



# Accessing NASA Astronaut Medical and Research Data

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Program

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## Data Accessibility

- Until ~2010, the only astronaut data available to researchers was de-identified or grouped data archived within the Life Sciences Data Archive (LSDA)
- We have been developing processes to enable and streamline the release of individual data from both research and medical archives



# Prospective Research

- NASA's Human Research Program (HRP) has well-established data sharing processes for purely prospective data
  - Flight research facilitated by ISS Medical Project (ISSMP):
    - Integrates informed consent briefings with crew
    - Develops Increment-specific Data Sharing Plans
      - Exchange of research data among PIs with attention to protecting rights of first publication
      - Documents medical data to be released from LSAH for research studies
  - Flight Analog research facilitated by Flight Analogs Project (FAP)
    - Analogs: such as Bed Rest Study at UTMB, and NEEMO
    - Similar, campaign-specific Data Sharing Plans for the exchange of research data
    - Bed rest data available includes Standard Measures data



# Retrospective Research via Life Sciences Data Repositories

## LSDA

Life Sciences Data Archive

### Research Data

Active archive of HRP research

Historical flight data 1961-Shuttle

Ground-based and flight analog data

Human, animal and plant data

Animal biospecimens available for research

## LSAH

Lifetime Surveillance of  
Astronaut Health

### Medical Data

Data for all astronauts selected to the corps beginning in 1959, including retirees who return for annual exams

Includes ground & flight medical exam & mission health data (e.g., MRID/MEDB, vehicle, environment data)

Future Plans

Human Performance Database

EVA Suit Exposure Tracking



# Astronaut Data: Number of Requests by Fiscal Year



# Information on Public Website: <https://lsda.jsc.nasa.gov>



HOME **RESEARCH** MEDICAL DATA REQUESTS JUST FOR FUN e-BOOKS

Life Sciences Data Repositories @ Johnson Space Center, Houston, Texas

Search Publicly Available Information and Data [RSS](#)

Experiment Mission Personnel Biospecimens Documents Hardware Dataset Photo Gallery

**NASA Research Announcement**  
Released July 30, 2012: NASA Research Announcement NNJ12ZSA002N Research and Technology Development to Support Crew Health and Performance in Space Exploration Missions [Full announcement](#).

**NASA Human Research Program (HRP)**  
NASA's Human Research Program (HRP) conducts research and develops technologies that allow humans to travel safely and productively in space. The Program uses evidence from data collected on astronauts, as well as other supporting studies. These data are stored in the research data repository, Life Sciences Data Archive (LSDA).

More about HRP: [HRP Home](#) | [Human Research Roadmap](#) | [Evidence Book](#) | [Education & Outreach](#)

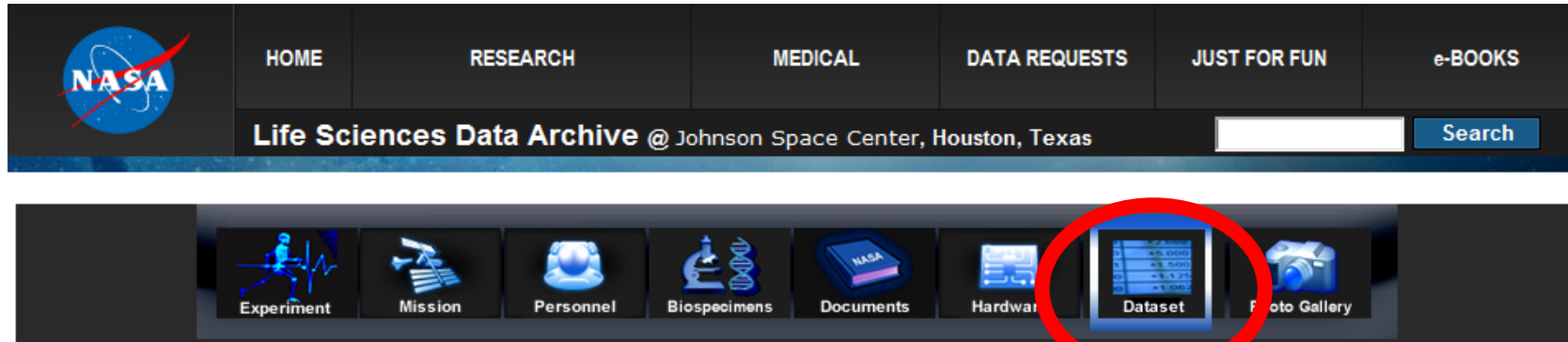
**Research Data Repository: Life Sciences Data Archive (LSDA)**  
[NASA Space Medicine](#)  
**Medical Data Repository: Lifetime Surveillance of Astronaut Health (LSAH)**  
[Missions or Studies in Progress](#)

**Data Request**  
Data can be requested from one or both repositories.

**Images Added to the Archive**



# Searching for Specific LSDA (Research) Data



Search Search within Results

Search:  Using: All Words  [Help](#)

