Exploring the Planets

Content Document
Summary of exhibition themes

The big idea: “Exploration reveals that our Solar System is filled with amazingly diverse places that transform our understanding of Earth and worlds beyond.”

This big idea reflects the team’s desire to cover areas of science, exploration and history, to show the vast diversity of worlds inside and outside our Solar System, to tell the stories of historic artifacts, and to show how planetary exploration has shaped our understanding of the Earth. Physically, we have pictured the exhibit units arranged around a central immersive environment, “Walking on Worlds”, a dynamic audiovisual experience that would surround visitors with landscapes of the worlds on which spacecraft have landed. The concept is to provide a visually powerful presentation that gives visitors a sense of standing on other planets.

The exhibition would be artifact-rich and filled with dramatic images of amazing features (giant volcanoes, huge canyons, methane lakes, massive storms, towering geysers). The team has developed a different approach for presenting the worlds of the Solar System. Unlike the current gallery, it would not be a planet-by-planet presentation, but rather it would reflect current understanding that the Solar System is better understood as groups of different types of worlds: terrestrial planets, gas giants, and small rocky or icy bodies. We hope in this way to take the visitors on a journey through the wonders of diverse worlds and in the end show that exploration of these worlds lets us understand our home as never before.

The Gallery

Since 1997, a new generation of robotic spacecraft has greatly advanced our understanding of the Solar System and the Earth’s place in it. These missions have revealed the previously unseen half of Mercury, deposits left by flowing water on Mars, and the present-day methane rivers and lakes of Saturn’s moon Titan. Major technological achievements include the first landings on an asteroid and a comet, ion propulsion systems, and a variety of scientific instruments that offer new perspectives on – and beneath – planetary surfaces. In the coming year, the first missions to the dwarf planets Ceres and Pluto will add a new chapter to the Solar System story.

These missions follow the trailblazing first generation of interplanetary spacecraft, which visited all of the other large planets between 1962 and 1989. These earlier missions transformed the planets from astronomical objects into unique worlds, revealing a diversity that could not have been anticipated from Earth-based observations alone. The rocky planets, gas giants, and icy bodies of the Solar System each had a unique and unexpected face, which was often scarred by a long and violent history. By exploring the planets, we have found a record of the Earth’s early history, the raw materials from which it was built, and a new appreciation for this remarkable world.

Over the past two decades, planetary science has reached the outer limits of the Solar System, where many small worlds occupy the space beyond Pluto, and acquired a new focus on the families of other stars. Discoveries of numerous planets orbiting nearby stars show us that other stellar systems are as different from our Solar System as the other planets are from the Earth.

The Space Age has been a major phase of exploration in human history. With a unique collection of artifacts from both generations of planetary missions, active scientific research in house, and longstanding status as one of the most visited museums in the world, the National Air and Space Museum is an unparalleled venue to tell this story and showcase the technology that made it possible. A new Exploring the Planets exhibition will provide a new generation of visitors with a new perspective on the Solar System and worlds beyond.
Take-aways:

After viewing this exhibition, we would like visitors to:

- Comprehend the vast diversity and similarities of the worlds of our Solar System and beyond
- Appreciate the visual beauty of other worlds
- Imagine and experience the sense of wonder of standing on another world
- Understand the history of planetary research and the rapid pace of discovery during the Space Age
- Understand the historic significance of spacecraft and instrument artifacts
- Learn about the basic types of planetary bodies: gas giant planets, rocky planets, and small rocky and icy bodies
- Understand the factors that make a planet able to support life
- Learn about recent discoveries in planetary exploration, including current Smithsonian research

Exhibition units:

The exhibition is planned along two conceptual pathways. The attached chart is a thematic (not physical) representation of gallery units and themes. Individual units are described below along with some of the exhibit elements and artifacts that could be included.

