HRR User's Guide

June 1, 2016

Contents

Introduction

Crew health and performance is critical to successful human exploration beyond low Earth orbit. The Human Research Program (HRP) investigates and mitigates the highest risks to human health and performance, providing essential countermeasures and technologies for human space exploration. Risks include physiological and performance effects from hazards such as radiation, altered gravity, and hostile environments, as well as unique challenges in medical support, human factors, and behavioral health support. The HRP utilizes an Integrated Research Plan (IRP) to identify the approach and research activities planned to address these risks, which are assigned to specific Elements within the program. The Human Research Roadmap (HRR) is the web-based tool for communicating the IRP content, risk Evidence Reports, external reviews of HRP research, and general HRP organizational information. The HRR can be accessed at https://humanresearchroadmap.nasa.gov.

***Note**: In this document, when the words "Evidence", "Risk", "Gap", "Task", or "Deliverable" are used to refer to the content of the HRRCMS, the first letter will be capitalized. Also, the name of fields will be capitalized. This will help distinguish them from their normal English usage.*

System Requirements

As of the writing of this document, the following browsers are supported:

- Google Chrome (recommended)
- Internet Explorer 8+ (Internet Explorer 11 preferred)
- Mozilla Firefox ESR 38.7

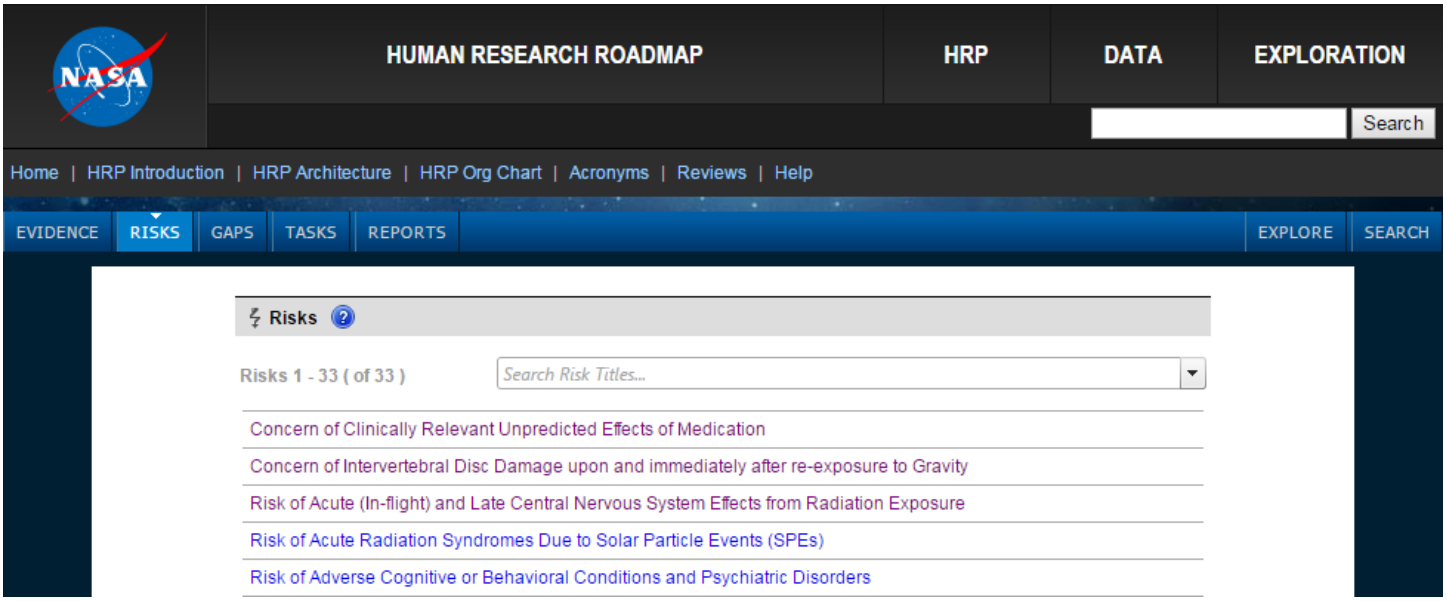
In addition to a supported web browser, if you want to open exported Excel documents you will need a copy of Microsoft Office or another program capable of viewing XLS/XLSX files.

Locating Items

There are several methods for locating a particular Risk, Gap, or Task in HRR:

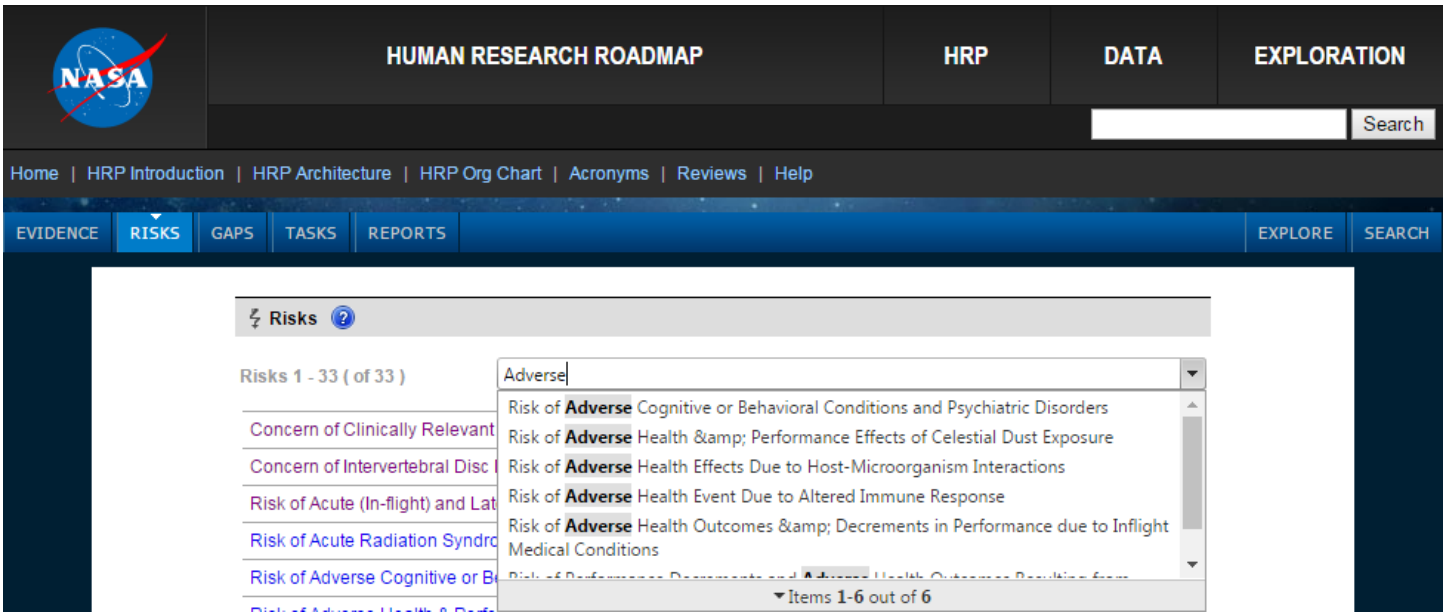
Item Listings

Click the navigation link for the item type you wish to locate: Risks, Gaps, or Tasks. A full list of the items in the database will be displayed:



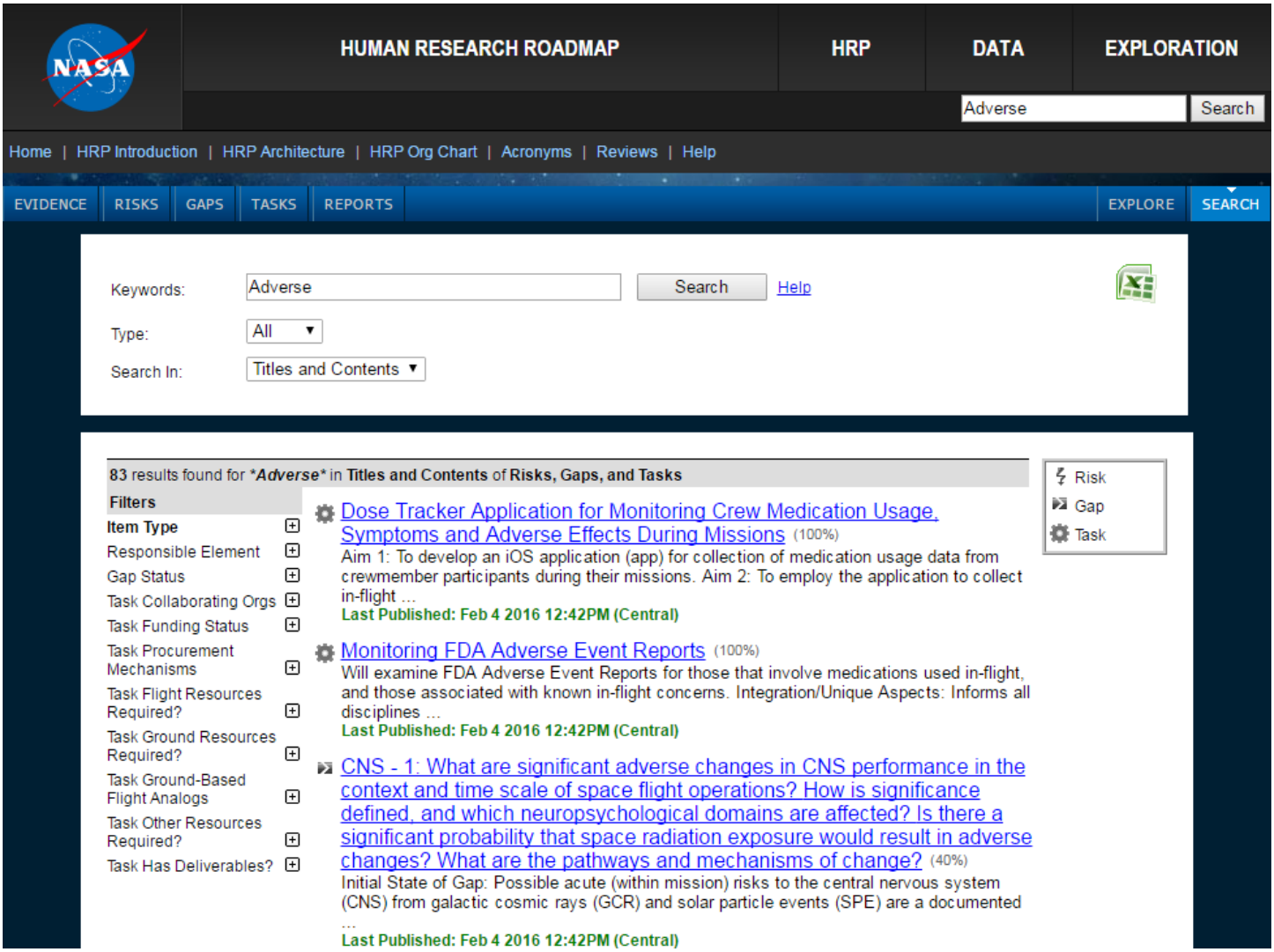
Search By Title

At the top of the full item listings and the top of each item's page is a search box which will allow you to locate an item by title. Start typing a title and a list of results will be shown; clicking one of these results will bring up that item's page:



Full Search

You can locate an item by title and contents by typing a search query in the search box at the top-right corner of the page and clicking the Search button, or by clicking the Search navigation link:



By default, the search results will contain items of all types and search within titles and contents. You can restrict your results by changing the Type and Search In values or by using the Filters at the left side of the list of results.