Show  20  50  100 results

**Research Area**  
(Any research area) ▼

**Species Studied**  
(Any species) ▼

**Experiment Title**  
(Any experiments) ▼

**Space Flight Mission/Ground-Based Study**  
(Any Space Flight Mission/Ground-Based Study) ▼

**Payload**  
(Any payload) ▼

**Hardware Item**  
(Any Hardware) ▼

**Investigator**  
(Any investigator) ▼

Search by keyword  
or other parameters  
through the  
'Dataset' portal

# Experiment-Specific Information



**The Effects of EVA and Long-Term Exposure to Microgravity on Pulmonary Function (96-E044)**

Principal Investigator [+ West, John B.](#)

Research Area Pulmonary physiology

Species Studied *Homo sapiens* (Human)

[Data are available for this experiment](#)

**Description**

**OBJECTIVES:**  
This experiment examined the effect of long-term exposure to microgravity ( $\mu$ G) and the effects of Extra Vehicular Activity (EVA) on pulmonary function. A longitudinal study was performed of four crews of the International Space Station (ISS), measuring aspects of pulmonary function that may be affected by long-term exposure to  $\mu$ G per se, and by exposure to noxious gases, or particulate matter present in the atmosphere of the ISS. The investigators proposed to evaluate the effect of EVA on the lung by studying those crewmembers who perform EVAs before and after single and repeated EVAs. Crewmembers who did not perform EVAs served as a flying control group for this aspect of the study. Because EVA poses a significant risk of decompression sickness including bubble events within the pulmonary circulation, non-invasive tests of pulmonary function that are altered by changes in the pulmonary vasculature presented an ideal way to follow a subject over the course of multiple EVAs.

To test the hypotheses researchers used the following: the standard respiratory function test, the measurement of intra-breath respiratory exchange ratio (intra-breath R), a hyperventilation test, the distribution of pulmonary perfusion, slow spirometry for lung volume subdivision, and the measurement of inspiratory and expiratory pressures to test the hypotheses.

[++ -- View more](#)

**Publications**

Prisk GK, Fine JM, Cooper TK, and West JB. Lung function is unchanged in the 1 G environment and during long-term microgravity. *Eur J Appl Physiol.* 2008;103(6):617-623. [\[PubMed\]](#)

Prisk GK, Fine JM, Cooper TK, and West JB. Pulmonary gas exchange is not impaired 24h after long-term microgravity. *Physiol.* 2005;99:2233-2238. [\[PubMed\]](#)

Prisk GK, Fine JM, Cooper TK, and West JB. Vital capacity, respiratory muscle strength, and lung volume are maintained during long-duration exposure to microgravity. *J Appl Physiol.* 2006;101:439-447. [\[PubMed\]](#)

**Data Information**

<b>Data Preservation Status</b>	Preservation complete
<b>Data Availability</b>	This experiment has both unrestricted and restricted data (potentially attributable to human subjects). <a href="#">+ View unrestricted data.</a>
	Please visit <a href="https://rlsda.jsc.nasa.gov">https://rlsda.jsc.nasa.gov</a> to view the restricted data catalog. This site is restricted to the JSC Internal Network (JIN) only. <a href="#">+ Data request for restricted records</a>





# Medical Information on Public Website: <https://lsda.jsc.nasa.gov>

## Medical Operations

The Space Medicine Division mission is to optimize the health, fitness, and well being of flight crews.

Astronaut medical data are collected per requirements detailed in the **Medical Requirements Integration Documents (MRID's)**. Data collected during these medical tests are generally housed in the **Lifetime Surveillance of Astronaut Health (LSAH)** repository. These test protocols are divided into areas as shown below. Each MRID will give an indication of the type of testing performed as well as the frequency of such tests.

FIND IT @ LSDA

Search

Click on a category image for relevant MRID information:

Behavioral Health and Performance	Bone, Muscle, Exercise	Cardiovascular
Environmental Health	Extravehicular Activity (EVA)	Immunology
Neurology	Nutrition	Radiation
Therapeutics and Clinical Care	View All Medical Requirements	

Note: The Medical Requirements Integration Documents (MRIDs) reflect the Medical Requirements documented in the **Medical Requirements Document (AMERD)**, JSC 24834, the **ISS Medical Operations Requirements Document (ISS MORD)**, SSP 13956, and the **Medical Operations Requirements Document (MORD)** JSC 13956.