Path 1: Worlds of the Solar System

1. **No Place Like Home?** This section introduces visitors to the amazing diversity of worlds inside and outside our Solar System. It illustrates how the Earth compares and contrasts with the other planets, and it explains what makes a world habitable for life.
   - **Highlights:** Solar System montages (images), the Voyager look-back image, a habitable zone diagram
   - **Artifact:** Viking biological experiment flight spare

2. **Touring the Solar System.** The size and diversity of worlds inside and outside our Solar System are shown with planetary size comparisons and a fun spacecraft video tour taking visitors from the outer reaches inward.
   - **Highlights:** planetary size comparison globes with actual surface detail, video or interactive illustrating the distances between planets

3. **The Far Reaches.** The small, icy worlds of the Oort Cloud, Kuiper Belt, and comet population are described, along with their role in shaping planetary surfaces.
   - **Highlights:** images of Pluto, comet images and video, KBO artist’s concepts, the story of the discovery of Eris
   - **Artifacts:** New Horizons model or instruments, Stardust return capsule, high-altitude and undersea comet samples

4. **Gas Giants.** This section gives an overview of the dynamic atmospheres, rings, and moons of the four gas giants, which contain most of the total mass in the Solar System outside the Sun.
   - **Highlights:** Jupiter atmosphere videos, topics of weird moons and intricate rings, moon movement animations.
   - **Artifacts:** Voyager spacecraft, Cassini/Huygens instruments if available
5. **Inner Planets.** The rocky worlds and the geologic processes that shaped them are described. A subset focuses on Mars.

**Highlight:** Mars rover backed by a large screen showing actual terrain that changes during the day to different sites along the rover’s path.

**Artifacts:** Mars meteorite, Mars watch, Viking IRTM, Pathfinder Lander with Marie Curie, NEAR instrument

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Central Immersive Environment

**Walking on Other Worlds.** This part of the gallery would aim to “transport” visitors to other planets using digital display technology. Robotic spacecraft have landed on two planets, two moons, two asteroids, and a comet. An eighth entered the atmosphere of Jupiter. This exhibit unit would be a dynamic immersive environment including several of these places. Using images and visualizations from missions, it is possible to develop digital environments representing planetary surfaces. Different worlds could be displayed at different times during the day which could encourage visitors to revisit the gallery. Connections could also be made with artifacts in the exhibition. The area will be designed to also accommodate short presentations such as Ask-an-Expert or explainer activities. The presenter could be “standing” on the world he/she is discussing.

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Path 2: Exploration

1. **From Points of Light to Wondrous Worlds.** This is a historical perspective on how advancing technology has changed our perception of the planets.

**Highlights:** historic telescope and spacecraft views compared to high-resolution recent views, features on historic and current scientists working in the same areas to compare their tools, methods, and ideas.

**Artifacts:** Blink comparator (Pluto discovery), Lowell Mars globe, Mariner 9 globe, telescopes, LROC cameras, HiRISE back-up or model, generations of radar sounders, Asaph Hall eyepiece and logbook (discovery of Phobos), Mariner 2 radiometers

2. **Hostile Territory: Challenges of Exploration.** Planetary exploration is fraught with perils. Particular issues at Venus, Mars, Jupiter, and colder locations are described.

**Highlights:** 7 minutes of terror video, design-a-spacecraft interactive, chart of Mars missions and success rate.

**Artifacts:** Pathfinder air bags, Surveyor camera, MESSENGER instrument, Huygens instrument if available, Vega, Venera drill

3. **Exploration Continues.** This section includes a What’s New area and shows discoveries by Smithsonian scientists.

4. **Looking Outward: A Galaxy of Solar Systems.** This unit features planets around other stars. We have learned that there is no typical solar system and this impacts our understanding of our own.

**Highlights:** interactives or videos on planet-finding techniques, create-a-solar-system interactive.

**Artifacts:** telescope used to test Kepler concept (built by SAO), Kepler instrument

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**Team members:**

The following staff formed a congenial and productive team that worked together contributing concepts and ideas: Bruce Campbell, Bob Craddock, David DeVorkin, Ross Irwin, Andy Johnston, Maureen Kerr, Yo Matsubara, Beatrice Mowry, Mike Neufeld, David Romanowski, Priscilla Strain, Tom Watters, Steve Williams