Reports

If you need to locate items based on precise conditions, you can use the Reports tool to run a custom query. Click the Reports navigation link to access the Reports tool. For more help on using the Reports tool, please see the "Reports User Guide" document on the Help page of HRR.

Home Page

The main page of HRR gives a basic explanation of the Human Research Roadmap, with links to explore and search the data contained within:

HRP Introduction

The HRP Introduction page contains a more in-depth explanation of the background, goals, and requirements imposed on the Human Research Roadmap by the Human Research Program.

HRP Architecture

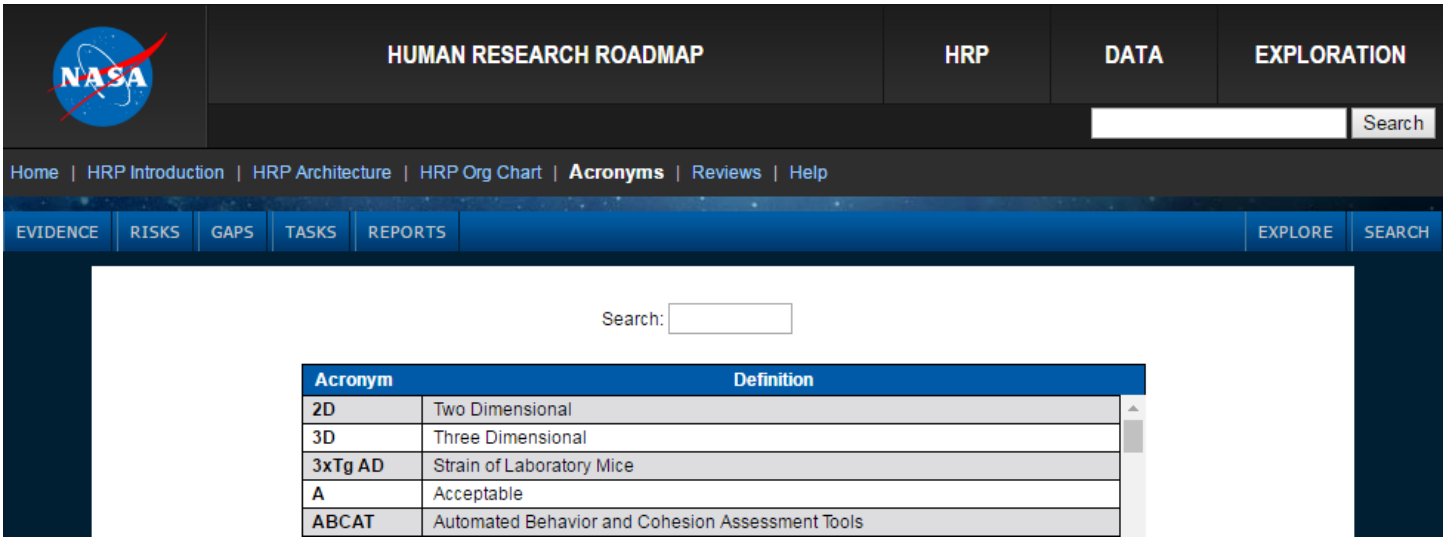
The HRP Architecture page explains the basic architecture of the roadmap (Evidence, Risk, Gap, Task, Deliverable) and goes into detail about each item type.

HRP Org Chart

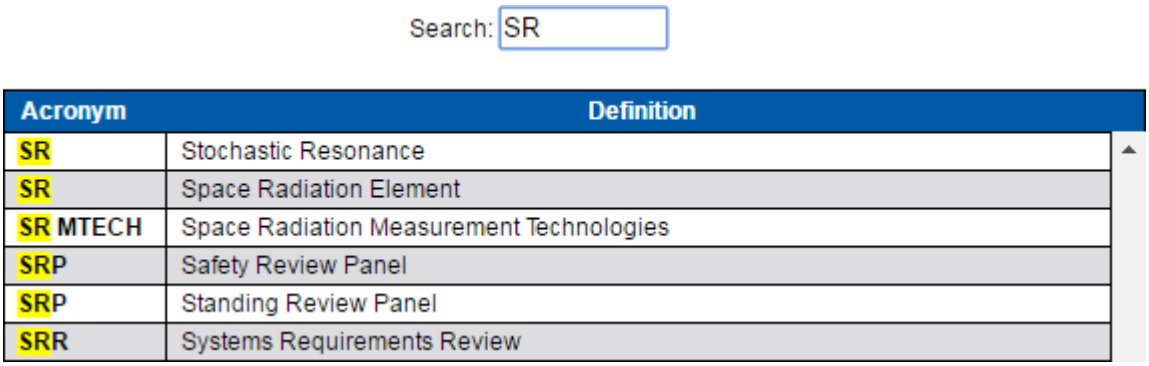
The HRP Org Chart displays an organizational chart for the Human Research Program, including certain offices at NASA and each of the six Elements involved in performing HRP's research.

Acronyms

The Acronyms page displays a list of acronyms used throughout the Human Research Roadmap:

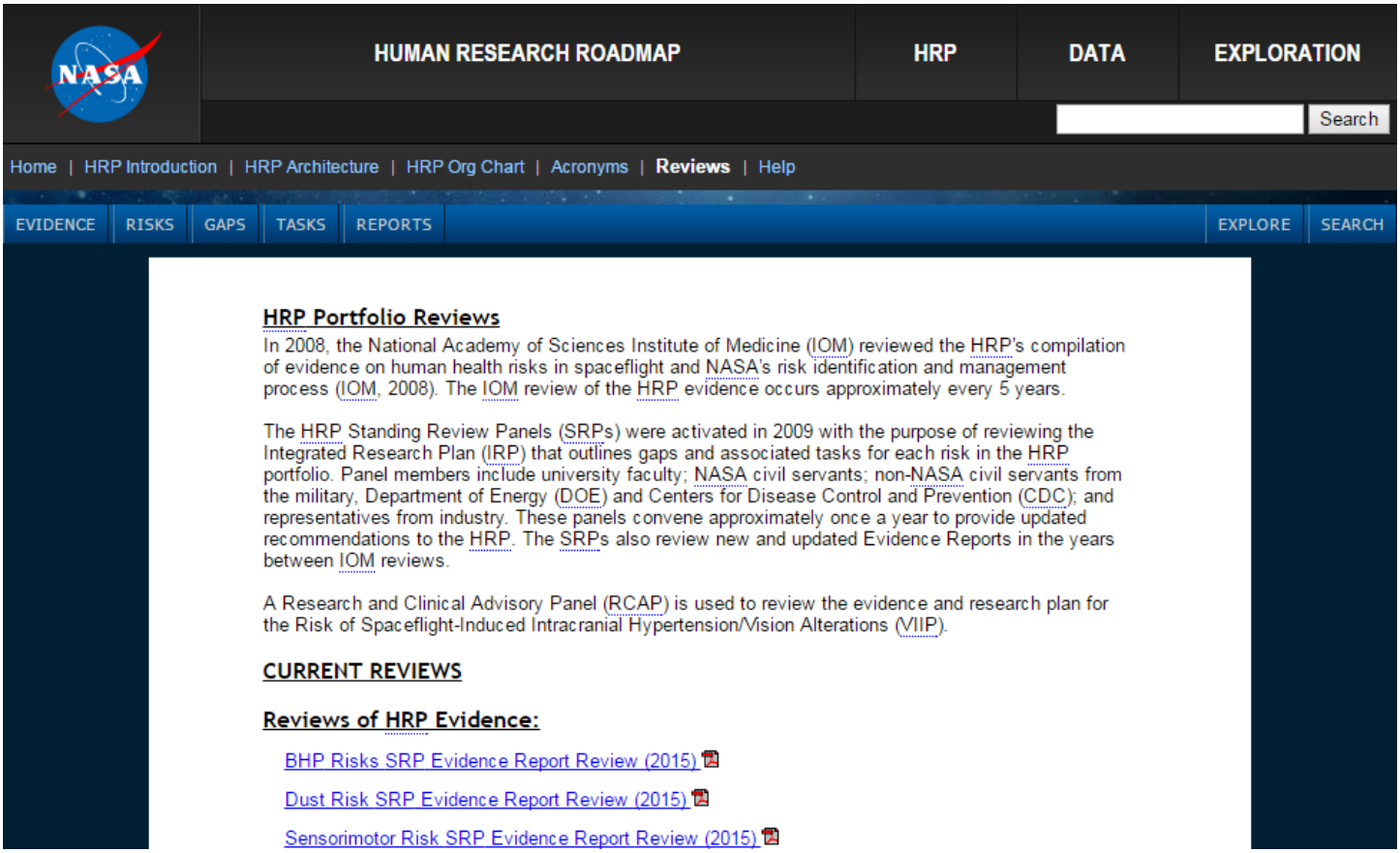


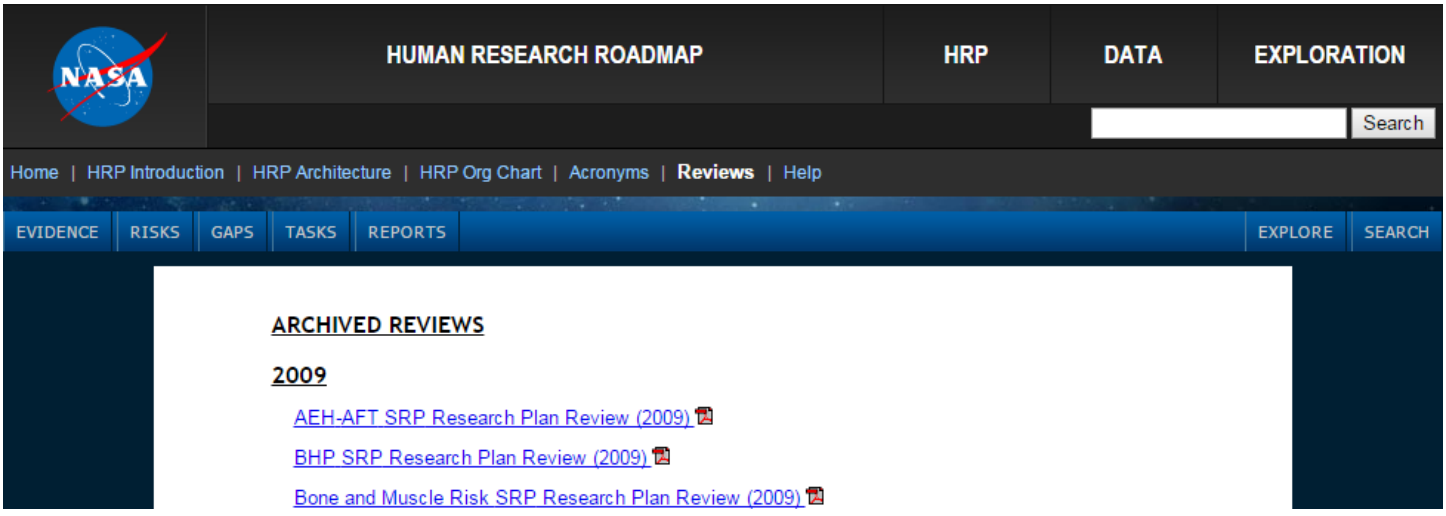
Enter text in the Search box to filter the list of acronyms and find all acronyms starting with a given set of characters:



Reviews

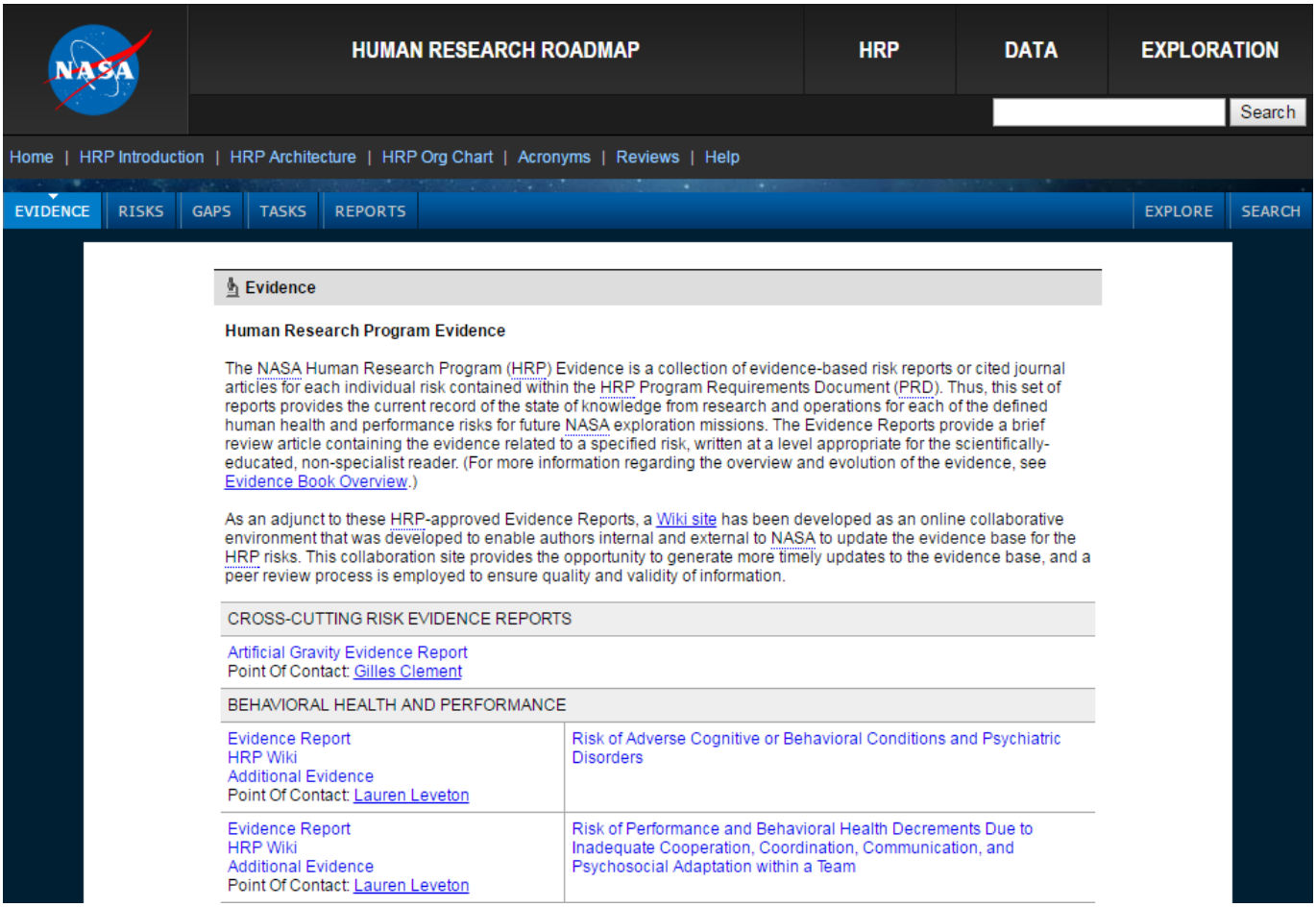
The Reviews page contains a list of the current reviews performed on the HRP Evidence and Research Plans, as well as a page of archived reviews organized by year:





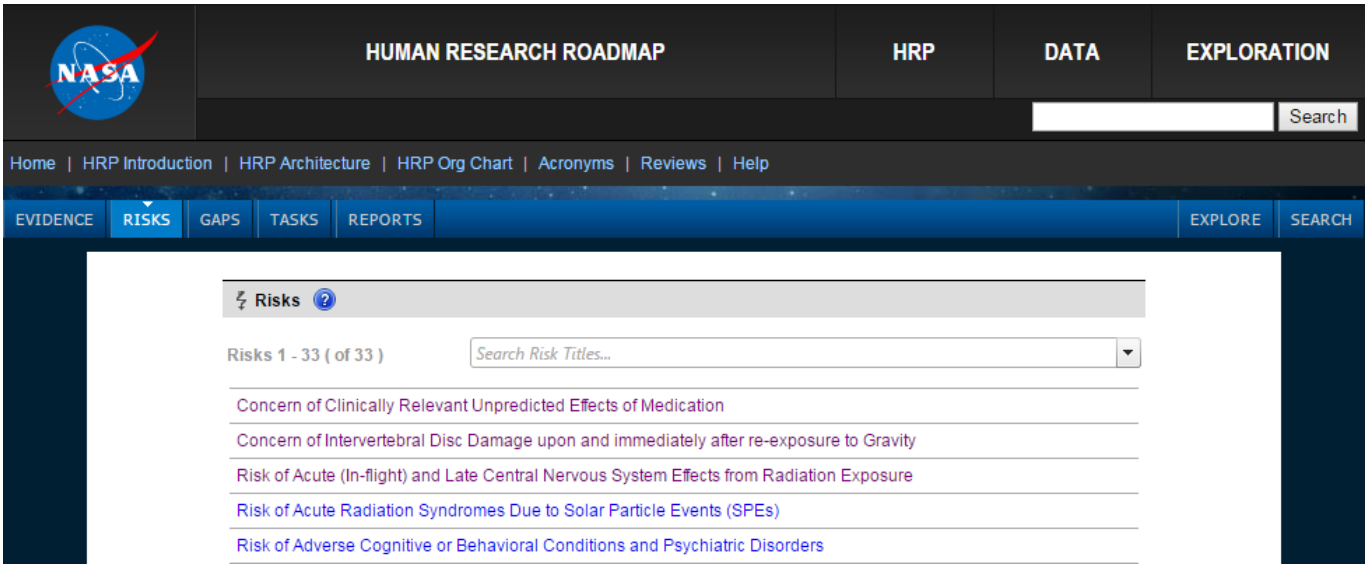
Evidence

The Evidence page gives an introduction to the HRP Evidence Reports and an overview of the original Evidence Book. A list of Evidence Reports organized by Risk is given as well:

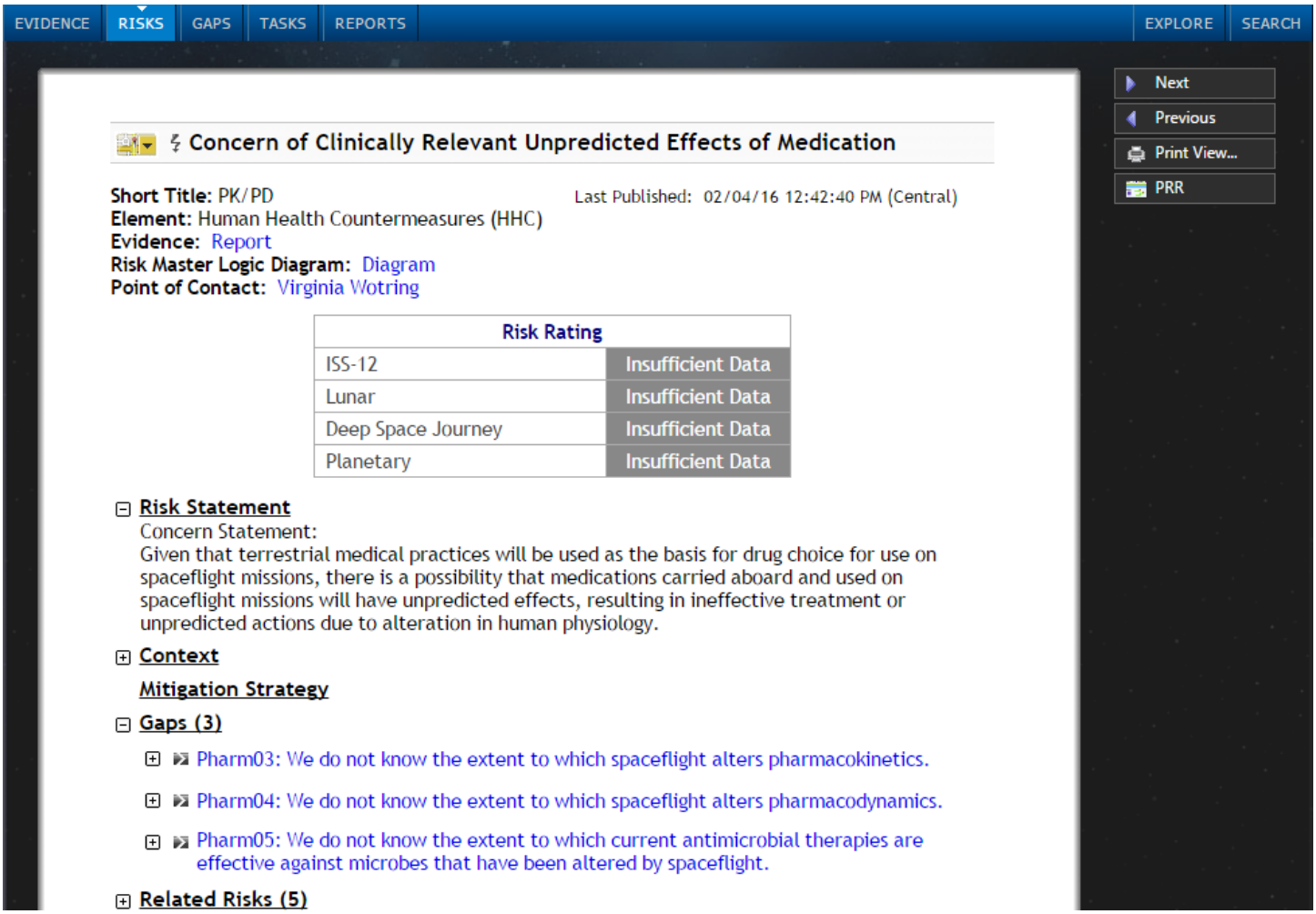


Risks

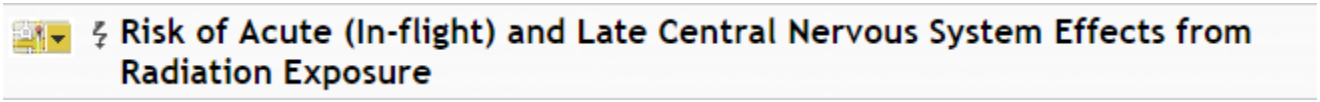
The Risks page lists every risk to human spaceflight assigned to the HRP for which research is needed:



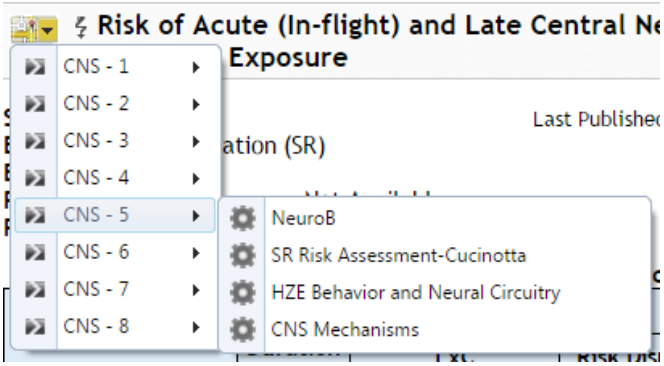
Clicking on an individual Risk in the list brings up details about that particular Risk:



Title



The primary title of the Risk. To the left of the Title field is a button with a roadmap icon. If you hover your mouse over this button, the associated Gaps and Tasks are shown in a tree structure allowing you to navigate to each item by clicking on it:



Short Title

Short Title: PK/PD

The abbreviated title for the Risk.

