Professional Development Short Course On:

UNIVERSAL ARCHITECTURE DESCRIPTION FRAMEWORK

Instructor:

Jeffrey O. Grady

ATI Course Schedule: http://www.ATIcourses.com/schedule.htm
JOGSE Grand Systems Development Training Program
Requirements Courses

521 Grand Systems Requirements Elicitation and Analysis
522 Grand Systems Requirements Management and Documentation
523 Grand Systems Requirements
524 Grand Systems Functional Analysis
525 Grand Systems MSA/PSARE
526 Grand Systems UML/SysML
527 Grand Systems IDEF/DoDAF
528 Universal Architecture Description Framework
541 Grand Systems Verification
The Problem and the Prescription

- When developing unprecedented systems all requirements in performance specifications should be derived from models.
- No single existing model is comprehensive.
- We will construct a comprehensive model that can be used on all programs no matter the nature of the physical product (hardware, software, people doing things).
- Existing specification templates are not coordinated with modeling methods so we will build one that is.
Course Sequence

• What are requirements and what kinds might we have to identify?
• Next we will look at a very simple way to write requirements
  – Controlled characteristic, value and units, relation
• Then, we will discuss ways these requirements are inter-related
• In subsequent periods, we will construct a toolbox full of effective tools to help us identify appropriate requirements for systems, hardware, and software entities
• These models will be combined to form universal architecture description frameworks using a universal specification template
Who Is Jeff Grady?

CURRENT POSITION
President, JOG System Engineering, Inc.
System engineering assessment, consulting, and training firm

PRIOR EXPERIENCE
U.S. Marines
1964 - 1965 General Precision, Librascope Div
Customer Training Instructor, SUBROC and ASROC ASW Systems
1965 - 1982 Ryan Aeronautical, Teledyne Ryan Aeronautical
Field Engineer, AQM-34 Series Special Purpose Aircraft
Project Engineer, System Engineer, Unmanned Aircraft Systems
1982 - 1984 General Dynamics Convair Division
System Engineer, Group Engineer Advanced Cruise Missile
1984 - 1993 General Dynamics Space Systems Division
Engineering Manager, Systems Development
Advanced Projects Systems Engineering

FORMAL EDUCATION
BA Math, SDSU; System Engineering Certificate, UCSD
MS Systems Management, USC with Information Systems Certificate

INCOSE First elected Secretary, Founder, Fellow, and CSEP
Author System Requirements Analysis (93 and 06), System Integration,
System Validation and Verification, System Engineering Planning and
Enterprise Identity, System Engineering Deployment,
System Verification
Systems Jeff Grady Worked On

- USN/Librascope ASROC/SUBROC Computer Systems
- USAF/GD Convair AQM 129 Advanced Cruise Missile
- USAF/GD Atlas Missile
- USAF/Ryan AQM-81 Firebolt 1983
Ryan Aeronautical War Birds

USAF Models 147J, NX, G, and H at Bien Hoa, SVN in 1968

USAF/Ryan AQM-34L Tom Cat
58 Combat Missions

U.S. Navy/Ryan Model 147SK

USAF/Ryan BGM-34C
Course Outline

1 Introduction to System Definition
2 Requirements Fundamentals
3 Architecture and Modeling
4 Functional Analysis
5 Functional Analysis
6 Performance Analysis and the RAS
7 Product Entity Structure Synthesis
8 Interface Identification and Definition
9 Specialty Engineering Requirements
10 Environmental Requirements
11 MSA and PSARE
12 MSA and PSARE
13 UML and SysML
14 UML and SysML
15 IDEF and DoDAF
16 IDEF and DoDAF
17 Introduction to UADF
18 Universal Specification
19 TSA/MSA UADF
20 TSA/MSA UADF
21 SysML/UML UADF
22 SysML/UML UADF
23 PSARE UADF
24 Management Infrastructure and the Future
25 Allocated to Project
26 Allocated to Project
27 Allocated to Project

Short course involves 24 hours over three day period and is primarily lecture. University quarter length course will provide for up to three hours of in-class time for workshop that is completed as home work.
Definition of a System

A system is said to be a collection of entities that interact through relationships (interfaces) to achieve a planned outcome within an environment.
Why is the problem of developing systems to solve complex problems so complex?

Is there a better way?
Systems requirements analysis is an important part of a problem solving technique for complex problems.

We can make it serve us better by adopting a UADF.
The System Development Sequence
That Minimizes Risk

• Define the problem
  – Specifications

• Solve the problem
  – Design, material, and manufacturing

• Prove it
  – Verification

• Within a sound management infrastructure
Requirement Defined

- Something wanted or necessary.
- Something essential to the existence or occurrence of something else.
- A necessary characteristic or attribute of some thing (or item).
Requirements Types

• **Performance**
  – Tells what the entity must do and how well it must do it
  – Derived from dynamic problem space models

• **Constraints**
  – Derived from solution space models of three kinds
  – Interface
    • Derived through n-square diagrams
  – Specialty Engineering or Quality
    • Derived through application of a specialty engineering scoping matrix and individual specialty models
  – Environmental
    • Derived through application of a three-layer model
Requirements Types

All of these requirements must be identified before product detailed design work is started and they must be mutually consistent.
What is a Specification?

A specification contains all of the requirements for a given item.
In Writing a Specification, What Is the Target?
We Are All Specialists

Breadth of Knowledge

Depth of Knowledge

All Knowledge

- Generalist Knowledge Base
- Domain Knowledge Base
- Specialist Knowledge Base

It Just Keeps Getting Bigger
What is the Hard Job in Preparing a Specification?

• Specifications are full of sentences.
• You should have no problem writing a simple sentence in your language of choice.
• There are two difficult tasks in writing these sentences
  – What do we write them about?
  – What numerical values do we place in them?
You have enjoyed ATI’s preview of

UNIVERSAL ARCHITECTURE DESCRIPTION FRAMEWORK

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http://www.aticourses.com/email_signup_page.html