

MISSION OPERATIONS DIRECTORATE FACILITY AND SUPPORT SYSTEMS DIVISION



REQUIREMENTS ANALYSIS FUNDAMENTALS
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INTRODUCTION

ADVANCED PROJECTS SECTION

- **ELEMENT WITHIN MISSION OPERATIONS DIRECTORATE**

- **RESPONSIBILITIES**
 - **DEVELOP/COORDINATE USER REQUIREMENTS FOR GROUND INFORMATION SYSTEMS SOFTWARE (E.G., MISSION CONTROL CENTER UPGRADE) AND TRANSMIT TO DEVELOPER.**

 - **REPRESENT OPERATIONS COMMUNITY (USERS) TO DEVELOPER.**

 - **REPRESENT DEVELOPER TO USERS.**

 - **DEVELOP/PROTOTYPE USER APPLICATIONS.**

 - **PROVIDE CONFIGURATION MANAGEMENT OVERSIGHT FOR USER APPLICATIONS.**

PROBLEM

- **SOFTWARE PRODUCTS OF THE CURRENT DEVELOPMENT PROCESS OFTEN DO NOT FULLY MEET "TRUE" USER NEEDS UPON DELIVERY.**
 - **DELIVERY OF NEEDED CAPABILITIES IS DELAYED.**
 - **COST OF CORRECTING SYSTEMS AFTER DELIVERY IS HIGH.**

- **PROBLEM IS ROOTED IN REQUIREMENTS DEFINITION AND ANALYSIS PROCESS.**

CAUSES

- **REQUIREMENTS DEFINITION FOR CONTEMPORARY INFORMATION SYSTEMS IS INHERENTLY DIFFICULT.**
 - **HIGH HUMAN/COMPUTER INTERACTION**
 - **APPLICATIONS DEVELOPED BY USER COMPLICATES APPLICATION INTERFACE REQUIREMENTS DEVELOPMENT**
- **REQUIREMENTS CHANGE RAPIDLY.**
 - **USER POPULATION IS DYNAMIC.**
 - **USER APPLICATIONS ARE CONSTANTLY EVOLVING.**
 - **NEW PROGRAMS (E.G., SPACE STATION) INTRODUCE NEW OPERATIONS CONCEPTS.**
 - **NEW TECHNOLOGY IS CONSTANTLY EMERGING.**
 - **EXPERIENCE WITH CURRENT SYSTEM UNCOVERS NEW REQUIREMENTS.**

CAUSES (CONTINUED)

- **REQUIREMENTS ARE OFTEN INCOMPLETE/CONFLICTING DUE TO DIVERSITY OF USER COMMUNITY.**
 - **TASKS**
 - **FLIGHT SYSTEMS (E.G., DISCRETE VS. ANALOG, TELEMETRY VS. TRAJECTORY)**
 - **USER EXPERIENCE LEVEL**
- **REQUIREMENTS ARE EASILY MISINTERPRETED BY DEVELOPER.**
 - **USERS ORGANIZATIONALLY SEPARATED FROM DEVELOPERS.**
 - **WRITTEN DESCRIPTIONS OF VISUAL SYSTEMS IS INADEQUATE.**
- **THESE CONDITIONS ARE NOT UNIQUE TO NASA MISSION OPERATIONS.**

INTRODUCTION TO SESSION 1

REQUIREMENTS ANALYSIS FUNDAMENTALS

- "REQUIREMENTS ANALYSIS, DOMAIN KNOWLEDGE, AND DESIGN," COLIN POTTS/MCC SOFTWARE TECHNOLOGY PROGRAM

SUGGESTS INNOVATIVE METHODOLOGY TO:

- ACCOMMODATE CHANGING/CONFLICTING REQUIREMENTS.
- SYSTEMATIZE TRANSLATION OF REQUIREMENTS INTO DESIGN, REDUCING MISINTERPRETATION.
- IMPROVE REQUIREMENTS COMPLETENESS.
- ENHANCE TRACEABILITY.

INTRODUCTION TO SESSION 1 (CONTINUED)

- **"KNOWLEDGE-BASED REQUIREMENTS ANALYSIS FOR AUTOMATING SOFTWARE DEVELOPMENT," LAWRENCE MARKOSIAN/REASONING SYSTEMS, INC.**

PROPOSES NEW SOFTWARE DEVELOPMENT PARADIGM THAT:

- **AUTOMATES DERIVATION OF IMPLEMENTATIONS FROM REQUIREMENTS, REDUCING MISINTERPRETATION.**
- **INCREASES DEVELOPMENT PRODUCTIVITY.**
- **VALIDATES FORMALIZED REQUIREMENTS.**
- **ENHANCES TRACEABILITY.**