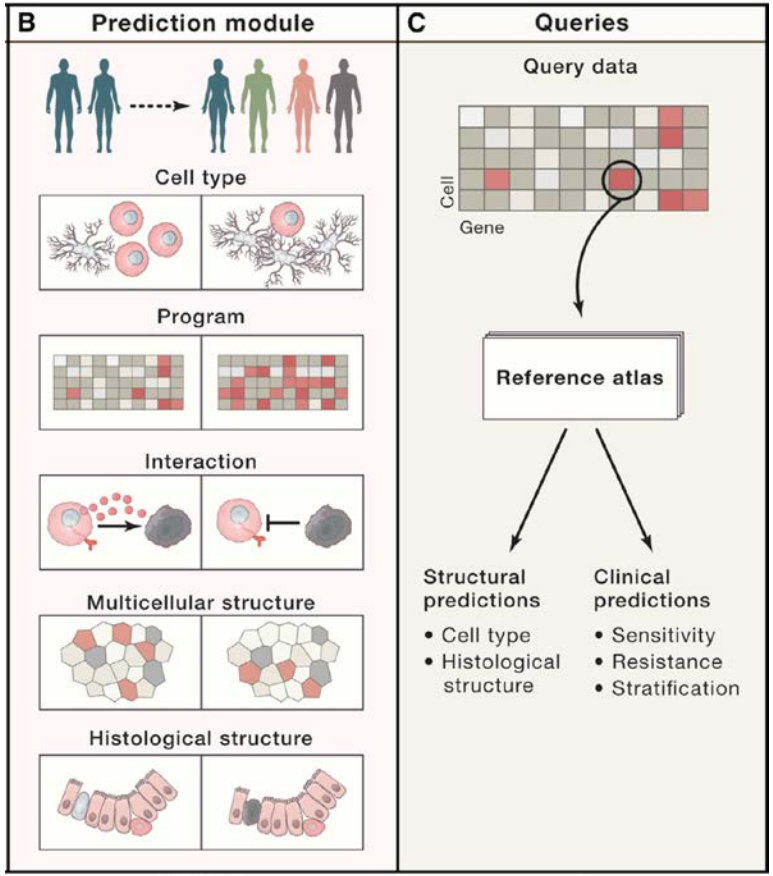
- Describe ***transitions during cancer****:* pre-malignant lesions to malignancy, locally invasive to metastatic cancer
- Represent a ***diverse patient population***, including minority and underserved patients
- Enable ***predictive modeling*** to discover biomarkers, understand basic cancer mechanisms, (eventually) refine therapeutic choices for patients.



https://humantumoratlas.org/

The NCI HTAN: Overview

HTAN structure: 10 HTAN U2C Centers (5 pre-cancer / 5 advanced cancer) + 2 Pilot Projects

DCC for data handling

Number of participants: 454 unique personnel (investigators, trainees, research staff) + NCI

Technologies employed:

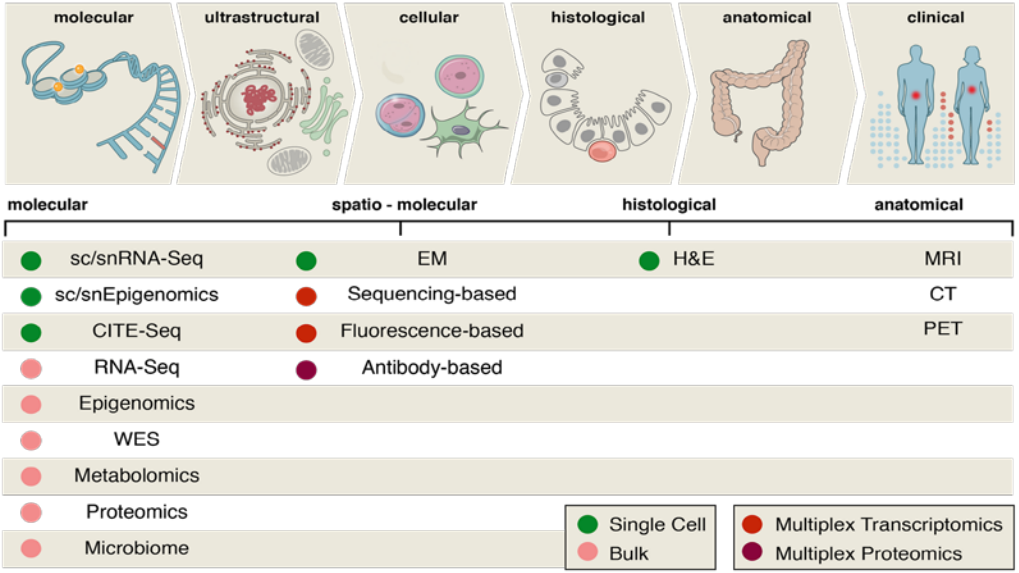


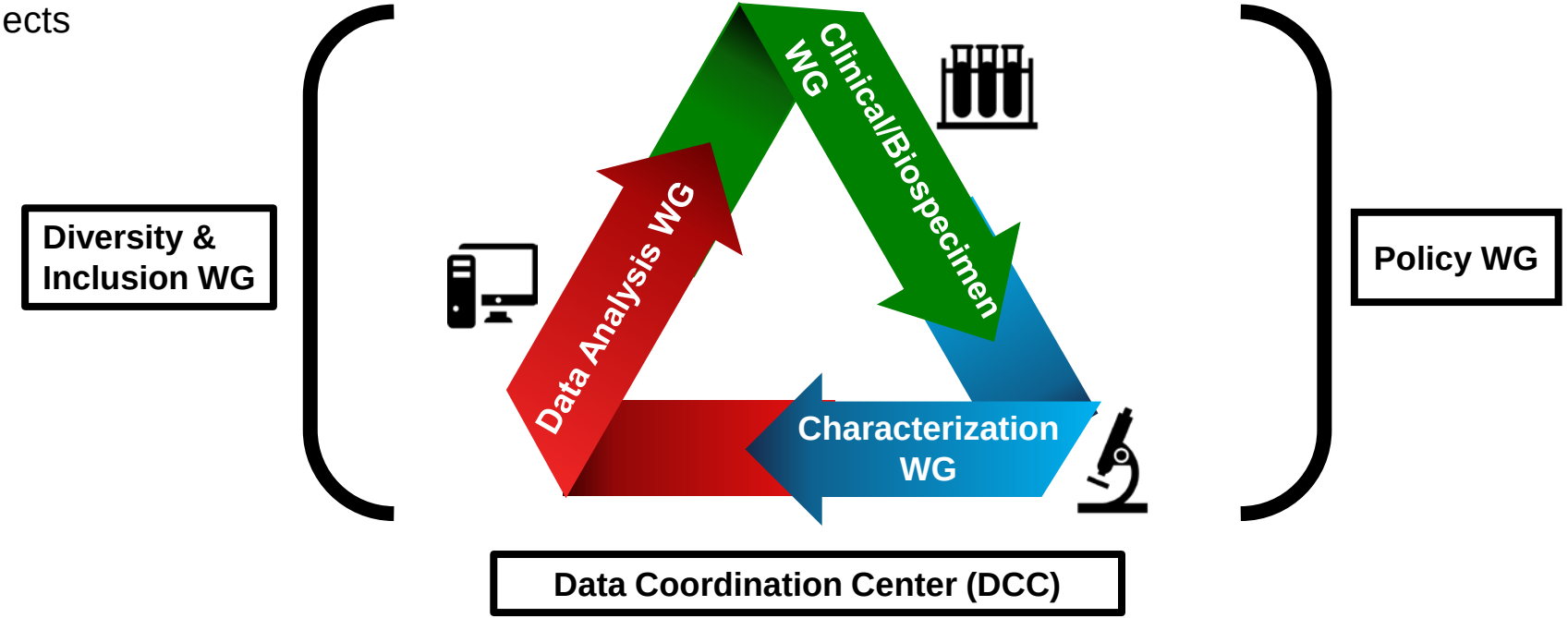
Image credit: Anna Hupalowska DFCI HTAN Team

