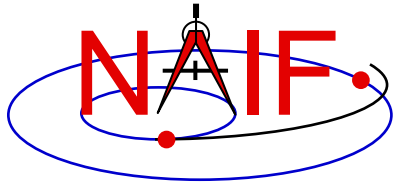




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Motivation for Developing SPICE

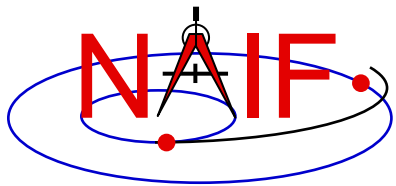
January 2018



Why Did NAIF Build SPICE?

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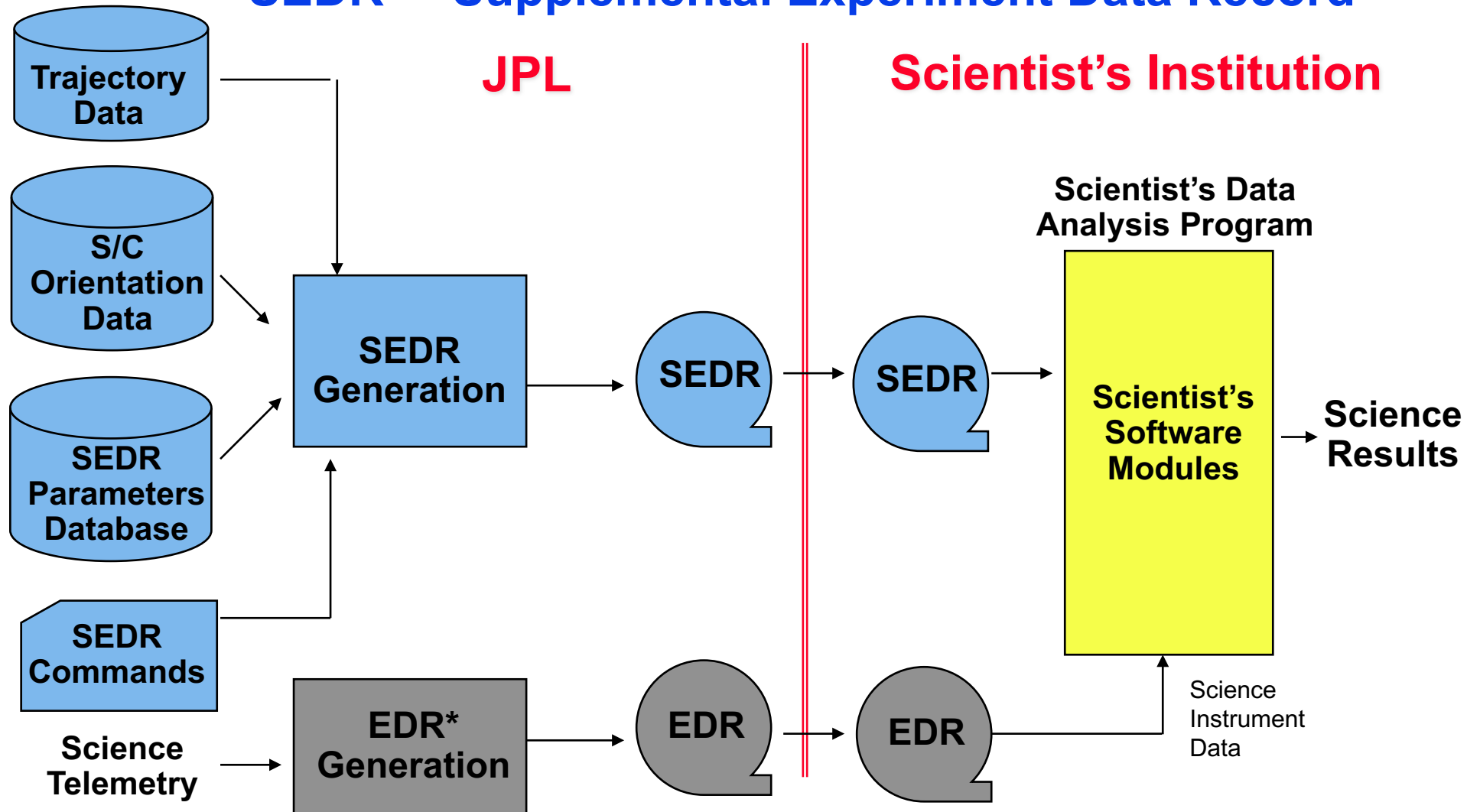
- **Scientists said they would like to:**
 - use common tools and methods throughout a project's lifecycle, and for all projects (national and international)
 - understand the calculations and transformations used to produce observation geometry data
 - be able to produce custom geometry calculations themselves, whenever and however they want
 - have the ability to revise the fundamental data and software tools used to produce their own observation geometry data



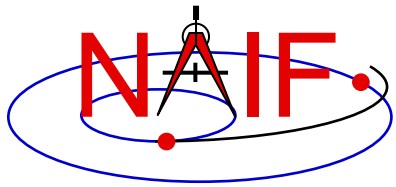
What Existed Prior to SPICE ?