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Missions or Studies in Progress

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Images Added to the Archive



# LSAH Publicly Available Information

## Medical Requirements

- Documents outline medical tests performed on ISS crew
- Click blue text to see testing details to help determine the data you need

All Medical Requirements			
Discipline	MRID#	MEDB#	Medical Requirement Title
Behavioral Health and Performance		MEDB 7.7	+ Behavioral Observation of Training
Behavioral Health and Performance		MEDB 7.4	+ Mood Assessment
Behavioral Health and Performance		MEDB 7.1	+ Preflight Behavioral Health Status Check
Behavioral Health and Performance	MR027L	MEDB 7.5	+ Post-flight Psychiatric/Psychological Evaluation
Behavioral Health and Performance	MR027L	MEDB 7.2	+ Preflight Evaluations
Behavioral Health and Performance	MR031L		+ Private Psychological Conferences (PPCs)
Behavioral Health and Performance	MR032L		+ ISS Private Family Conferences (PFCs)
Behavioral Health and Performance	MR032S		+ Private Family Conferences (PFCs) for Shuttle Crews
Behavioral Health and Performance	MR085L	MEDB 7.6	+ Neurocognitive Assessment
Bone, Muscle, Exercise		MEDB 5.4	+ Calf Volume Measurement
Bone, Muscle, Exercise		MEDB 5.1	+ Functional Fitness Assessment
Bone, Muscle, Exercise	MR006L		+ Exercise Treadmill Test
Bone, Muscle, Exercise	MR019L		+ Heart Rate Monitoring
Bone, Muscle, Exercise	MR025L		+ Postflight Rehabilitation

## LSAH Newsletters

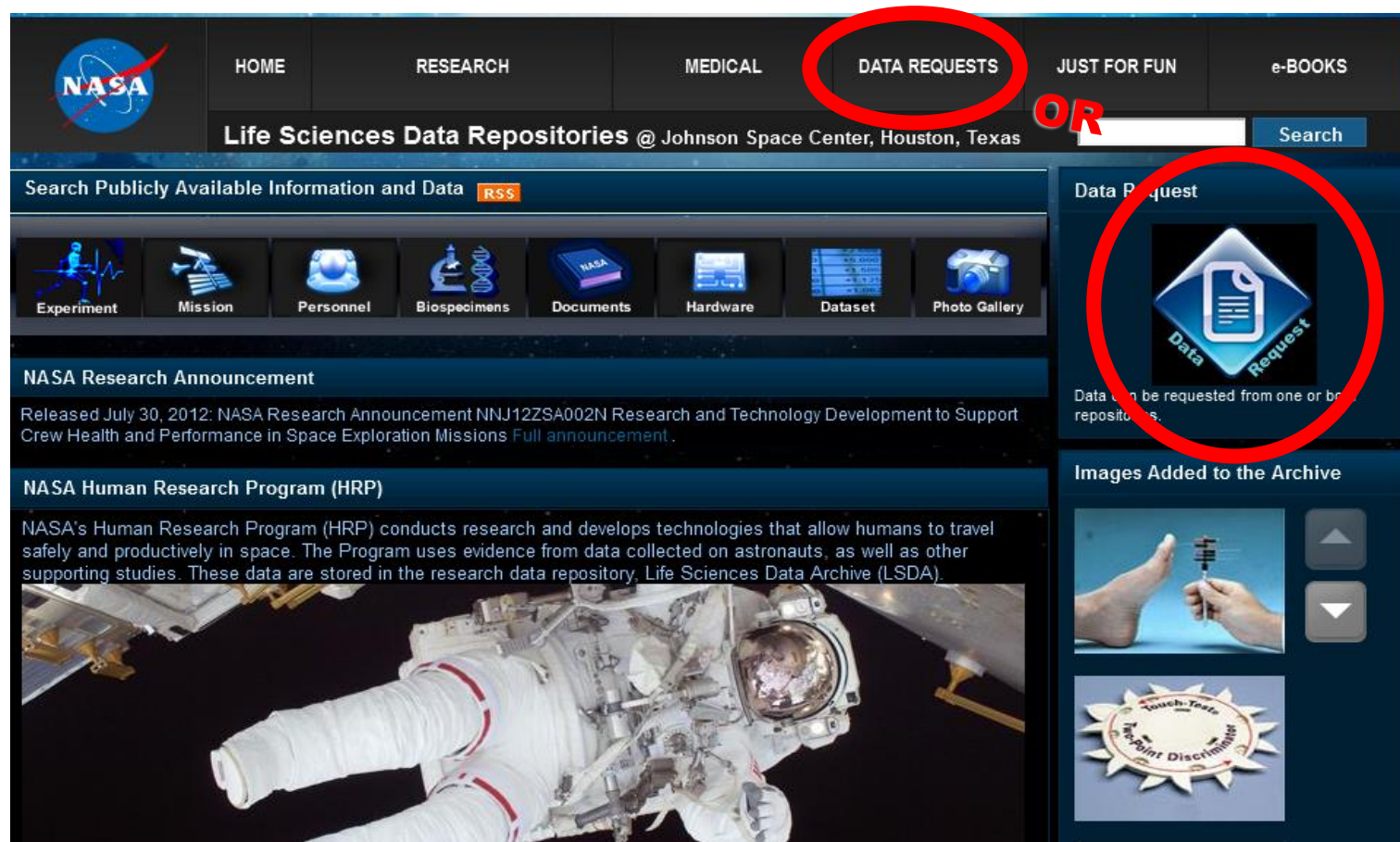
- Published periodically to keep participants informed on the program's findings