HTAN – Network Coordination

CANCER MOONSHOT

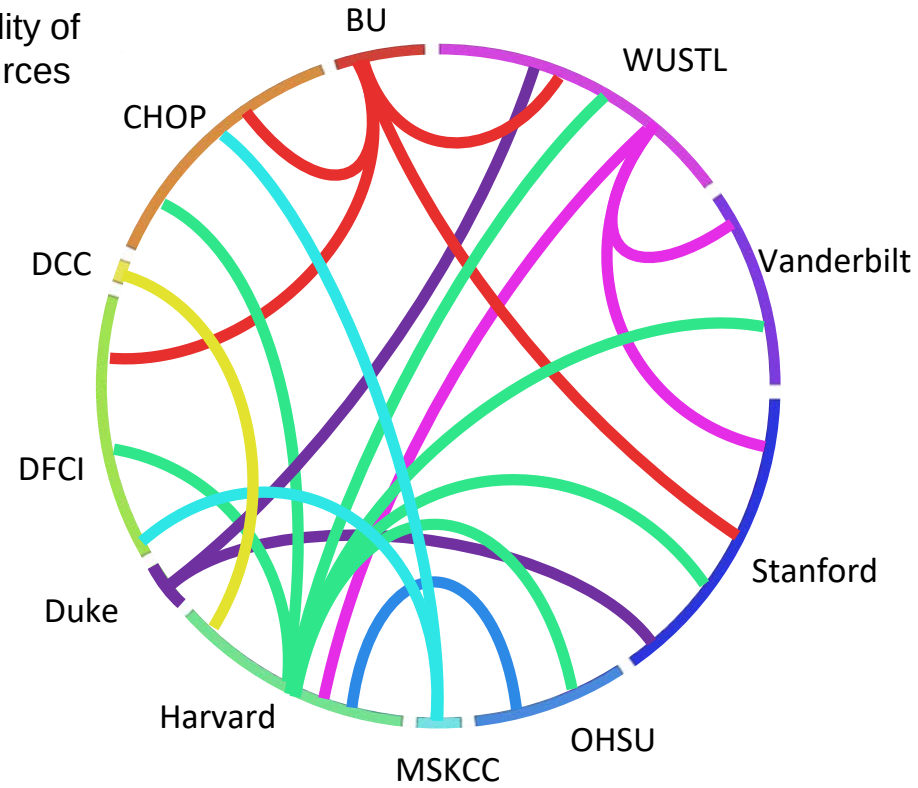
HTAN coordination mechanisms:

HTAN-DCC; Steering Committee Meetings; Bi-annual Meeting, Working Groups, Trans-Network Projects



HTAN Trans-Network Projects (TNPs)

- Optimizing repeatability, interpretability and accessibility of HTAN characterization methods on shared tissue sources
  - ***Breast Cancer Tumor Microarray***
  - ***Colorectal Cancer - Liver Metastasis***
  - * ***SARDANA (various tissues and methods)***
  - * ***SRRS (virtual repository for HTAN biospecimen)***
  - ***Ductal Carcinoma In Situ***
- Defining cell annotation and signatures
  - ***CASI***
- Image data sharing, visualization and analysis
  - ***Image Data Project***



Key FY20 Activity: Developing HTAN Consensus Data Formats and Metadata Dictionaries

