# Requirements Examples

Good and Bad!

# Exercise Intro

Good exercise, but has some problems

Problem – lacks context

- Some reqs may be complete and unambiguous in one context and not in another
- We can still identify requirements that are problematic in almost any context, plus state assumptions

Problem – issues in requirements can overlap

- Some requirements might have issues with two or more areas
- Often there is no one right answer, but we can give an answer and explain why we gave it

Note – see guidelines on next slide for some help

Note – *italicized* “answers” are only suggestions

# Quality Review: Individual Reqs

Unambiguous

- Provide enough detail to constrain the requirement to one interpretation
- Use “shall” not should, could, etc.

Complete

- Don’t use “etc.” or other language leaving out info
- Don’t have TBD requirements

Verifiable

- Include measurement tolerances and other specific constraints that can be tested
- Don’t write in the negative

Traceable

- Ensure reqs have unique ID

# NASA CoNNeCT System

The Software shall provide the error log from each SDR to the ground upon request.

The Software shall provide information from onboard experiment applications.

*-Not complete (which pieces of information?)*

The Software shall provide telemetry data parameters to the Ground System at least once per minute during an experiment period.

The Software shall perform Bit Error Rate (BER) calculations on data received from the SDRs.

# NASA CoNNeCT System

The Software shall provide a command interface to operations personnel to generate and send commands from the CoNNeCT Control Center.

The Software shall initialize the system to a known configuration.

*-Not unambiguous (which configuration?)*

The Software shall manage limited-life flash memory so as to not wear out its usage within the first two years after launch.

The Software shall timestamp all data to within 1 ms accuracy.

# Course Management System

The Registration System shall perform prerequisite checks before processing student registrations.

The Instructor Portal shall enforce two-factor authentication.

The Grade Manager shall support standard grading.

*-Not unambiguous (what is meant by standard grading?)*

The TA Portal should allow grade changes only with instructor approval.

*-Not unambiguous (should means will? or optional?)*

# 3GPP Radio Access Network

The RBS shall setup dedicated channels within five milliseconds of a reservation request.

The UE shall send smaller messages on the RACH common channel.

*-Not verifiable (don't specify what smaller means)*

The RNC shall encrypt outgoing data to the core network.

The RBS shall initiate the health monitoring service just after startup.

*-Not verifiable (doesn't specify exactly when after startup)*

# NASA X-38 System

Support Services shall provide an API call to specify the address and length of a telemetry buffer.

The FTSS shall configure each FCP to halt processing if any of the MPE tests fail.

Communication services shall route messages to the proper virtual group(s) and socket.

*-Not complete (doesn't specify which are the proper virtual groups)*

The scheduler shall give tasks priority values according to their rate - the higher the rate, the higher the priority.

*-Not complete (doesn't specify an exact mapping)*

# NASA X-38 System

The FTSS software shall provide the identical services in all vehicle modes.

The FTSS software shall provide an API call that provides the application program the minor frame number.

The FTSS shall configure each FCP to halt processing if any of the MPE tests fail.

RAM scrub shall not scrub the area used for telemetry data.

*-Not verifiable (how do we fully test that it didn't/won't?)*

# Command and Control System

The Shared Map Service shall color code units (e.g. blue for friendly forces).

*-Not complete (should specify full mapping)*

The Shared Map Service shall provide both 2D and 3D views of the battlefield.

The Shared Schedule Service shall include a hierarchical view of units.

The Shared Schedule Service shall update data at a rate to be determined later.

*-Not complete (need to specify now, not later!)*

# Primary Flight Display

The PFD shall provide an indication of current heading.

The PFD can display altitude in either feet or meters.

*-Non unambiguous (can? Also which one feet or meters?)*

The PFD shall include common visualizations such as altitude tape and airspeed tape.

*-Not complete (need a full list of visualizations)*

The PFD shall never show popups for more than 60 seconds.

*-Not verifiable (how can we test that it never will?)*

# References

NASA CoNNeCT SRS

https://spaceflightsystems.grc.nasa.gov/SpaceDOC_II/Reference/documents/4%20SCaN%20Testbed/GRC-CONN-REQ-0084.pdf

NASA X-38 SRS

http://web.mit.edu/16.35/www/project/297749RevF.doc

Remaining requirements are fictional but are based on real system domains.