# Requesting Data Not Available on Website

- Individual astronaut data are not downloadable
  - Potentially attributable to an individual subject
  - Protected by the Privacy Act
- **HOWEVER**, individual data can be requested for research, medical and operational purposes
  - Currently, medical data are available for US crewmembers only
  - Usually requires funded, peer-reviewed study, IRB protocol, crew consent





# Data Request Form

**REQUEST DATA**

Please use the form below to enter your data requests.  
Please be as specific as possible and fill out the fields completely.  
Acceptable alpha numeric character: a-z, A-Z, 0-9, @, \, dash, comma and dot.  
Asterisks indicate required fields \*

Enter your Name: \*

E-Mail: \*

Phone:

Request Need Date: (MM/DD/YYYY)

Mission: (if applicable)

Data Type Requested: (if applicable)  Tissue (LSDA)  Research (LSDA)  Medical (LSAH)  I don't know

Grant or Contract Number: (if already in place)

Company / Institution:

Data Request Description and Comments:  
(Please provide the description of your project, specific aims, and methods along with a list of tests and/or specific parameters you are requesting.) \*

Data Request Justification:  
(Please provide the purpose of your request, specify study question, and how the data will be utilized.)

Enter Text Below: \*

**User's Guide for Requesting NASA Data**

- Research Data Repository (LSDA)
- Medical Data Repository (LSAH)
- Data Categories
- Requesting Human Data
- Applicable Laws and Regulations
- Requesting Animal Tissues
- [Data Accessibility: Video Presentation](#)

*Read these guides!*

## Your request must include:

- Contact Information
- Date when data are required (>3 months)
- Grant, NRA#, or current project that data will support
- Institution
- “Data Request Description” - i.e., what data you are requesting? Be detailed
- “Data Request Justification” - i.e., why do you need this data? If requesting individual data, why can't de-identified or grouped data be used?
- More detail, the faster your request can be scoped



## Data Request Timeline



- The timeline for any single data request (DR) depends on many factors, and no two are the same
- **Easiest/fastest**: Demographic data or incidence of a particular issue on small number of ISS crew (US only) and single aim
- **Hardest/slowest**: Large number of variables or multiple types of data (e.g., imaging, video, textual) and a large number of crew, mixed ISS and previous programs, multiple aims; needing International Partner crew; any dataset with missing data that need to be retrieved (e.g., EVA injury, medications, exercise) or where policy/data sharing hasn't been determined (e.g., any genetic information)



# EVA Data Request Considerations

- Most NASA medical data was collected for clinical care purposes and may not include parameters required for your research
  - Diagnoses may not comply with research definitions because focus is on clinical care treatment
  - Testing is conducted to diagnose and treat; may not meet research standards in terms of parameters collected, consistency of schedule or constraints
- Suggestions for Data Mining Study Development
  - Consult with LSAH personnel early during study development
    - We can assist you in understanding exactly what data is available, what the necessary lead time is for pulling/cleaning/processing, and other potential issues
    - Data we have *MAY* be available for re-interpretation with proper permissions
  - If your study has an inflight component, consult with HRP, ISSMP (ISS Medical Project) personnel for special time, hardware, other requirements



# EVA Data Availability

- EVA Suit Exposure Tracker (SET) - LSAH has compiled all available US astronaut EVA training runs into one database.
  - Over 12,000 training runs from neutral buoyancy training for 232 astronauts
  - Data quality is best after 1985; earlier records inconsistent
  - NASA Technical Memo describing the dataset just published:
    - <https://ston.jsc.nasa.gov/collections/TRS/listfiles.cgi?DOC=TM-2017-219291>
  - Need approval from the NASA EVA community to release datasets to internal or external requesters (anticipated in FY18)
  - Suit fit runs and non-EMU training records were excluded
  - Data for some runs has not been location although photographic evidence exists (training partner data was used in some cases)
  - These data were compiled with assistance from Randall McDaniel, Kevin B. Thomas, Marc Ciupitu & GCTC staff



## EVA Data Availability (cont.)

- Crew Comments Database -
  - Compilation of over 70,000 comments from post-mission debriefings on a variety of topics
  - Description of data available in the crew comments database published as NASA Technical Presentation
  - <https://ntrs.nasa.gov/archive/nasa/casi.ntrs.nasa.gov/20160011585.pdf>
- Human Research Program Evidence Books
  - <https://humanresearchroadmap.nasa.gov/evidence/>

The screenshot displays the NASA Human Research Roadmap website's search interface. At the top, the NASA logo is on the left, and navigation tabs for 'HUMAN RESEARCH ROADMAP', 'HRP', 'DATA', and 'EXPLORATION' are on the right. Below these is a search bar with a 'Search' button. A secondary navigation bar contains tabs for 'EVIDENCE', 'RISKS', 'GAPS', 'TASKS', 'REPORTS', 'EXPLORE', and 'SEARCH'. The 'SEARCH' tab is circled in red. The main content area shows a search form with 'Keywords: EVA', 'Type: All', and 'Search In: Titles and Contents'. A 'Search' button and a 'Help' link are also visible.