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“SEDR” - Supplemental Experiment Data Record



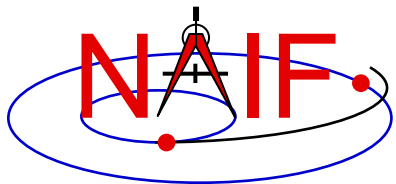
* EDR = Experiment Data Record = "raw" science instrument data



SEDR System Characteristics

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- **The SEDR generation program was built and operated at JPL**
 - **Scientist's requirements on SEDR had to be provided long before launch**
 - » **Late or post-launch updates were hard/expensive to accommodate**
 - **Difficult to change WHAT gets computed**
 - **Difficult to change HOW items are computed (algorithms, parameters)**
 - **Difficult to change the TIMEs at which items get computed**
 - **Generally only one SEDR file would be produced for each period of time**
 - » **Result: the scientist can't get better observation geometry data if/when better inputs (e.g. spacecraft trajectory or orientation, etc.) become available**
 - **SEDR generation was done "in the blind"**
 - » **Operators were not familiar with processes used to make the inputs**
 - » **Operators were not familiar with scientist's processing schemes**
 - » **Result: SEDR may not fully meet science team's expectations**
 - **The SEDR system was not exportable to other institutions**

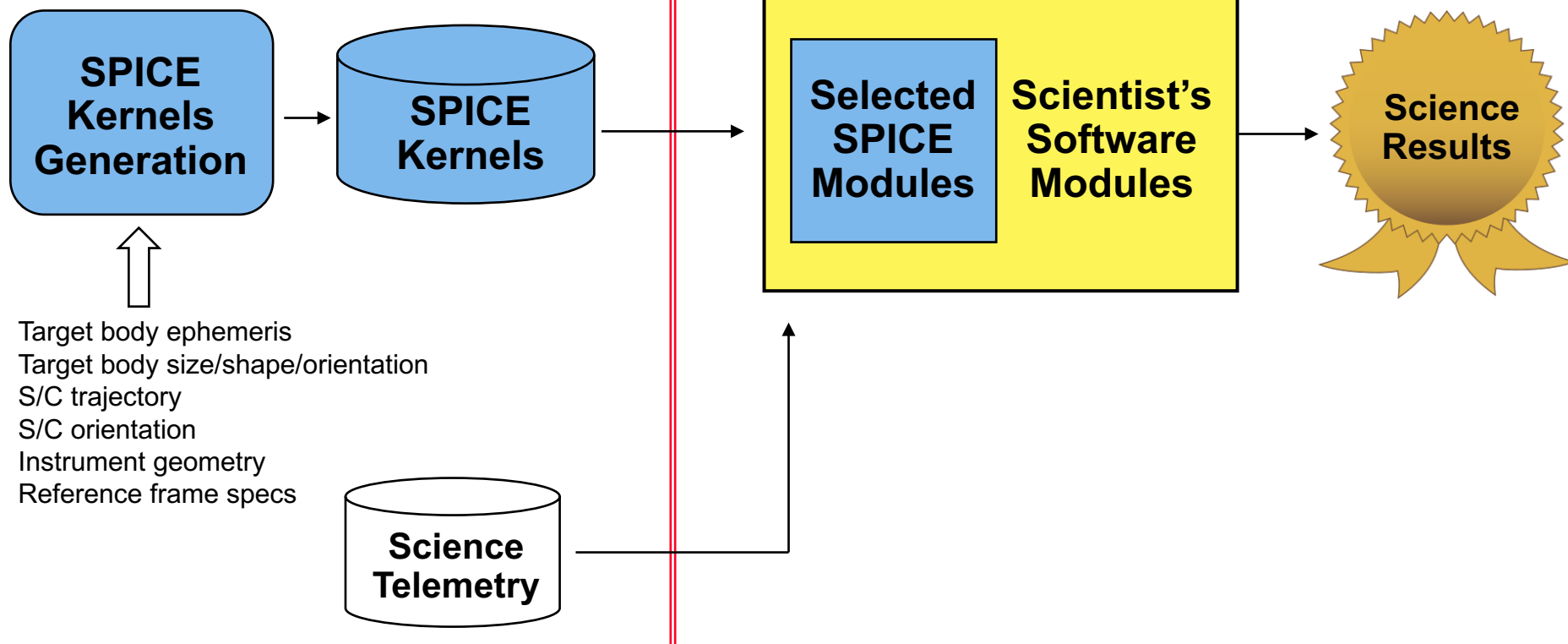


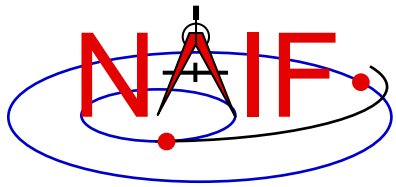
The SPICE Idea

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**Any Mission
Operations Center**

Scientist's Institution

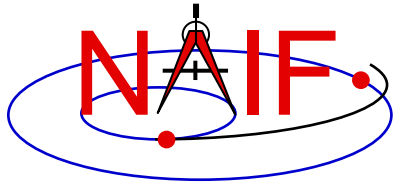




SPICE Benefits vs. SEDR

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- **The customer has great flexibility in deciding:**
 - what observation geometry parameters are computed
 - at what times or at what frequency these parameters are computed
 - for what time span these parameters are computed
 - electing if/when to re-do parameter computations using new (better) or otherwise different data as inputs
- **The customer also has:**
 - common tools and methods that can be reused on many tasks
 - full visibility into algorithms and data used in geometry calculations
- **The flight project operations center can:**
 - concentrate on producing better ancillary data, rather than on producing lots of SEDRs and frequently updating the SEDR software
- **The SPICE process may be replicated anywhere**



SPICE Detriments vs. SEDR

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- **Customers must do some non-trivial programming to read SPICE data and compute whatever is needed**
- **If the mission operations center is other than JPL, the appropriate project people need to learn how to produce SPICE data**
- **In some areas of SPICE the offering of choices to allow correct handling of different situations may present complexity that is unwarranted for “simple” problems**