Element

Element: Human Health Countermeasures (HHC)

The HRP Element responsible for investigating the Risk.

Evidence

Evidence: Report

A clickable hyperlink to the HRP Evidence Report connected to the Risk, if available.

Risk Master Logic Diagram

Risk Master Logic Diagram: Diagram

A clickable hyperlink to the Master Logic Diagram connected to the Risk, if available.

Point of Contact

Point of Contact: Janice Huff

The person responsible for handling inquiries about the Risk content. Clicking the hyperlink will take you to a contact form allowing you to send a message to the point of contact person.

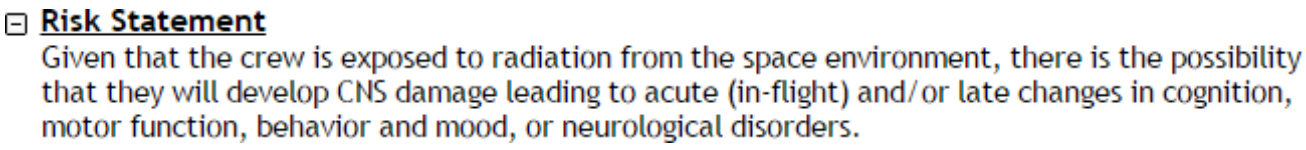
Risk Ratings and Dispositions

Risk Ratings and Dispositions per Design Reference Mission (DRM) Category

DRM Categories	Mission Duration	Operations		Long-Term Health	
		LxC	Risk Disposition *	LxC	Risk Disposition *
Low Earth Orbit	6 months	3x4	Accepted/Optimize	2x3	*Not Applicable*
	1 year	1x2	Insufficient Data	2x3	**To Be Determined**
Deep Space Sortie	1 month	1x2	Partially Controlled	2x3	Requires Mitigation
Lunar Visit/ Habitation	1 year	3x2	Accepted	*Not Applicable*	Requires Mitigation
Deep Space Journey/Habitation	1 year	1x1	Uncontrolled	1x3	Accepted
Planetary	3 years	2x3	Uncontrolled	3x2	Controlled

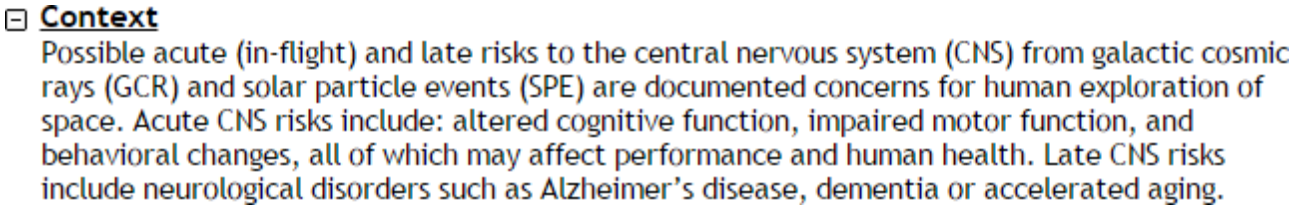
A table of various Design Reference Mission (DRM) categories, with likelihood and consequence ratings and risk dispositions associated with operations and long-term health for each category.

Risk Statement



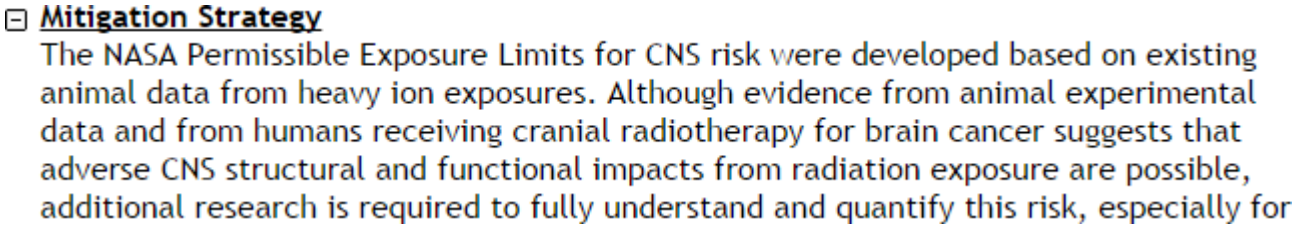
A statement describing the Risk and how it affects human spaceflight. Click the ⊞/⊟ buttons to show or hide this field's contents.

Context



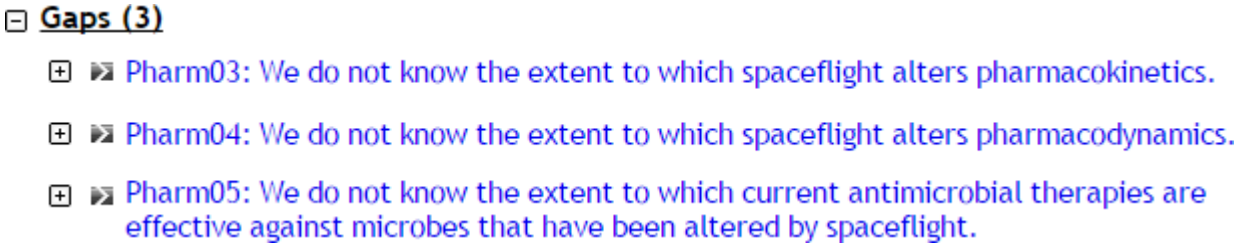
The context information for the Risk. Click the ⊞/⊟ buttons to show or hide this field's content.

Mitigation Strategy



The mitigation strategy to be used for the Risk. Click the ⊞/⊟ buttons to show or hide this field's content.

Gaps



A list of Gaps associated with the Risk. Click the top ⊞/⊟ buttons to show or hide the list of Gaps. Click each Gap Title to view its page in HRR, or click the ⊞/⊟ buttons next to the Gap Title to show or hide the Gap's information.

Related Risks

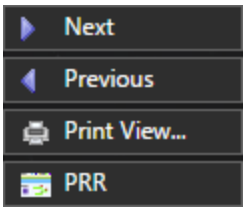
A list of Risks related to the current Risk, either by a shared Gap or a shared Task. Each common Risk is displayed with a list of items common between that Risk and the current Risk. Click the ⊞/⊟ buttons to show or hide the list of Risks.

Last Published

Last Published: 02/04/16 12:42:40 PM (Central)

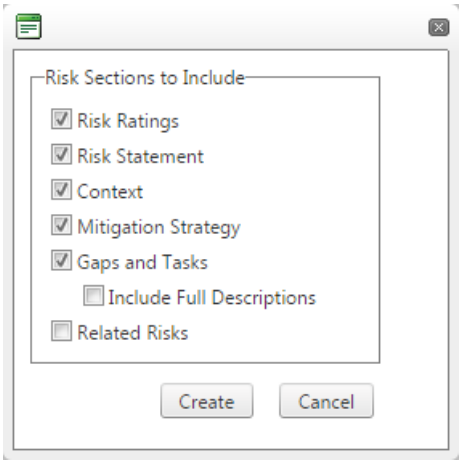
The date and time the Risk's content was last updated. This timestamp is shown next to the Short Title field at the top-right corner of the page.

Navigation Buttons



The navigation buttons hover at the top-right corner of the page, below the Explore and Search navigation links.

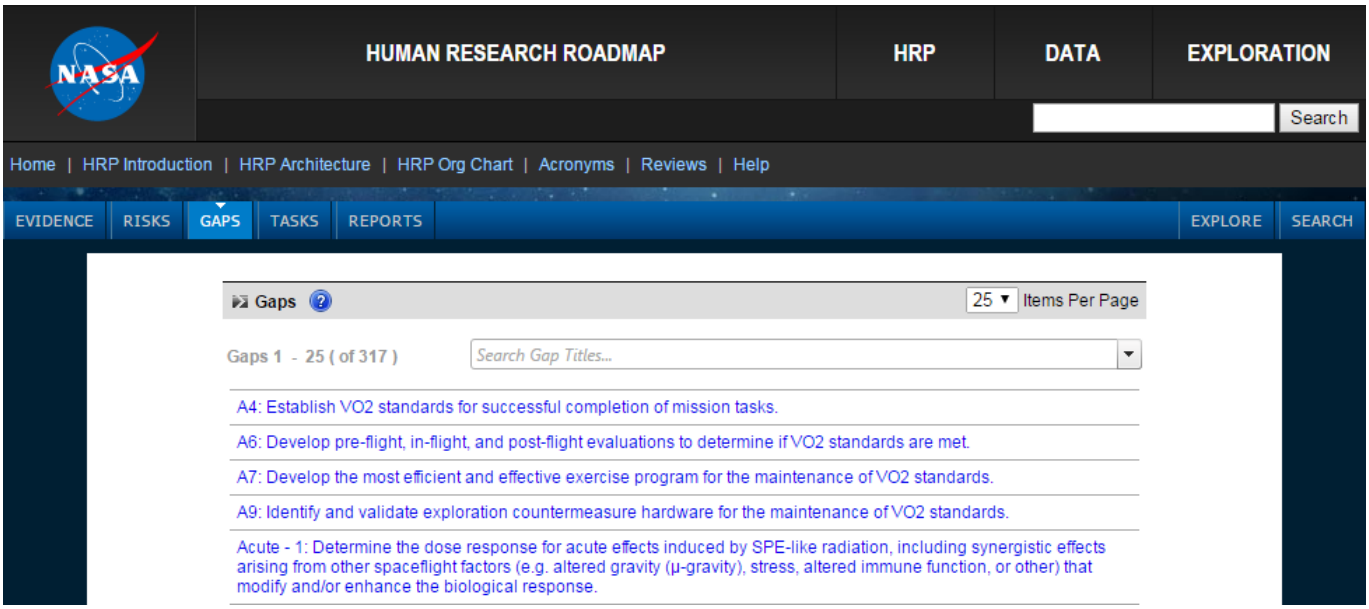
- Next: View the next Risk (sorted alphabetically by title)
- Previous: View the previous Risk (sorted alphabetically by title)
- Print View: Shows a dialog allowing you to customize a printer-friendly view of the Risk:



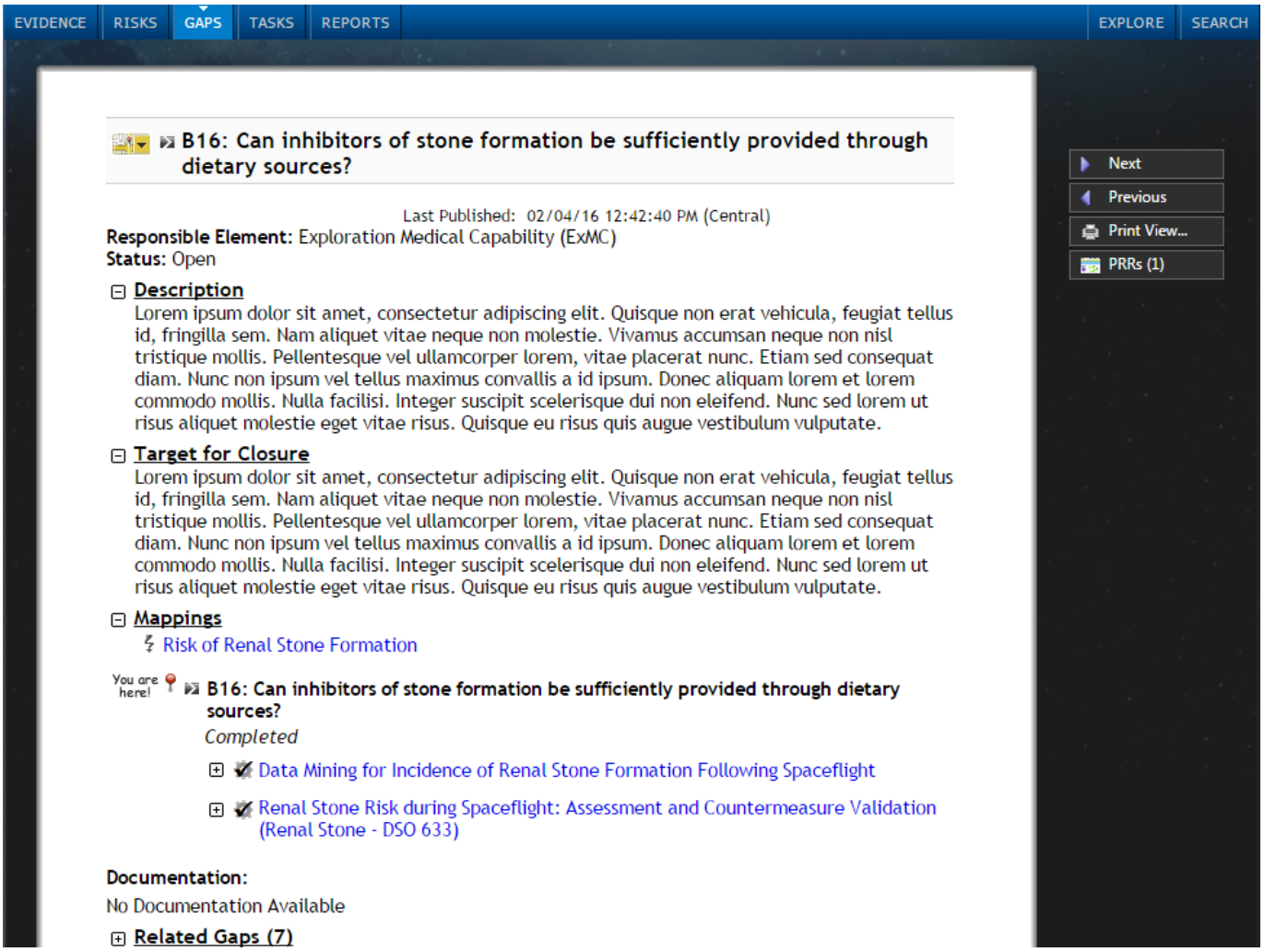
  Click the Create button to open the printer-friendly view in a new tab.
- PRR: Opens the Path to Risk Reduction document for the current Risk

Gaps

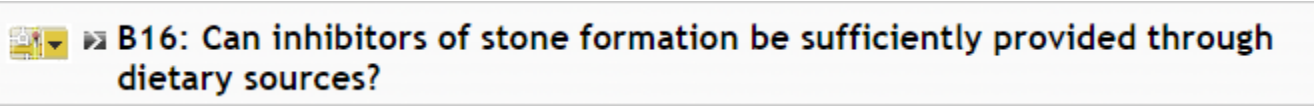
The Gaps page lists every gap in knowledge associated with the risks to human spaceflight, as identified by the HRP:



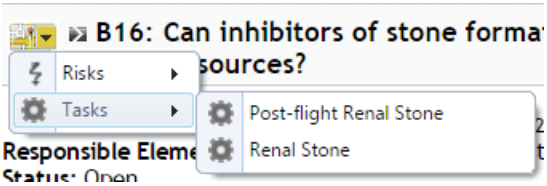
Clicking on an individual Gap in the list brings up details about that particular Gap:



Title



The full title of the Gap in the format Short Title: Full Title. To the left of the Title field is a button with a roadmap icon. If you hover your mouse over this button, the associated Risks and Tasks are shown allowing you to navigate to each item by clicking on it:



Responsible Element

Responsible Element: Exploration Medical Capability (ExMC)

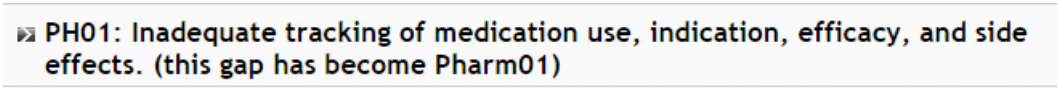
The HRP Element responsible for closing the Gap.

Status

Status: Open

The current status of the Gap. There are five possible values for the Status field:

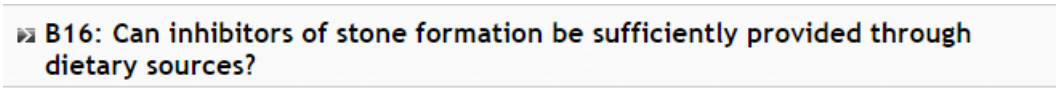
- Open: The Gap is currently open and requires further research to be closed
- Closed: The Gap has been closed
- Merged: The Gap has been merged into another Gap and is no longer part of the research plan. Merged Gaps will only show the Gap Title and a link to the target Gap:

  This Gap was merged into the following Gap:
  Pharm01: We do not know how medications are used during spaceflight.
- Split: The Gap has been split into one or more other Gaps and is no longer part of the research plan. Split Gaps will only show the Gap Title and links to the target Gaps:

  This Gap was split into the following Gaps:
  B11: What are the effects of radiation on bone? (Merged with Osteo 4)
  B2: What new technologies are available for in-flight fracture diagnosis? (Transferred to ExMC gap 4.02)
- Archived: The Gap has been removed from the research plan. Archived Gaps will only show the Gap Title and a statement that the Gap has been Archived:

  This Gap has been Archived and removed from the Current Research Plan.

Content Split Into

Content from this Gap was split into 2 other Gaps ⊞

Content from this Gap was split into: ⊟
B11: What are the effects of radiation on bone? (Merged with Osteo 4)
B2: What new technologies are available for in-flight fracture diagnosis? (Transferred to ExMC gap 4.02)

Gaps that are split can still be part of the current research plan if the original gap is still relevant. For this case, the original gap will show some content split into other Gaps with a statement "Content from this Gap was split into # other Gaps" message. Click the "# other Gaps" link or the ⊞ button to show a list of links to the target Gaps; click the ⊟ button to hide this list again.

Closure Rationale

Closure Rationale
This gap existed to explore the optimal means of preparing crew medical officers (CMOs) for the potential medical conditions on the Exploration Medical Condition List (EMCL) that a crew might face during an exploration mission. For this gap, the term "medical" encompasses dental and behavioral health conditions. Evidence from published reports on medical education, training, and validation, in addition to results from a survey on topics related to ISS crew medical officer (CMO)

The rationale behind the closure of the Gap. This field is only visible if the Status is Closed.

Closure Documentation

Closure Documentation:

- test.pdf

A set of files containing documentation related to the closure of the Gap. Click each link to view each document. This field is only visible if the Status is Closed.

Description

⊟ **Description**

1) Initial State
Due to the stringent astronaut screening process and pre-flight medical care, the human space flight program has fortunately not yet seen traumas or severe illness requiring on-orbit medical emergency care. Therefore, it has been difficult to determine the effectiveness of the full breadth of CMO skills training given to the crew regardless of their medical background (i.e., physician astronaut vs. non-physician-astronaut). This gap focuses on the identification of the

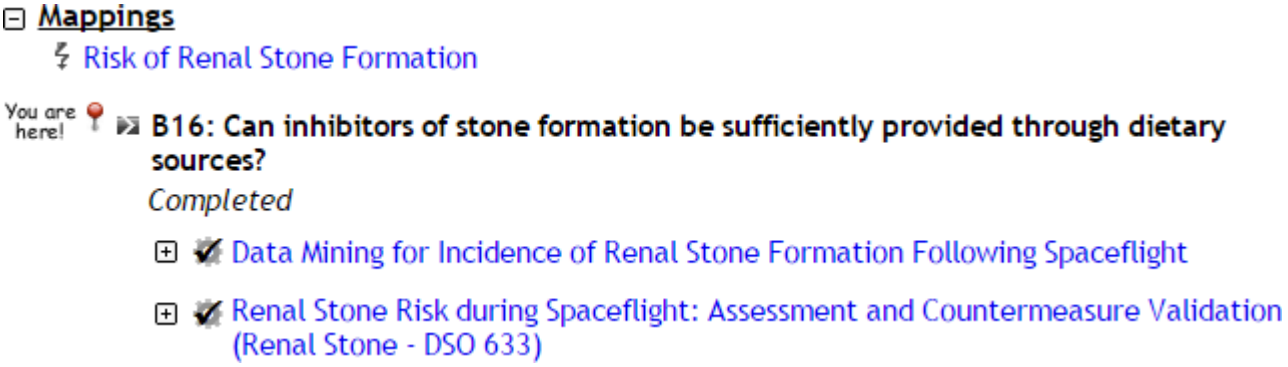
A description of the Gap being investigated. Click the ⊞/⊟ buttons to show or hide this field's content.

Target for Closure

⊟ **Target for Closure**
Delivery of while paper to identify the best training methods and validation techniques for the skills needed to address the Exploration Medical Condition List (EMCL) for CMO and ground personnel.

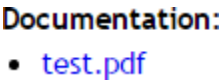
The target to be met in order to consider the Gap closed. Click the ⊞/⊟ buttons to show or hide this field's content.