# Examples of EVA Data Requests Filled in the Past

- Hand Injury / Glove sizing
  - Suit sizing and anthropometry\*
  - EVA Hypoxia and Sleep
  - Shoulder, Elbow Injury / Suit Trauma (typically upper body)
  - Metabolic data from graded exercise tests, EVAs where available
  - Infection rates in EVA crew
  - Medical data from annual exams, flight-specific medical requirements
  - Vehicle and crew-worn environmental and acoustic data (O2, CO2, radiation, etc.)
  - Medication use
  - Clinical blood or urine, nutritional parameters
- 
- *\*Limited anthropometry, suit sizing data available; other sources may need to approve, collaborate with dataset*

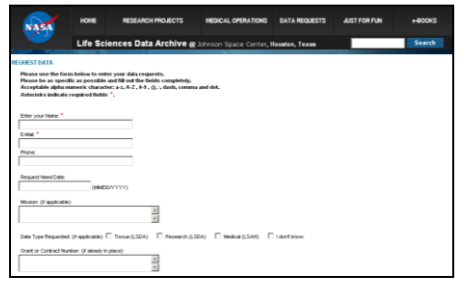
# Questions?



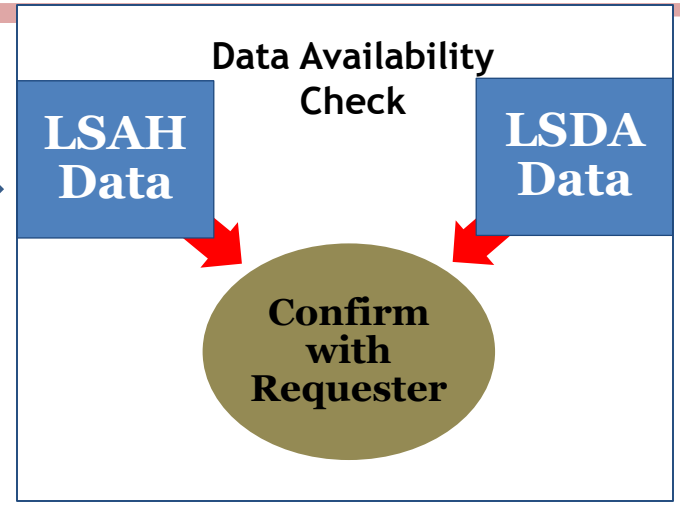
# Backup Slides



# Data Request Fulfillment



Data Request Clearinghouse



Automated email to requester

Obtain more info

Retrieve missing data

Mission Medical Records  
 LSDA Archive  
 Training Records  
 Clinic/LSAH Records  
 Vehicle Environmental Data  
 Biospecimen Data  
 Research Study/Laboratory Data  
 Questionnaires/Surveys

Assimilate Data from Various Sources

Request Approval Process:

- ✓ Request purpose?
- ✓ Merit established?
- ✓ Attributable data?
- ✓ IRB review required?
- ✓ Consent necessary?

