Ground Systems Architecture Workshop

Test Like You Fly (TLYF) Philosophy Applied to Ground Segment Testing

Mars Reconnaissance Orbiter Mission Experience

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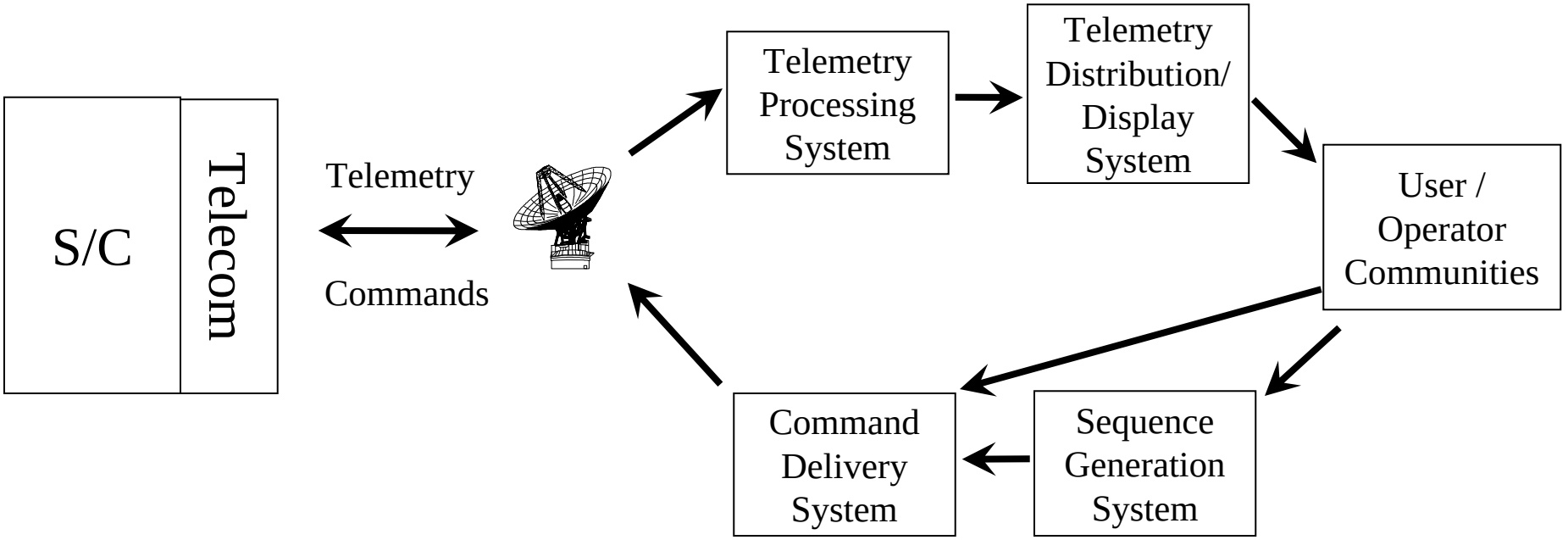
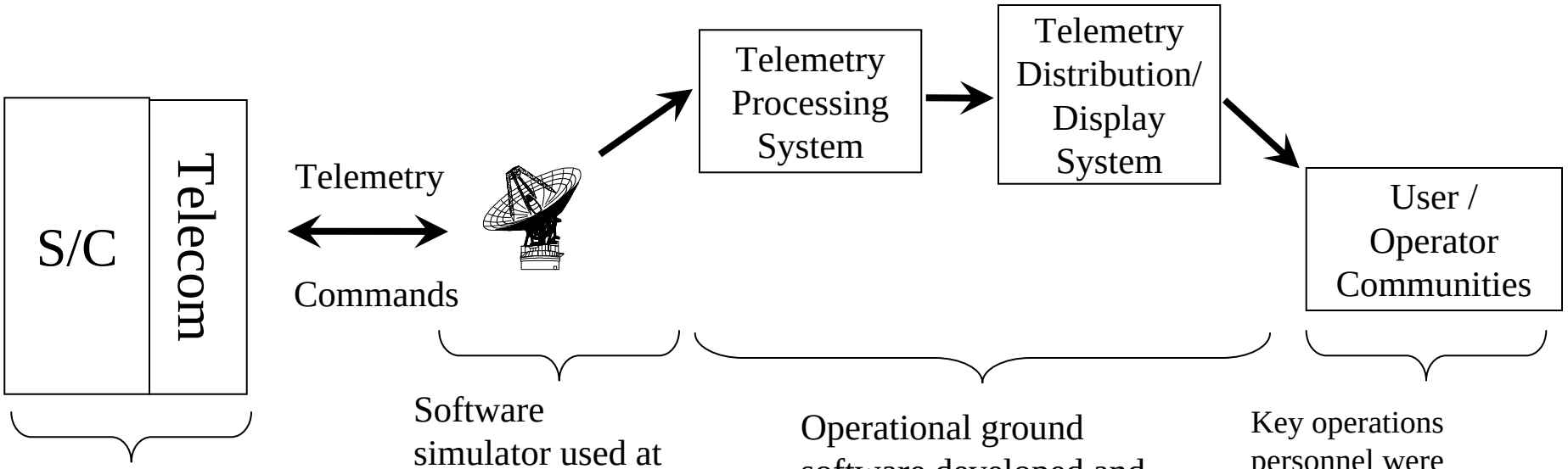
Nominal Flight Data Flow



TLYF Strategy

- Combination of different components of ground systems and flight systems are used to achieve the TLYF
  - Ground Systems
    - People
    - Processes/Procedures
    - Software and hardware
    - Simulator
  - Flight Systems
    - Engineering Model
    - Flight Model
    - Simulator
- Early interface agreement identified, e.g. CCSDS versions, packet telemetry, CCSDS File Delivery Protocol (CFDP), etc.
- Early ground systems delivery to support flight software development once the command and telemetry dictionaries are in the agreement
- Handshake in command/telemetry/block dictionaries deliveries and ground uplink and downlink software deliveries
- Mission operations personnel participating in the command testing, telemetry testing and flight scenario testing during spacecraft development and Assembly, Test and Launch Operations (ATLO) periods
- Engineering models of the s/c and payloads used in the Operations Readiness Tests (ORTs)

TLYF Strategy – Downlink Components



Flight Model, Engineering Model Simulator

Software simulator used at the early development & ATLO phases. Engineering model used at compatible test cases. Actual stations (except antenna) used in ORTs.

Operational ground software developed and delivered early to support FSW, EM, FM development, ATLO testing, scenario testing, and ORTs. ORTs use actual operations hardware.

Key operations personnel were selected from the beginning of the development cycle. As flight systems development matures, more engineers transition to operations team with up to date flight system knowledge and experience with ground systems.

TLYF Strategy – Uplink Components