Mappings



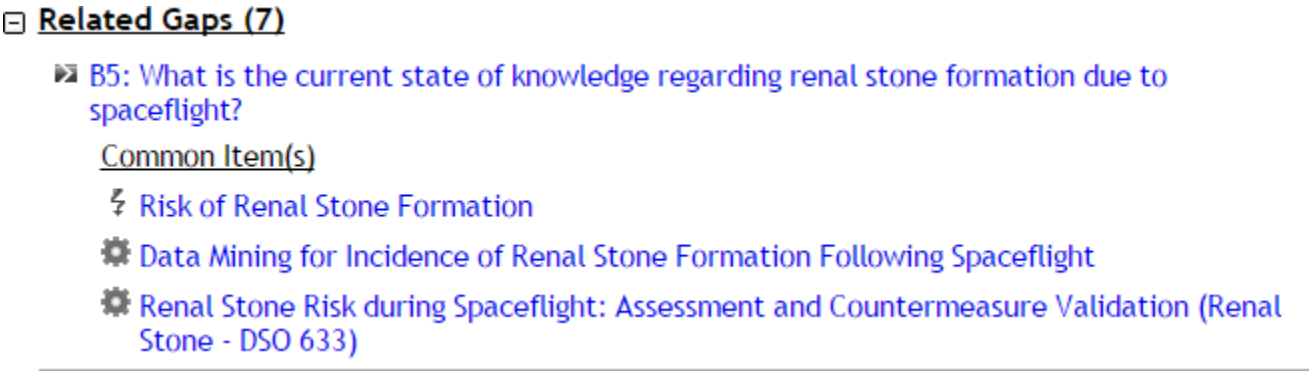
A list of Risks and Tasks associated with the Gap. Risks are listed first, then the current Gap, then an expandable list of Tasks (grouped by Funding Status). Click the top ⊞/⊟ buttons to show or hide the entire field. Click each Risk Title or Task Title to view its page in HRR, or click the ⊞/⊟ buttons next to the Task Title to show or hide the Task's information.

Documentation



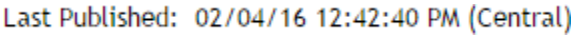
A set of files containing documentation related to the Gap. Click each link to view each document.

Related Gaps



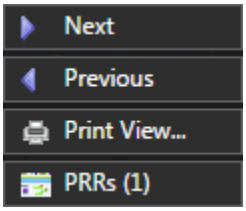
A list of Gaps related to the current Gap, either by a shared Risk or a shared Task. Each common Gap is displayed with a list of items common between that Gap and the current Gap. Click the ⊞/⊟ buttons to show or hide the list of Gaps.

Last Published



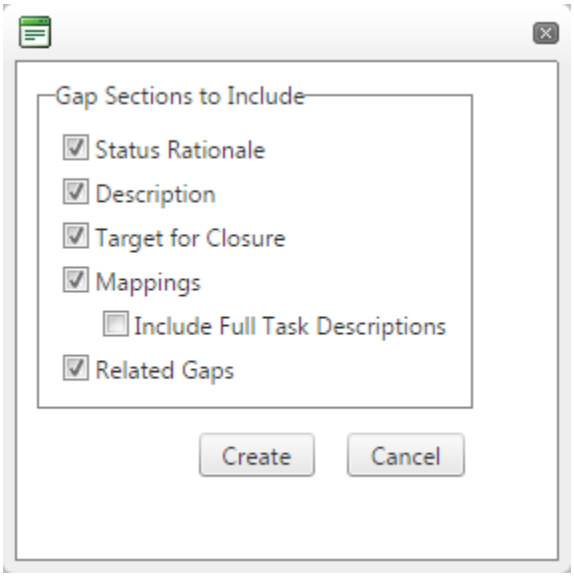
The date and time the Gap's content was last updated. This timestamp is shown below the Title field at the top of the page.

Navigation Buttons



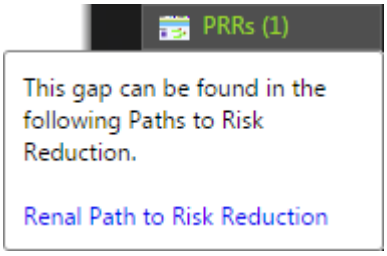
The navigation buttons hover at the top-right corner of the page, below the Explore and Search navigation links.

- Next: View the next Gap (sorted alphabetically by title)
- Previous: View the previous Gap (sorted alphabetically by title)
- Print View: Shows a dialog allowing you to customize a printer-friendly view of the Gap:



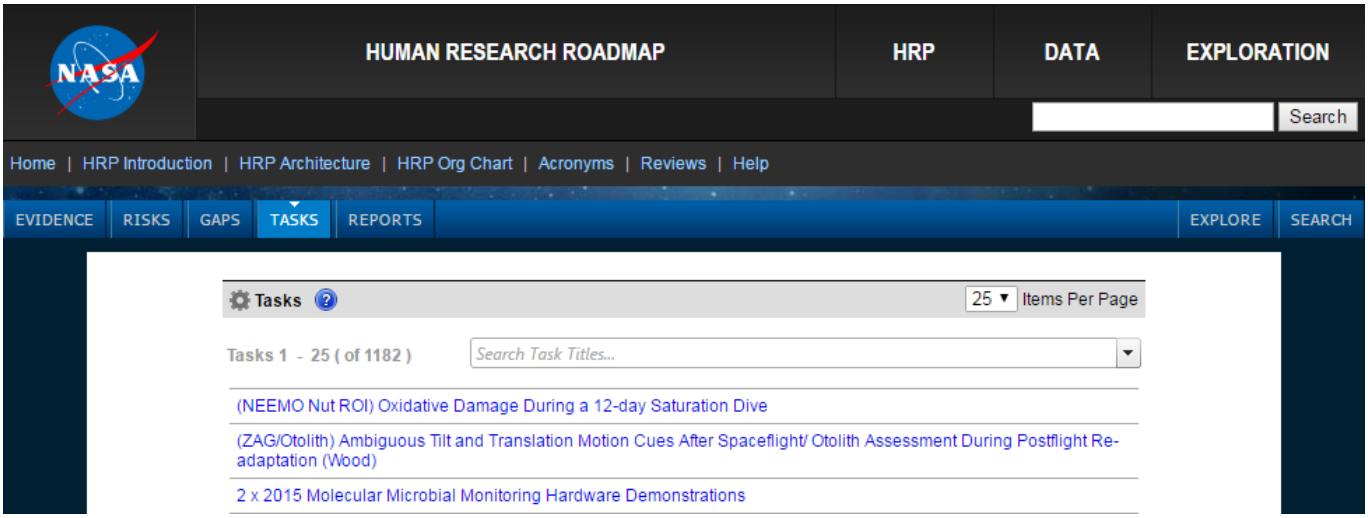
Click the Create button to open the printer-friendly view in a new tab.

- PRR: Hover over this button to show the Path to Risk Reduction documents for the Risks associated with the Gap:

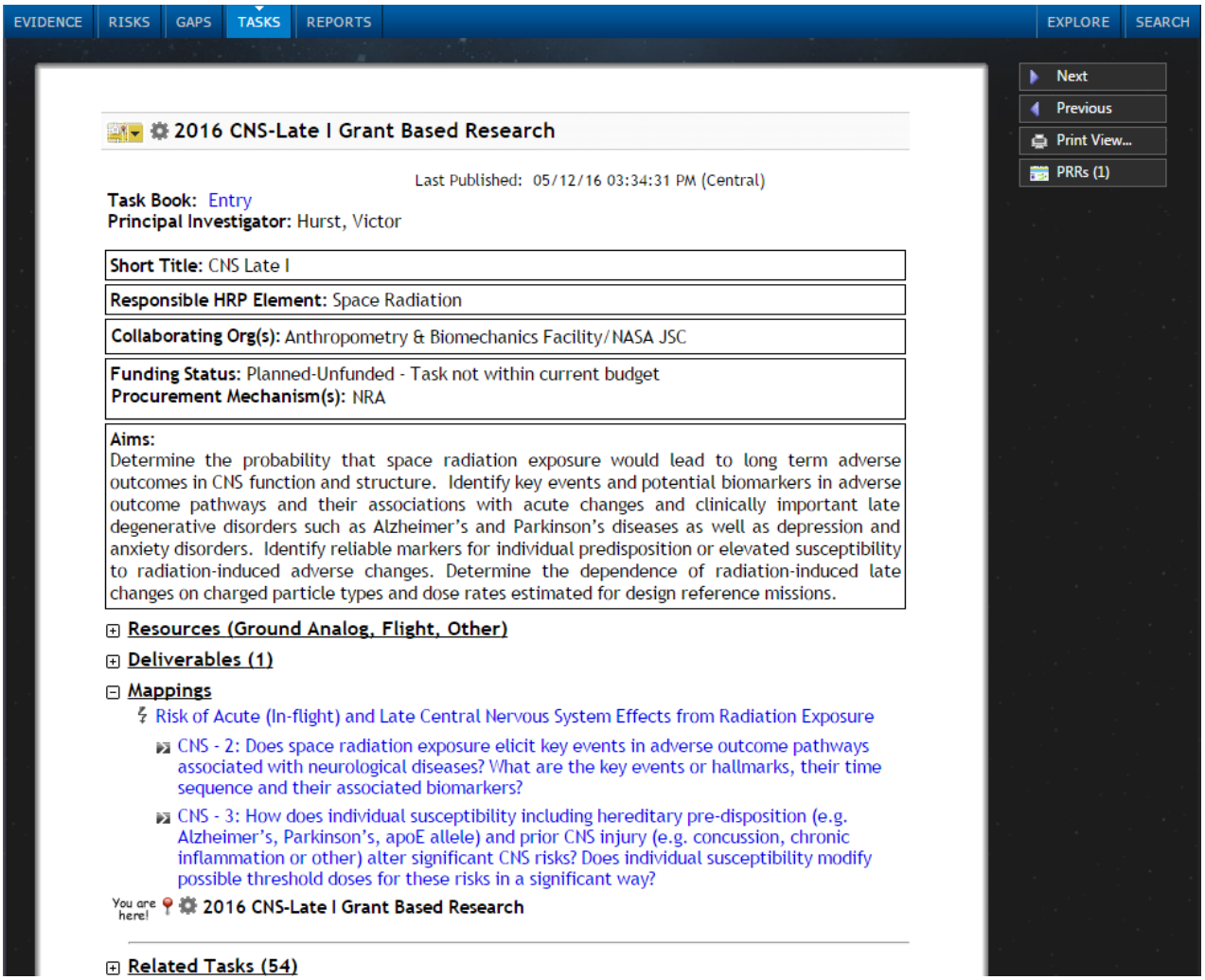


Tasks

The Tasks page lists every task being undertaken by the HRP to close identified gaps in knowledge associated with the risks to human spaceflight:

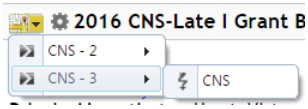


Clicking on an individual Task in the list brings up details about that particular Task:



Title

The primary title of the Task. To the left of the Title field is a button with a roadmap icon. If you hover your mouse over this button, the associated Risks and Gaps are shown in a tree structure allowing you to navigate to each item by clicking on it:



Task Book

Task Book: Entry

A clickable hyperlink to the Task Book entry connected to the Task, if available.

Principal Investigator

Principal Investigator: Krihak, Michael

The name of the principal investigator performing research on the Task.

Short Title

Short Title: CNS Late I

The abbreviated title for the Task.

Responsible HRP Element

Responsible HRP Element: Space Radiation

The HRP Element responsible for managing/conducting the Task.

Collaborating Org(s)

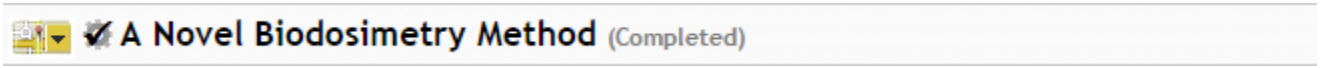
Collaborating Org(s): Anthropometry & Biomechanics Facility/NASA JSC

A list of organizations collaborating with the HRP on the Task.

Funding Status

Funding Status: Planned-Unfunded - Task not within current budget

The current status of funding for research on the Task. Note that Completed Tasks are shown in gray text and have a "(Completed)" message next to the Task Title:



Procurement Mechanism(s)

Procurement Mechanism(s): Directed

A list of procurement mechanisms used to perform research on the Task.