Request approved

Requester notified of anticipated schedule; signs data use agreement if required

Request not approved  
Notify requester; modify request

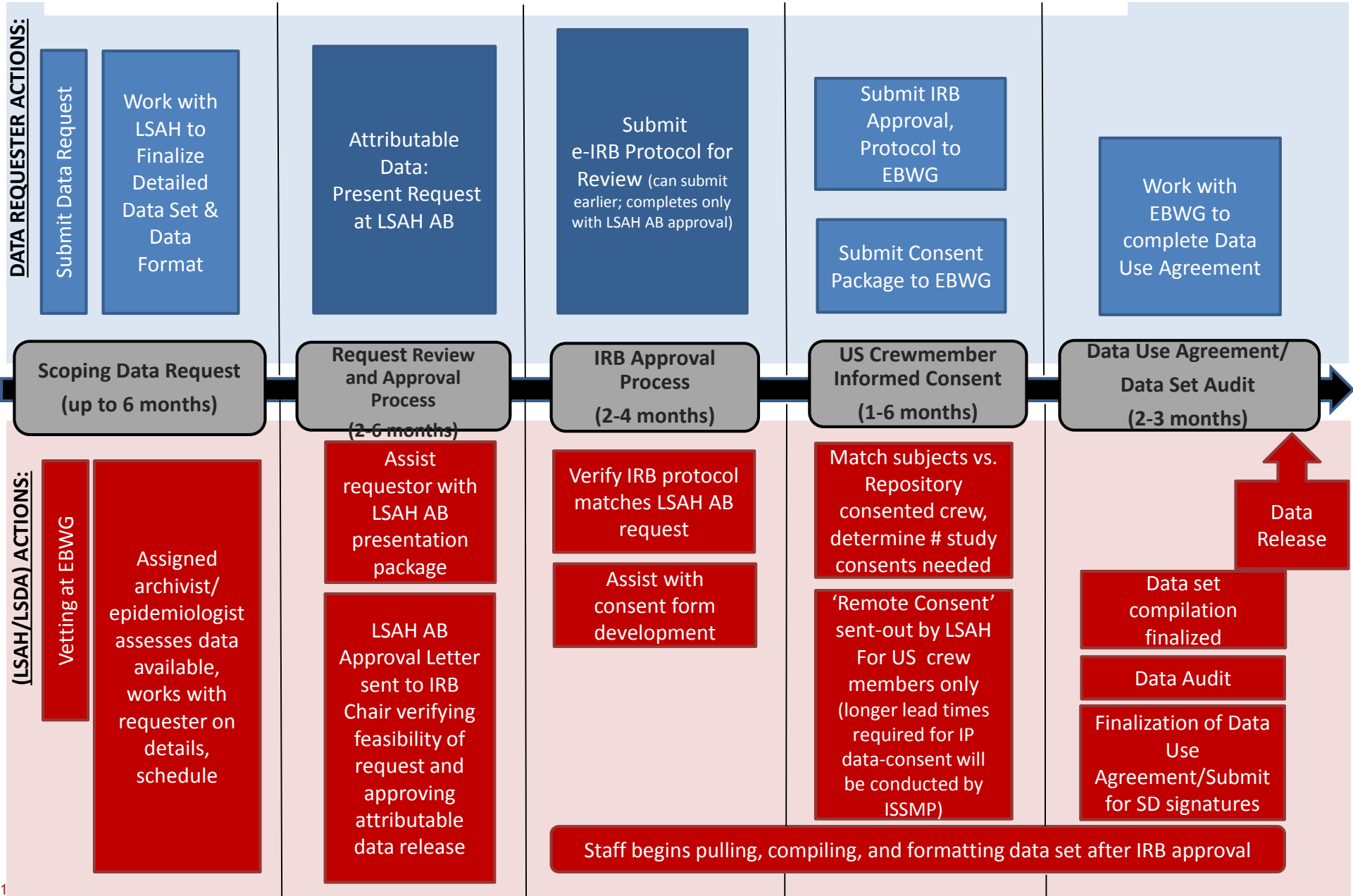
Perform Data Quality Assurance

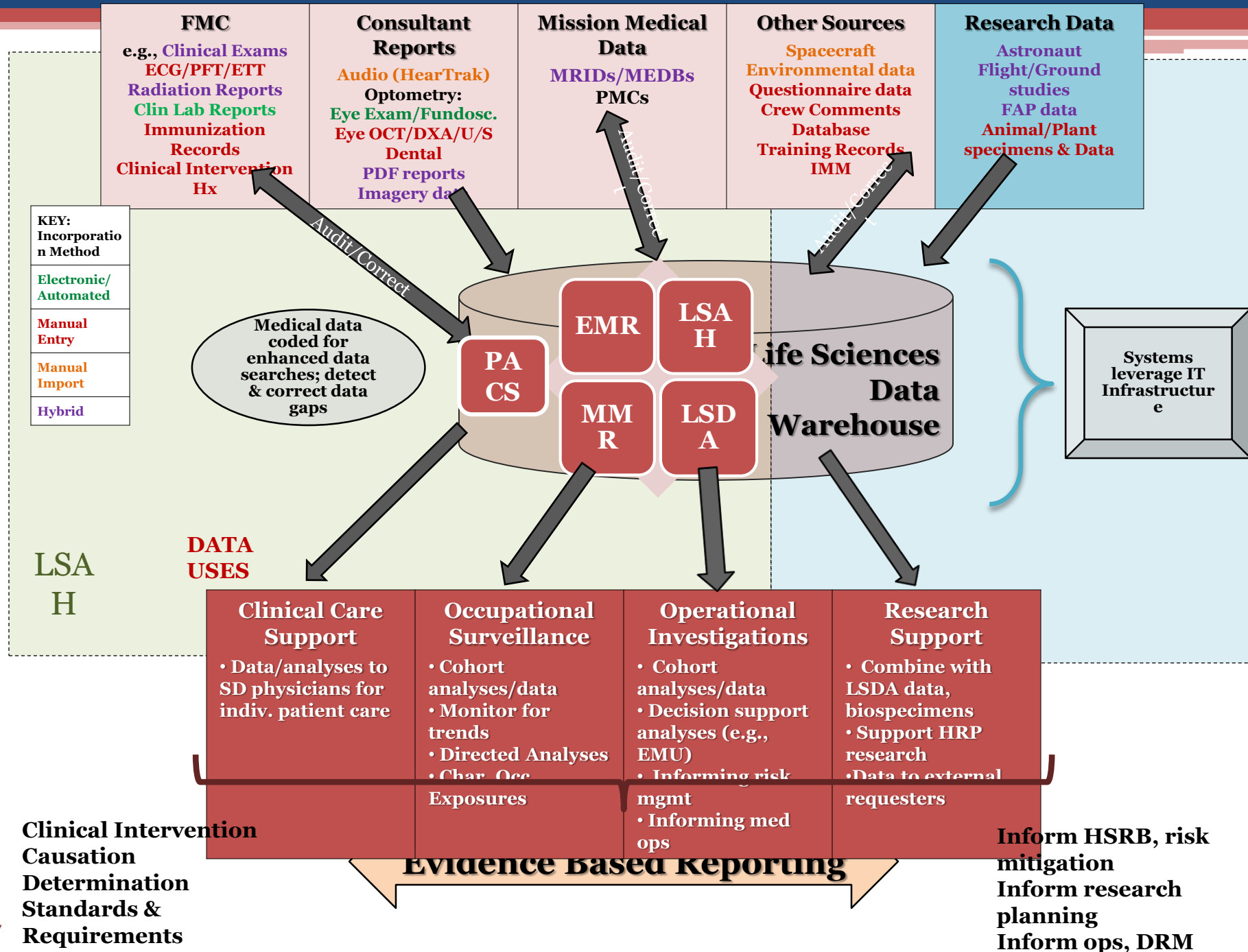
Consent Forms Complete (if req'd)

