

Department Mission and Objectives

The Department of Information Technology (ITD) comprises three units: 1) the System Technology Section, 2) the Library and Archives Section, and 3) the Research Resource Section (which supports creation of the Research Resource Center).

The mission of the **System Technology Section** is to develop information infrastructure and provide a variety of information services for efficient operation of RERF's research and related activities. Specifically, the section is responsible for the maintenance of RERF's in-house network infrastructure, the development of a variety of software applications, and the operation and maintenance of hardware resources such as servers and network equipment. RERF maintains large amounts of data obtained from numerous epidemiological, biological, and clinical areas of research, including data from the LSS, F1, AHS, and FOCS study cohorts as well as other RERF studies. The section has contributed to improvement in the reliability and availability of the large-scale data by developing database applications to store and utilize the data. Furthermore, the section endeavors to ensure the security of the data, work that not only contributes to enhanced efficiency of research but also protects the data from external threats to sensitive confidential information pertaining to A-bomb survivor study participants. This fiscal year, we have upgraded the dedicated communication line between Hiroshima and Nagasaki, increasing the bandwidth 200Mbps to 10Gbps, which means 50 times more than the previous bandwidth. This enhancement enables seamless transfer of huge volumes of data and supports improved communication, such as video-conferencing. Additionally, we believe this improvement will facilitate the migration of research resources to a cloud environment. Our primary objective is to enhance the availability of the institute's research resources. We are confident that migration these resources to a cloud environment will significantly advance research activities both within and outside the institute.

The **Library and Archives Section** plays two major roles: managing the entire collection of academic publications, including books and magazines, held in RERF's library, and archiving the entirety of the institute's research papers and historical materials.

Research Resource Section (supporting the Research Resource Center)

The Research Resource Section, newly established in FY2022 within the ITD, aims to digitize and integrate the entirety of research assets at RERF as a preliminary step toward establishment of the Research Resource Center (RRC). The section is expected to formulate and lead plans to digitize and integrate all of RERF's research assets in alignment with the institute's Strategic Plan. Planning for the RRC relates to a central aspect of RERF's future mission – to preserve, collate and organize RERF's valuable research data assets and to make these data accessible and available for high-priority research. Our current mission involves prioritizing key datasets to determine which data are more useful for researchers within the institute. As a first step, we have developed an RRC portal site, which provides the location of all data within the institute and also offers a deeper understanding of the structure of those data through visualization. Furthermore, the site includes content from the ORS (Office of Research Support), which is expected to serve as a location for 'Communication' and 'Collaboration' to promote collaborative research both within and outside the institute. In terms of research

resource visualization, we have illustrated biosample data provided by the LIMS (Laboratory Information Management System), operated in conjunction with the BRC (Biosample Research Center), using Tableau. Key features include:

- Lists of preserved samples categorized by cohort (e.g., AHS, In Utero, F1)
- Interactive dashboard displaying sample counts by year, dose, age, and quality

Visualization of cancer incidence information is also underway. By visualizing the primary research resources within the institute, we believe that understanding of these research resources will deepen, leading to improved utility. In October 2024, we hired a temporary employee to work concurrently with the Department of Epidemiology and our section on improved data visualization.

A key element of the work of the Research Resource Section is its focus on the integration of physical sample data with clinical and epidemiological data throughout RERF. The section is also responsible for maintaining information on informed consent obtained from A-bomb survivors that is available to all RERF researchers for reference when formulating research protocols involving the use of the biosamples stored at RERF. To archive this information, we are planning to establish a linkage between three types of information: biosample, epidemiological/clinical, and informed consent. The issues of enhancement and increased availability of all such research assets within the institute are closely tied to informed consent associated with any existing research assets. Our objective encompasses not only the digitization and integration of research data within the institute but also the archiving of consent and access information for its utility in future research endeavors.

Summary of Response to 2024 Recommendations

In response to previous recommendations, we have initiated:

1. Development of the RRC Portal Site, and
2. Visualization of biosamples,

to facilitate understanding of and access to of the samples. We have also almost completed the organization of biosample inventory information regarding tissue and organ samples, including slide specimens. The RRC Portal Site is currently available in-house only, but in the future, we plan to make the site more widely available. We believe the RRC Portal Site will contribute to facilitating RERF's research activities and promoting RERF's Strategic Plan.

FY2024 Departmental Highlights

Through our efforts thus far, preparations for migration to a cloud environment are nearly complete due to the establishment of a fundamental infrastructure for an external network via enhancement of the bandwidth in both the Hiroshima and Nagasaki laboratories. This fiscal year, we are working to enhance the presentation application layer, including development of an RRC Portal Site, which can be used to promote the five principles of RERF’s Strategic Plan – Continue, Create, Collate, Collaborate, and Communicate. The RRC Portal Site will mainly focus on the processes ‘Collate,’ ‘Collaborate,’ and ‘Communicate.’ Here, ‘Collate’ refers to the process of integrating and organizing research resources that have previously been siloed within the institute, thereby making them available for meaningful use (e.g., for comparison and analysis). Also, in order to promote use and access of research resources, the portal provides Data Visualization of the contents using the Tableau tool.