Aims

Aims:
Determine the probability that space radiation exposure would lead to long term adverse outcomes in CNS function and structure. Identify key events and potential biomarkers in adverse outcome pathways and their associations with acute changes and clinically important late degenerative disorders such as Alzheimer's and Parkinson's diseases as well as depression and anxiety disorders. Identify reliable markers for individual predisposition or elevated susceptibility to radiation-induced adverse changes. Determine the dependence of radiation-induced late changes on charged particle types and dose rates estimated for design reference missions.

A description of the aims of the research being performed on the Task.

Resources

⊟ **Resources (Ground Analog, Flight, Other)**

Ground Analog Resources

Ground-Based Flight Analogs • Reduced Gravity Flight	
Number of Subjects	1

Flight Resources

Number of Subjects	2

Other Resources

Other Resources Needed?	Yes

The resources needed to perform research on the Task. Click the ⊞/⊟ buttons to show or hide the contents of the field.

- Ground Analog Resources
  - Ground-Based Flight Analogs: A list of flight analogs to be used in place of flight resources
  - Number of Subjects: The number of human subjects needed for the flight analogs
- Flight Resources
  - Number of Subjects: The number of human subjects needed for flight research
- Other Resources
  - Other Resources Needed?: A Yes/No value indicating if other resources are needed

Deliverables

A Task can produce multiple Deliverables in the course of research. Each Deliverable has its own section on the page, and you can click the ⊞/⊟ buttons to show or hide the list of Deliverables.

⊟ **Deliverables (1)**

Category: Technology or Tool
Subcategory: Database

Description:
Annual and final reports providing evidence for radiation-induced late adverse outcomes in the CNS and organizing findings in adverse outcome pathways. Identify potential biomarkers of radiation-induced adverse outcomes that are shared by known neurodegenerative diseases to aid in assessing significance of risks and identify molecular targets for mitigation. Reports and peer-reviewed publications will provide the necessary knowledge for identifying and validating mitigation strategies. This task will contribute to gap closure by providing the necessary knowledge for developing risk estimates. Results will inform and prioritize concerns to be used in an integrated research approach using the NSCOR funding approach. This task supports the path to risk reduction milestone for risk characterization on Late CNS Effects.

Internal Customers:
Behavioral Health and Performance
External Customers:
AES - Advanced Exploration Systems
Is a Customer-Supplier Agreement (CSA) Required? Yes

Category and Subcategory

Category: Technology or Tool
Subcategory: Database

The category and subcategory that the Deliverable falls under.

Description

Description:
Annual and final reports providing evidence for radiation-induced late adverse outcomes in the CNS and organizing findings in adverse outcome pathways. Identify potential biomarkers of radiation-induced adverse outcomes that are shared by known neurodegenerative diseases to aid in assessing significance of risks and identify molecular targets for mitigation. Reports and peer-reviewed publications will provide the necessary knowledge for identifying and validating mitigation strategies. This task will contribute to gap closure by providing the necessary knowledge for developing risk estimates. Results will inform and prioritize concerns to be used in an integrated research approach using the NSCOR funding approach. This task supports the path to risk reduction milestone for risk characterization on Late CNS Effects.

A description of the Deliverable to be produced.

Internal Customers

Internal Customers:
Behavioral Health and Performance

A list of HRP Elements that will receive the Deliverable once produced.

External Customers

External Customers:
AES - Advanced Exploration Systems

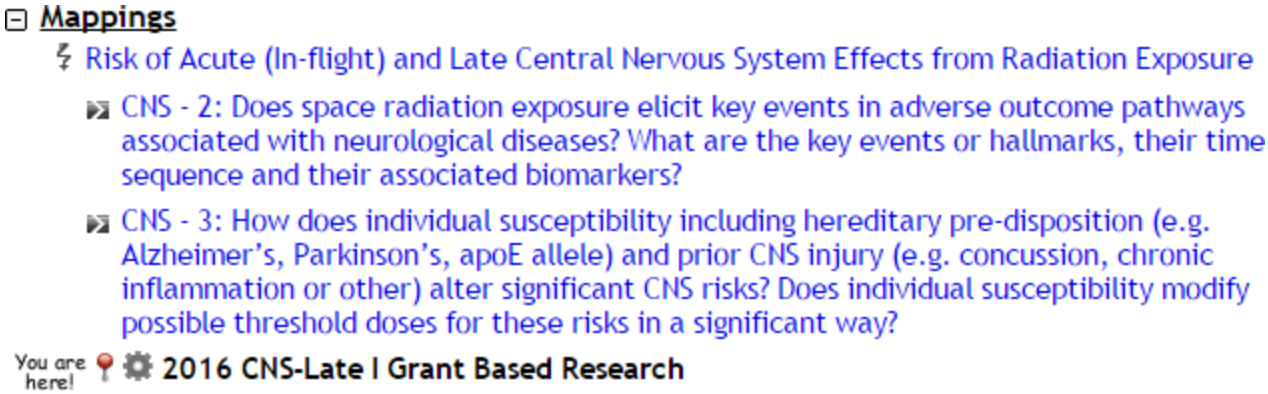
A list of external customers that will receive the Deliverable once produced.

Is a Customer-Supplier Agreement (CSA) Required?

Is a Customer-Supplier Agreement (CSA) Required? Yes

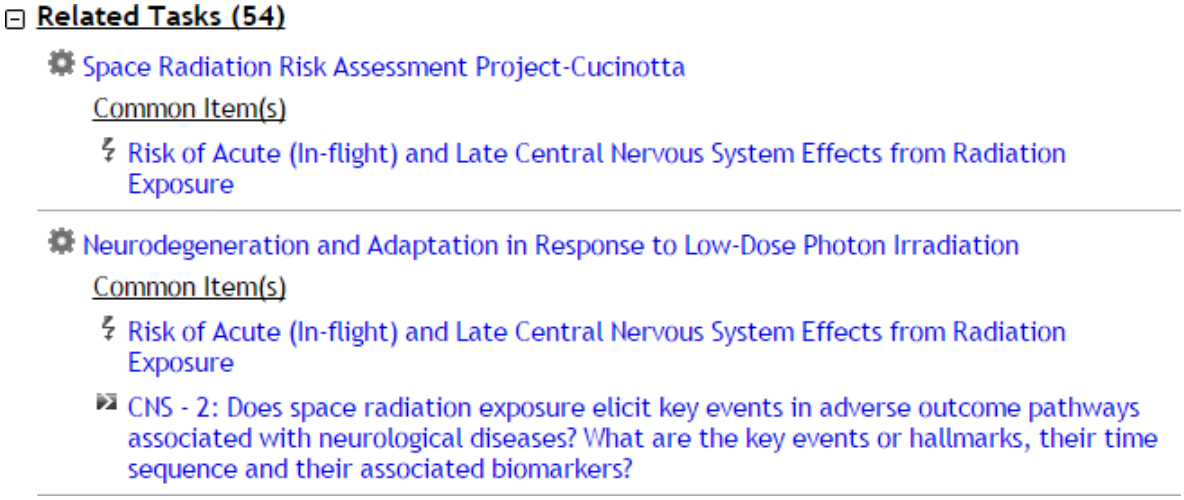
A Yes/No value indicating that a Customer-Supplier Agreement (CSA) is required for the Deliverable. This field is only visible if the list of External Customers is not empty.

Mappings



A list of Risks and Gaps associated with the Task. Click the ⊞/⊟ buttons to show or hide the contents of the field.

Related Tasks



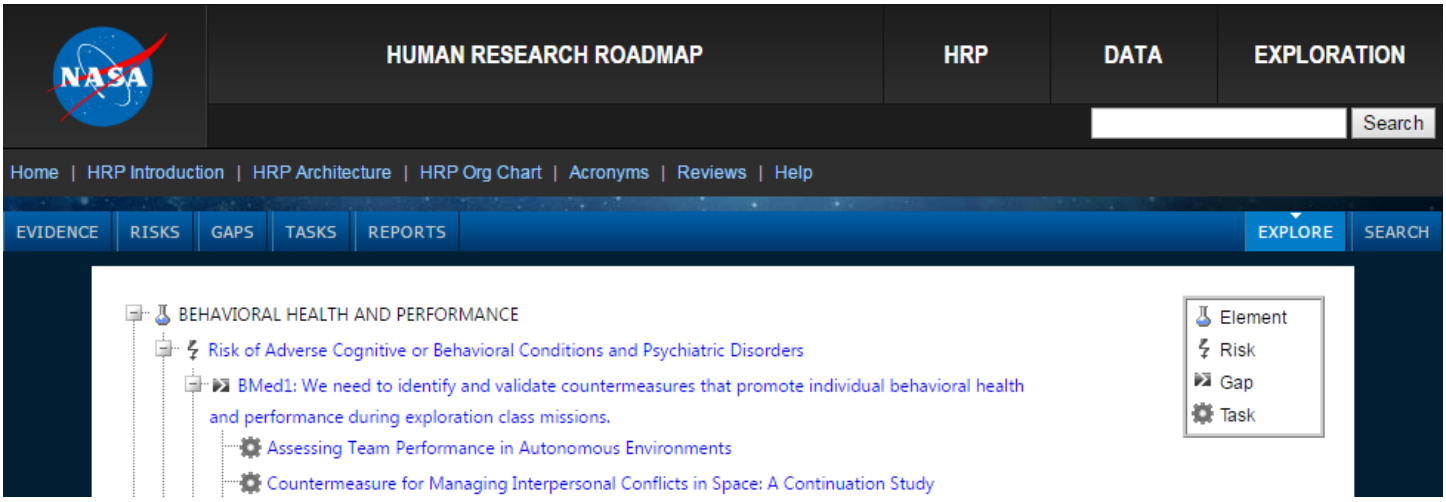
A list of Tasks related to the current Task, either by a shared Risk or a shared Gap. Each common Task is displayed with a list of items common between that Task and the current Task. Click the ⊞/⊟ buttons to show or hide the list of Tasks.

Reports

The Reports tool allows you to build and run custom reports against the data in the HRR database. This tool is quite flexible and powerful, so a separate User Guide has been written for it. Please see the "Reports User Guide" document on the Help page of HRR for more information.