Data sent to Requester

# Key Elements of Retrospective ATTRIBUTABLE Data Request Process

(duration of each step depends on size, complexity of data set)







# LSAH Advisory Board

Chair: Chief, Space & Clinical Operations Division or designee



## Board Purpose

This board reviews:

- All requests for attributable data (except clinical care)
- Other requests forwarded to the board by EBWG
- Requests where NASA policy is not yet determined

**Meets 4<sup>th</sup> Tuesday of each month**



# Evidence Base Working Group Membership

## Group Purpose

EBWG is the clearinghouse for all incoming data requests

Releases public or un-attributable data

Facilitates data requests through approval processes to release

Meets every other Monday

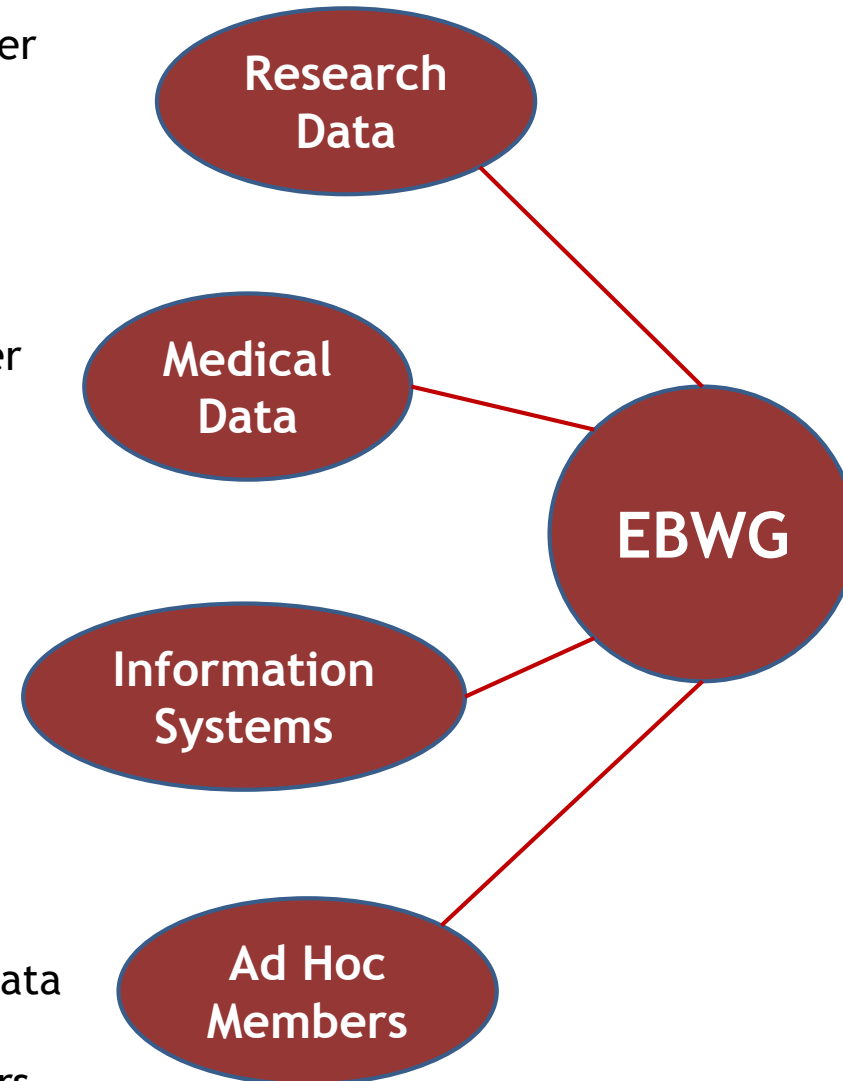
- LSDA NASA Manager
- LSDA Archivists

- LSAH NASA Manager
- Epidemiology Manager
- LSAH Epidemiologists
- BDRA Epidemiologist

- Information Systems Architecture Branch Chief
- *Space Medicine, LSDA IT staff (consultants)*

### FUTURE?

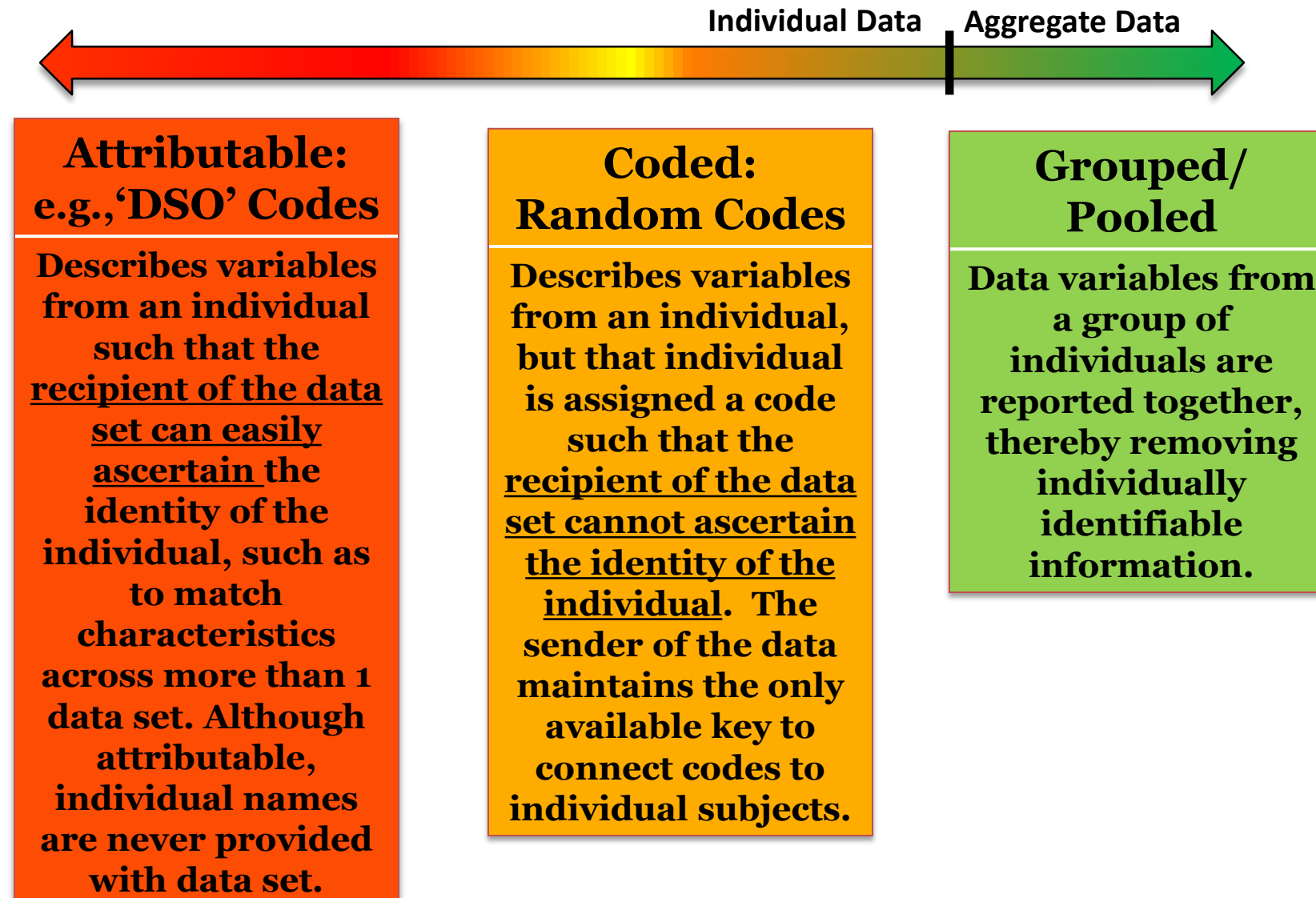
- Human Performance Data Base staff
- Other archive managers







# Data Attributability Continuum



**(Consent Required)**