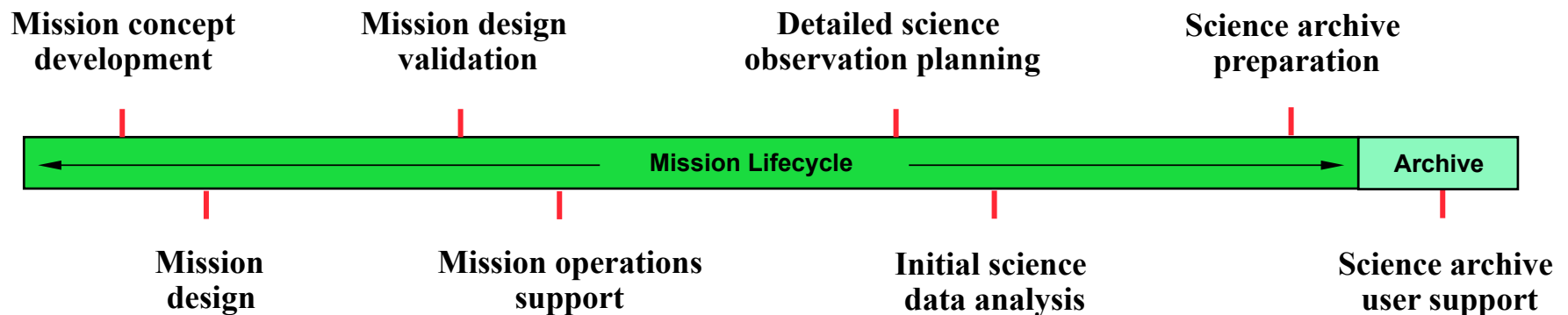# SPICE Introduction

March 2010

History

- **Implementation of a precursor to SPICE was initiated by scientists in 1984 as part of a major initiative to improve archiving and distribution of space science data in all NASA disciplines**

- **Responsibility for leading SPICE development was assigned to the newly-created Navigation and Ancillary Information Facility (NAIF), located at the Jet Propulsion Laboratory**

- **Today's SPICE system dates from about 1991**

Breadth of Use

- **The original focus of SPICE was on ancillary data and associated software needed by scientists for:**
  - **initial science data analysis**
  - **science archive preparation**

- **The scope of SPICE usage has grown to cover the full lifecycle of a mission as well as post-mission archive uses.**

Mission concept development	Mission design validation	Detailed science observation planning	Science archive preparation

Mission Lifecycle — Archive

Mission design	Mission operations support	Initial science data analysis	Science archive user support

Major SPICE Users*

- **SPICE is used on all NASA planetary exploration projects**
  - Examples: All Mars missions, Cassini, Deep Impact, Messenger, Juno
- **Limited SPICE data have been (or are being) created for some past missions**
  - Examples: Voyager, Viking Orbiter
- **SPICE is used to some degree in support of some space physics and astrophysics missions**
  - Examples: Hubble Telescope, Spitzer Telescope, IBEX, Wise, Kepler
- **SPICE was or is used on many non-NASA missions**
  - **Russia's** Mars 96; **ESA's** Huygens Probe, Smart-1, Mars Express, Rosetta and Venus Express; **Japan's** Hayabusa and SELENE; **India's** Chandrayaan-1
- **SPICE will be used on at least one NASA earth science mission**
- **SPICE ephemerides are used at some terrestrial observatories**
- **SPICE is used by NASA's Deep Space Network for both scheduling and operating the DSN antennas.**

* Not all are supported by NAIF; some are using SPICE on their own.

Ancillary Data Archives

- **SPICE is the U.S. Planetary Data System's normal means for archiving ancillary data**
  - **(But it's not a formal requirement)**

- **SPICE data for European planetary missions are archived in ESA's Planetary Science Archive**
  - **Some of these data will be mirrored on the NAIF server**

- **SPICE data for some Japanese and Indian missions will be available in the future from their local archives**
  - **Already the case for Hayabusa**

- **SPICE, or some SPICE ideas, might play a role in the future International Planetary Data Alliance (IPDA)**
  - **An IPDA "project" is looking into this question**

Distribution

- ## SPICE system components are freely distributed

  – **Projects pay for local deployment and operation, done either by their own personnel, or by NAIF, or a combination**

  – **There are no U.S. ITAR restrictions on distribution**

- ## Users get complete source code and much documentation

Quality of Training Materials

- **This set of tutorials has been presented and revised numerous times**
  - **No matter how hard we try, it seems impossible to:**
    - » **Get all the facts absolutely right and up-to-date**
    - » **Get the level of detail "right" for every student**
    - » **Get all of the language clear, complete and concise**
    - » **Present everything in the "correct" order**

- **These training materials are meant to supplement–not replace–the subroutine headers and the "required reading" reference documents that are the primary sources for user information about SPICE**