Explore

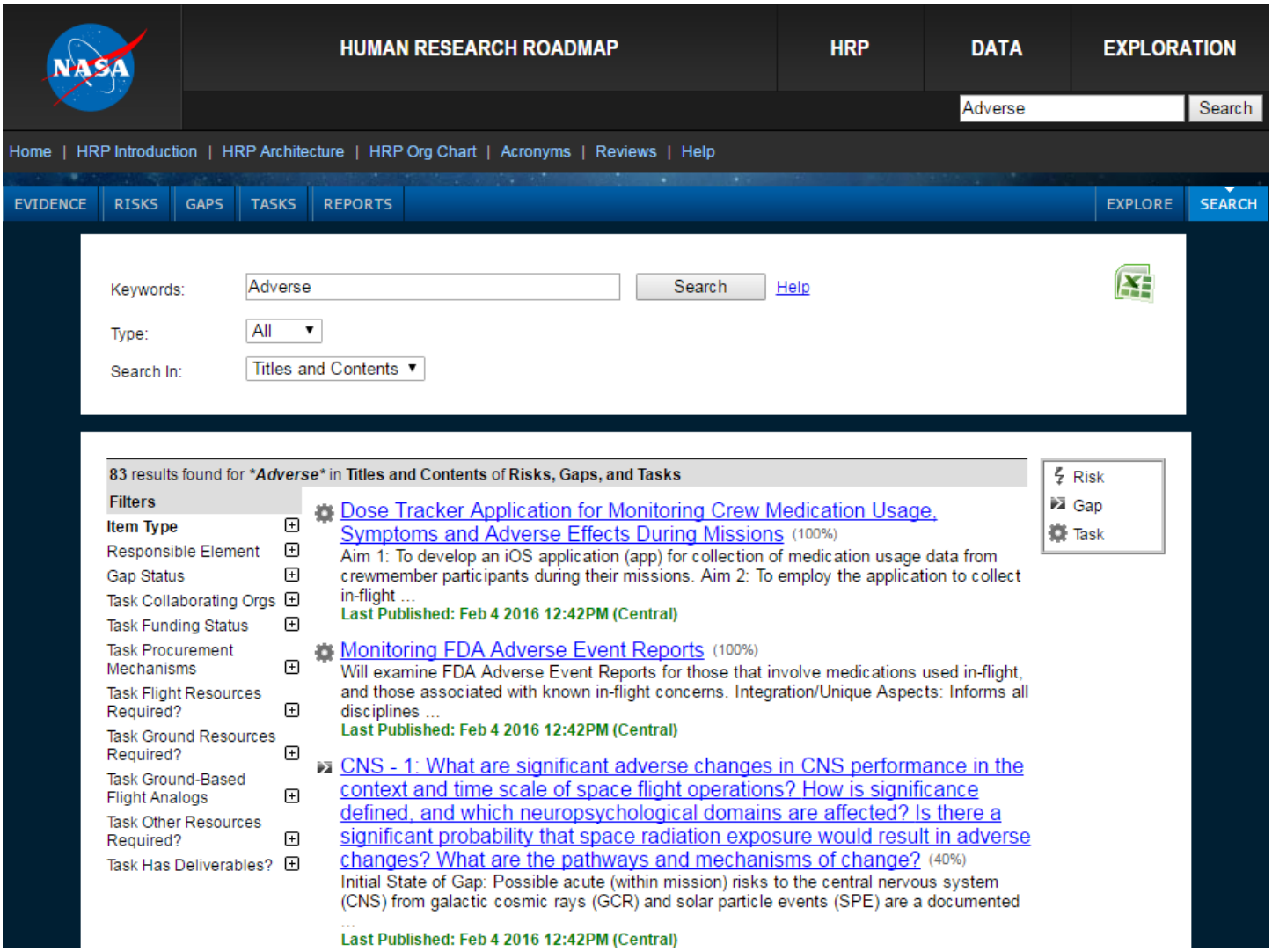
The Explore page displays all of the Risks, Gaps, and Tasks in the system organized in the research plan hierarchy starting with Element:



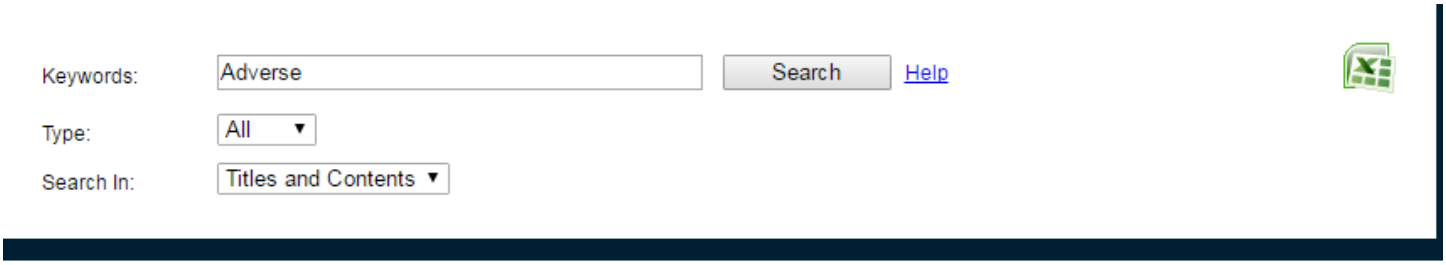
The tree nodes can be expanded by clicking the plus icon (⊞) and collapsed by clicking the minus icon (⊟).

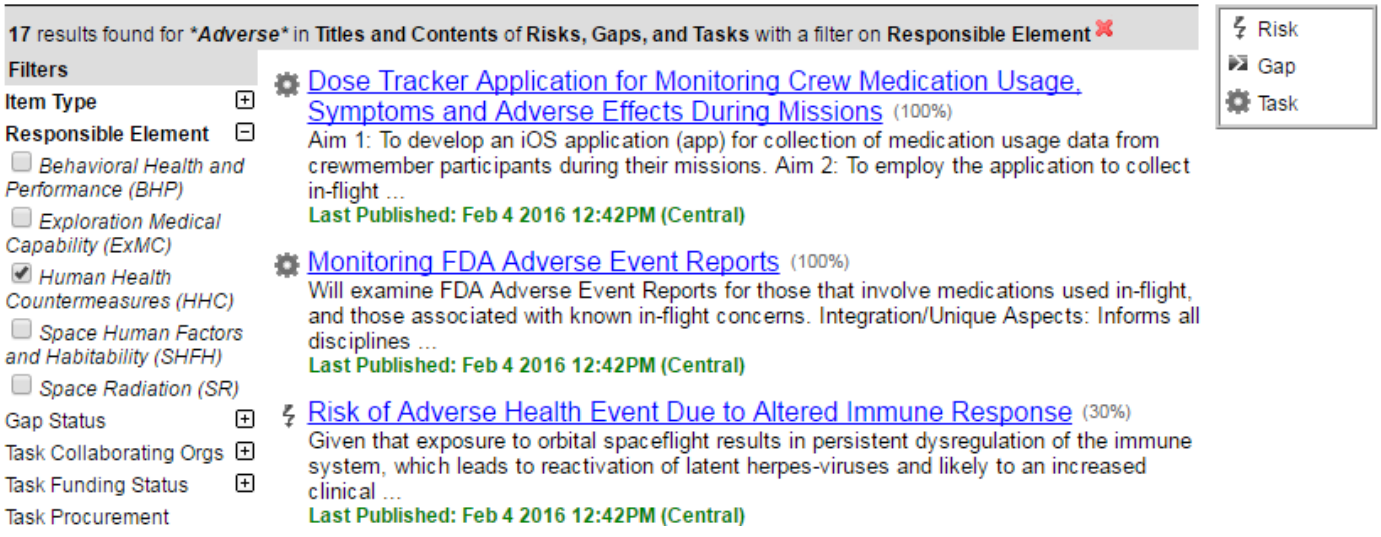
Search

You can locate an item by title and contents by typing a search query in the search box at the top-right corner of the page and clicking the Search button, or by clicking the Search navigation link:

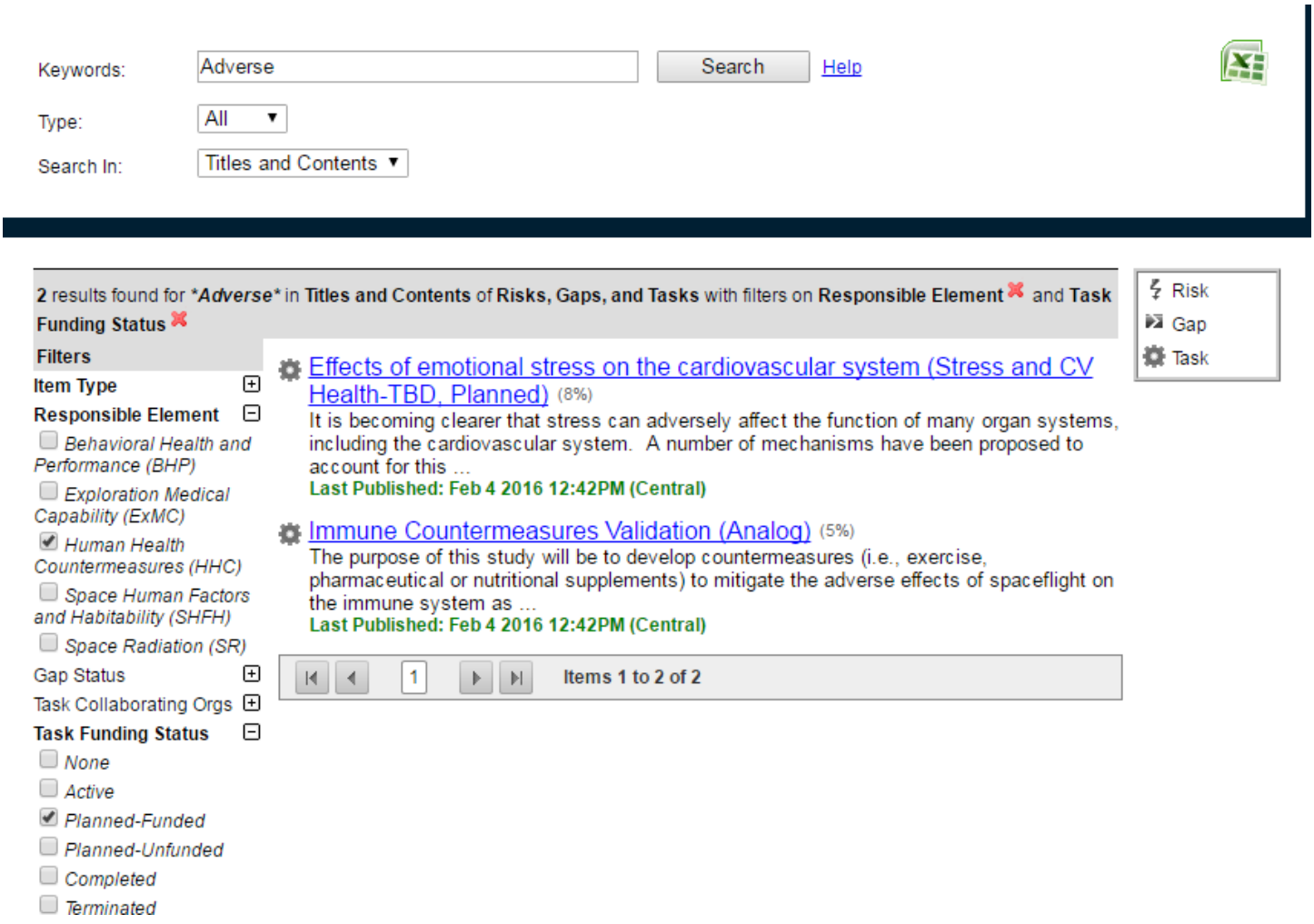


By default, the search results will contain items of all types and search within titles and contents. You can restrict your results by changing the Type and Search In values or by using the Filters at the left side of the list of results. For example, to restrict the results to only those items whose Responsible HRP Element is Human Health Countermeasures, click the ⊞ button next to “Responsible Element” and mark the checkbox next to “Human Health Countermeasures (HHC)”. The list of results is automatically updated to reflect the new filter:





Multiple filters can be applied at the same time; for example, to only display Planned-Funded Tasks in the previous set of results, click the ⊞ button next to “Task Funding Status” and mark the checkbox next to “Planned-Funded”:



To remove a filter, either clear its checkboxes in the Filters section or click the ✖ button in the results header next to the filter you wish to remove.