



# *Verification of Avionics Software of MC*

A Case Study in IV & V



## *Avionics - IV&V*

- ◆ First indigenous fly-by-wire technology demonstrator
- ◆ First IV&V group in the country
- ◆ One of the most complicated and huge software
- ◆ Two groups - FCS IV&V (safety critical) and (Avionics IV&V mission critical)



## *Project at a Glance*

- ◆ Embedded real time software
- ◆ Technically demanding in terms of high reliability (0.0001%)
- ◆ Avionics software - 20 components (LRUs) with MC (Mission Computer) as the main component connected via MIL1553 bus
- ◆ DOD standards 2167A



## *Project at a Glance(contd)*

- ◆ 20 components are developed in different labs, different implementation
- ◆ MC is the most complicated and mission critical software (22 volumes of SRS and 275 KLOC)
- ◆ Some components were developed in C, some in Ada, some in assembly...



## *IV&V was conceived*

- ◆ IV&V requirements
  - ◆ to maintain uniformity, consistency
  - ◆ to verify the consistency across labs with respect to requirements, changes, defects etc.
- ◆ IV&V had the responsibility of maintaining the high reliability number
- ◆ Independent V&V was involved from start of the project till end
- ◆ V&V plan was prepared



# *IV&V Plan was developed*

## **Covering ...**

- ◆ Scope, roles and responsibilities
- ◆ Activities at each phase
- ◆ Dependencies
- ◆ Risks
- ◆ etc...



## *IV&V activities*

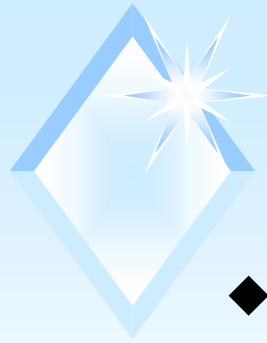
- ◆ Verification of Global Specifications of entire S/W
- ◆ Verification of overall project plan
- ◆ Participation in reviews
- ◆ Verification of Functional specs, SRS, Design documents of each component
- ◆ Verification of quality plan and SCM plan of every component
- ◆ Verification of Test plan, test description, test rig and witness test execution on sample basis



## *IV&V for MC*

- ◆ Apart from regular verification of documents more work was done on MC
- ◆ In order to improve effectiveness a parallel system test plan-description was prepared and executed  
*doing is believing*
- ◆ This IV&V test uncovered a new set of defects
- ◆ This effort of around 50 person months on system testing was appreciated by the management and gave a great insight into the project





## *What it meant ...*

- ◆ One group whose primary focus is Quality and processes
- ◆ Improvement in inter-group relations
- ◆ Setting up of common processes and sharing best practices and lessons learnt
- ◆ It improved reliability of software