CANCER MOONSHOT

1. Existing Standards

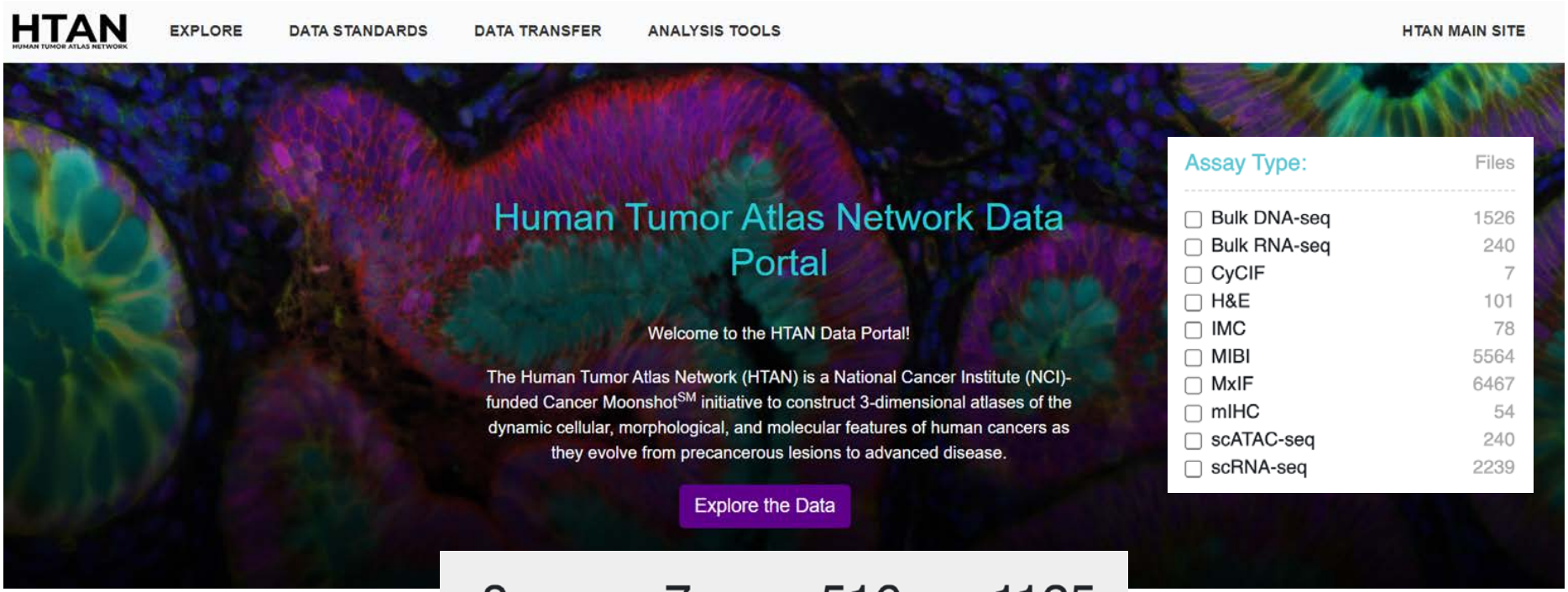
2. HTAN Working Group input

3. Request for comments (RFC)

4. HTAN Consensus

The HTAN Data Portal
First Data Release – May 2021

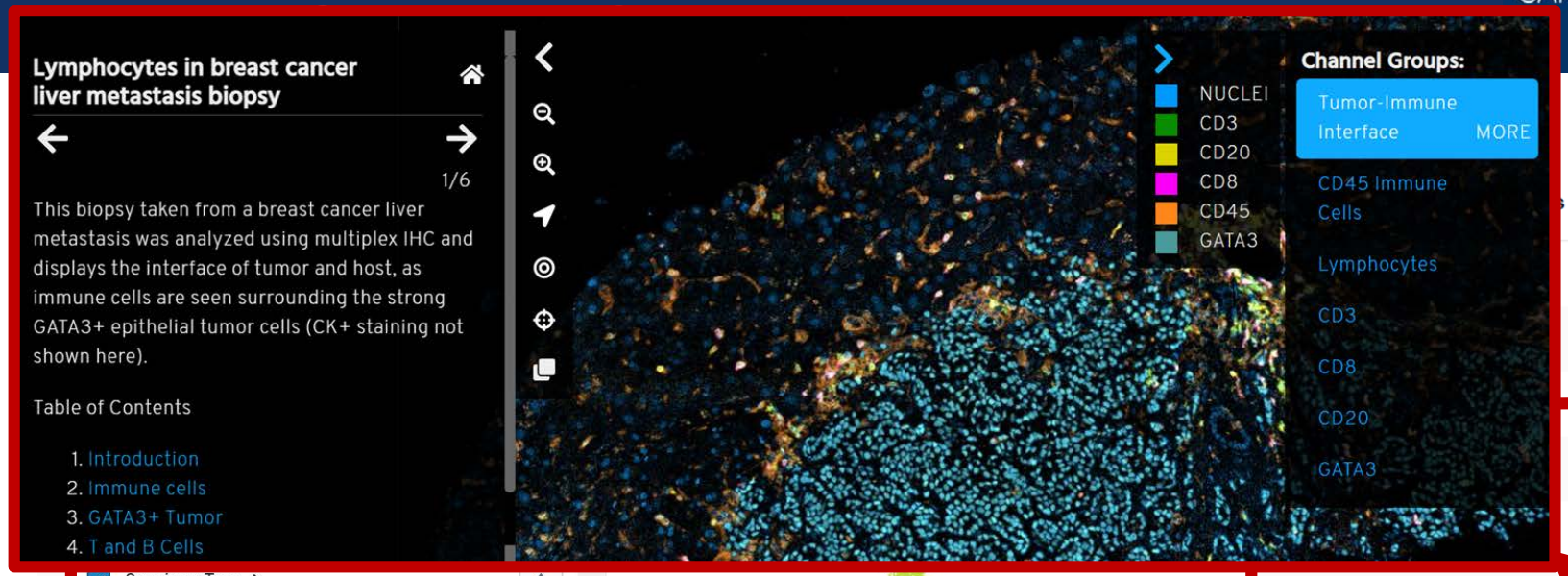
CANCER MOONSHOT

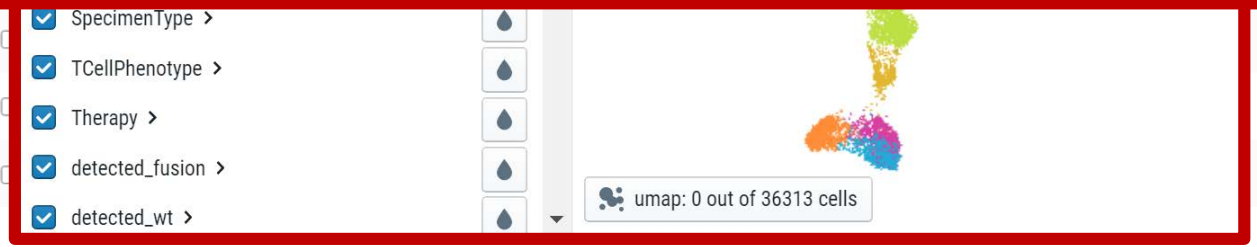


NIH NATIONAL CANCER INSTITUTE

data.humantumoratlas.org

The HTAN Data Portal





	Viewers
