

## STScI E/OP DEVELOPMENT AND TESTING OF PRODUCTS AND PROGRAMS

Every formal and informal educational product or program produced by STScI is standards-based, field-tested and evaluated for impact. We have a well-defined and rigorous development model, as shown in Figure 1.

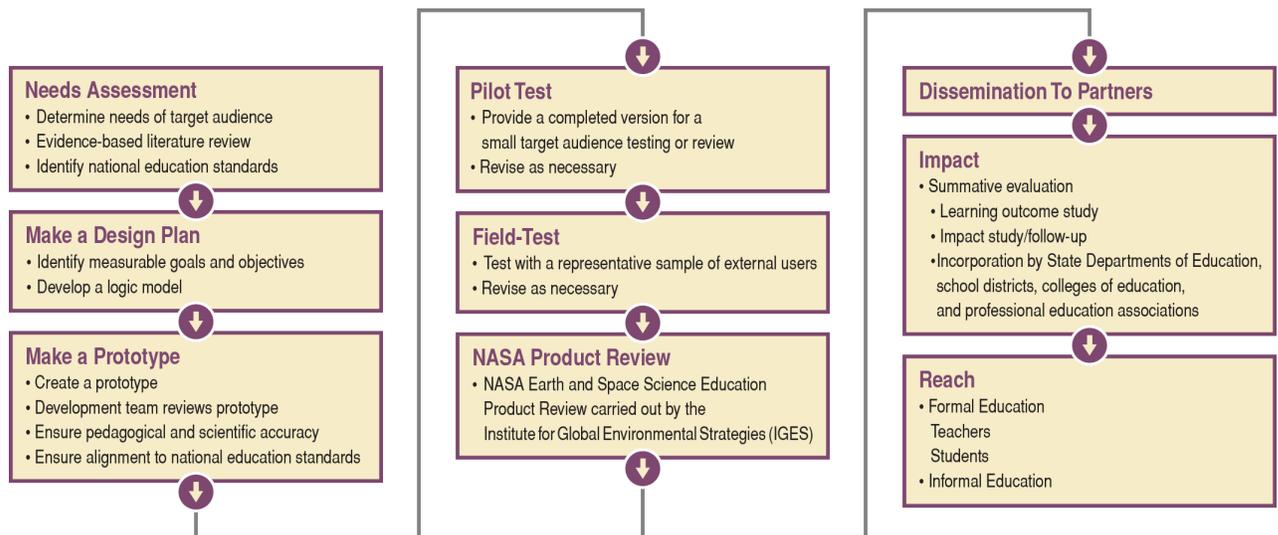


Figure 1 Development and evaluation model. Every formal and informal educational product follows a rigorous development model. Every product is standards-base, field-tested and evaluated for impact.

### PROCESS: NEEDS ASSESSMENT AND FORMATIVE EVALUATIONS

Needs Assessment: The first step in the development of any education or outreach product, including web resources, and coupled with an evaluation model, must initiate with a *user needs assessment* that includes three important components:

- Determine the needs of the target audience. For example, in the library exhibit *Visions of the Universe*, input is sought from the American Library Association which articulates to STScI the needs for library patrons.
- Perform an evidence-based literature search to gather an accurate picture of the range of existing materials, follow trends and developments, and identify areas of need.
- Identify alignment with national education standards. This may not explicitly be *astronomical* standards, since these are scarce for K-12 curricula. These standards include math standards, process standards, technology standards and science standards.

Design and Prototype: The next step is to make a *Design Plan*. It must have well-defined goals and objectives that are measurable. If it cannot be measured, the design is not pursued. A logic model (c.f., NSF guidelines) is an evaluation planning tool to clarify what a project intends to do and what it hopes to accomplish. It relates the

goals/objectives to some or all of the following elements: inputs, activities, outputs, outcomes, impact. The flow of the activity or resource is produced as a storyboard, for scrutiny, to determine how the end user will interact with the resource in various environments, without resorting to actual production. Storyboarding is followed by *prototype development* of the product. At this stage, a working model of the product is reviewed by an internal development team including scientists and educators. The team ensures pedagogic and scientific accuracy, grade level assignment, and alignment to national education standards. Its feedback is used as diagnostic input to improve the design.

Production Resource and Testing: In the next step, a completed product version is tested on a small target audience as a *pilot test*. This formative assessment, or diagnostic testing, is used as feedback and the product is revised as necessary. When the product has been revised and is deemed ready for the next step, it is tested on a representative sample of external users in a *field test*. The product is revised as appropriate based on the results of the field test. Where evaluations are performed by OPO, they are done by individuals who were *not* involved in the design in order to maintain separation.

Finally, when the product is deemed ready for dissemination, it is submitted for NASA Earth and Space Science Education Product Review, carried out by the Institute for Global Environmental Strategies (IGES). This is a requirement for all NASA SMD education programs. Review criteria include relevance, accuracy, alignment to National Education Standards, effective instructional practices and appropriate student assessment. A list of evaluations performed on OPO products can be found at <http://outreachoffice.stsci.edu/evaluation/>.