

PROJECT MANAGEMENT FOR SCIENTISTS

SCIENCE REQUIREMENTS

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OUTLINE

- Introduction
- Science Objectives
- Science Requirements
- Other Requirements
- Template and Example
- Checklist

INTRODUCTION

- Science requirements
 - are one of the 3 constraints driving scope
 - also influence cost and schedule
 - describe ideal outcome of project
- Uncertainty in science requirements translates into uncertainty in cost and schedule and therefore uncertain success
- Many project fail due to vague and/or undocumented requirements

SCIENCE OBJECTIVES

Follow from science vision and strategy

- I would like to understand ...
- This is what I need to observe, measure, test, ...
- This is how well I need to observe, measure, test ...

SCIENCE REQUIREMENTS

- Project scientist: responsible for science requirements
- Requirements evolve from science vision and strategy
- Science visions not concrete enough to be science requirements
- Use examples of how things will work if requirement too difficult to formulate (use cases)
- Often incomplete, fill in as project goes on
- Project team may need to interview scientists

REQUIREMENT REQUIREMENTS

- Need to have flexibility:
 - Prioritized
 - Information on need (what if not fulfilled)
 - May use requirements and goals
- Prepare de-scope options
- Need flexibility in fulfilling science requirements
 - Watch out for 'over'-specifying
 - Do not limit design, implementation

OTHER REQUIREMENTS

- Functional requirement: specifies a function that a system or system component must be capable of performing
- Performance
- Interface
- Operational
- Resource
- Verification
- Acceptance testing
- Documentation
- Security, Portability, Reliability, Maintainability, Safety requirements

REQUIREMENT TEMPLATE

- **Identifier:** Unique enumeration
- **Title:** Few, descriptive words
- **Need:** Essential requirements marked '1'. Non-essential requirements marked '2', '3' in descending level of importance
- **Priority:** Priority for completion. Requirements with priority 1 will be completed first, followed by priorities of 2, 3, ...
- **Source:** Origin of requirement can be found in document referenced by this entry
- **Description:** Requirement itself

Courtesy B.Goodrich

EXAMPLE (COURTESY B.GOODRICH)

SR.1 Science goals

Need:1

Priority:1

Source: *SOLIS, Proposal to NSF dated 12 February 1997*

SOLIS will produce observations to understand (1) the causes of the solar activity cycle, (2) storage and explosive release of energy, and (3) causes of radiative variability.

SR.2 25-year lifetime

Need:1

Priority:1

Source: *SOLIS, Proposal to NSF dated 12 February 1997*

Duration of the stream of regular observations will be at least 25 years.

SR.3 Relation to other activities

Need:1

Priority:2

Source: *SOLIS, Proposal to NSF dated 12 February 1997*

SOLIS observations will be integrated into the National Space Weather Program, operational needs of NOAA/SEL, support of NASA mission, and collaboration with other organizations.

SR.4 Community access

Need:1

Priority:2

Source: *SOLIS, Proposal to NSF dated 12 February 1997*

SOLIS observational capabilities will be made available to as many qualified users as possible.

REQUIREMENTS CHECKLIST

Check for

- clear, unambiguous requirements
- verifiable requirements
- consistency among requirements
- gaps in requirements
- requirements from beyond project lifetime
- unnecessary requirements (design restrictions)
- traceable requirements (identification of underlying assumptions)
- unique identifier for every requirements