	CellxGene (1)
	CellxGene (3)
	CellxGene (11)
56	Minerva Story (1)
73	CellxGene (1)
312	

Strengths and Opportunities

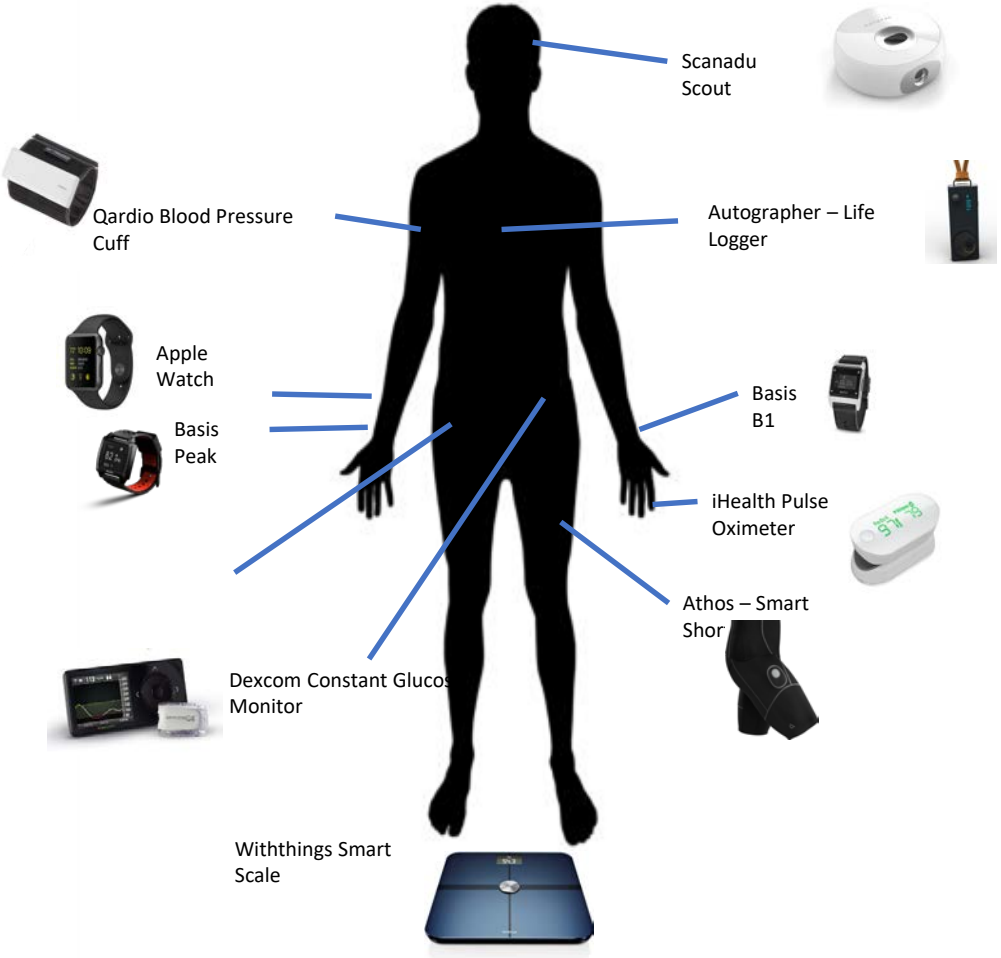
CANCER MOONSHOT

1. Tackles large problems hard to cover by any individual laboratory
2. Brings together world's experts
3. Avoids redundancy
4. Foster collaborations
5. Can bring a lot of attention to an understudied areas
6. Generally well funded