This report outlines two key topics: 1) efforts towards establishment of the Research Resource Center (RRC), and 2) other departmental efforts. The Research Resource Section (RRS) within our department is making dedicated efforts toward the establishment of the RRC.

I. Efforts towards Establishment of the Research Resource Center (RRC/RRS)

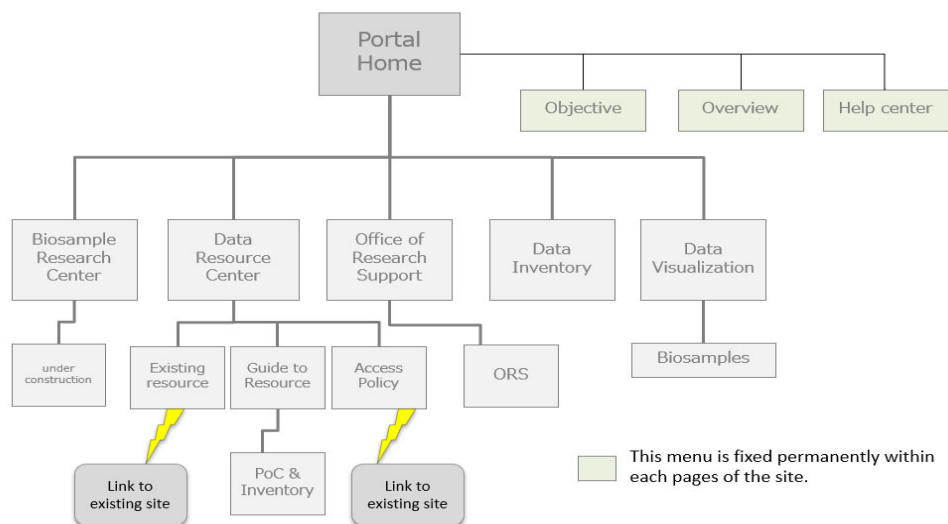
1.1 Development of the RRC Portal Site

The RRC Portal Site was established in June 2024 using Microsoft SharePoint as a platform for sharing information on research resources within the institute and is available to all RERF researchers, with the aim of promoting the following goals:

- **Collate:** Centralizing research resources for unified access.
- **Collaborate:** Enabling seamless joint research.
- **Communicate:** Sharing data and research outcomes efficiently.

The following figure indicates the sitemap of the portal as of December 2024.

The Sitemap of RRC Portal Site



Currently, the portal comprises three main content areas:

- Biosamples
- Epidemiological and Clinical Databases
- Office of Research Support (ORS)

The first two content areas play a key role in promoting the process of ‘Collate’ by serving as a platform linking all the research resources held at the institute. Eventually, the notional Office of Research Support (ORS) is expected to play an active role as a platform for promoting collaborative research both within and outside the institute, and for communicating research outcomes to the world. Each content area is under development, with further enhancements planned in the near future. As RERF applies for further funding and human resources to fully build out the RRC, the urgent priority of the RRC/RRS is to organize resource inventory information to capture the institute’s siloed research resources in as centralized and comprehensive a manner as possible, and to work towards creating a practical integrated database that consolidates existing resources. To achieve these goals, we are working on visualization of existing research resources, as described below.

1.2 Visualization of Research Resources

As part of the visualization of research resources, we have focused on visualizing biosamples that are currently managed and integrated by the Biosample Research Center (BRC) using a robotic freezer and the Laboratory Information Management System (LIMS). Using Tableau, we have begun creating dynamic visualization displays through the LIMS biosample database. Key features include:

- Lists of preserved samples categorized by cohort (e.g., AHS, In Utero, F1).
- Interactive dashboards displaying sample counts by year, dose, age, and quality.

In the near future, we plan to create such displays not only for biosample information but also for cancer incidence information, as well as clinical, epidemiological, and molecular-biological information.

1.3 Organizing Biosample Inventory Information

In order to arrange the inventory information for tissue and organ samples, we are currently working on organizing our biosample resources (e.g., paraffin blocks, slide specimens, and blood smear samples). Thus far, we have achieved:

- 100% digitization of paraffin block inventory information
- 99% digitization of slide specimen inventory information

Regarding the paraffin blocks, the inventory information has been completely stored in a database using ‘autopsy-No’ and ‘surgical-No’ as primary keys for autopsy and surgical pathology specimens. Additionally, we have already stored most of the slide specimen inventory information using ‘branch-No’ and staining method in addition to ‘autopsy-No’ and ‘surgical-No’ as primary key information. In the future, we plan to virtualize the slide specimens sequentially.