Challenges

1. **Most investigators are not trained to do individual science**
2. **Can have trouble working in a consortium e.g. might be secretive and not collaborative**
3. **Lots of committees to coordinate activities**

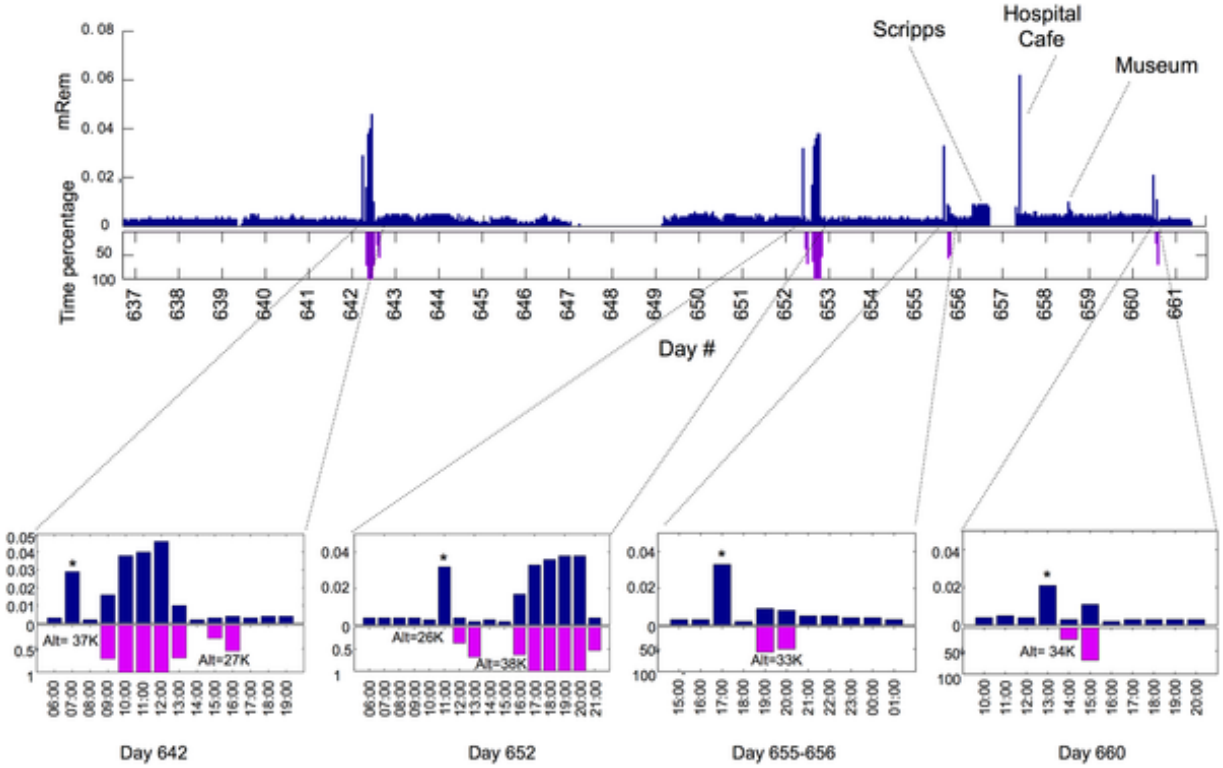
Wearable Sensors: Over 900 Devices



Radtarge
Radiation

Li, Dunn et al.
PloS Biol 2017

Exposure to Radiation in Daily Life



Li X, Dunn J, Salins D, Zhou G, Zhou W, et al. (2017) Digital Health: Tracking Physiomes and Activity Using Wearable Biosensors Reveals Useful Health-Related Information. PLOS Biology 15(1): e2001402. https://doi.org/10.1371/journal.pbio.2001402
https://journals.plos.org/plosbiology/article?id=10.1371/journal.pbio.2001402