OU-VIS status report

Henry Joy McCracken / Catherine Grenet

and the OU-VIS team

OU-VIS core team

- **OU-VIS: produce calibrated VIS data**
- The OU-VIS team:
  - Catherine Grenet, Olivier Hérent, Patrick Tisserand, Sybille Téchené, H. J. McCracken, R. Gavazzi (IAP)
  - Chris Dolding, Kevin Benson (MSSL)
  - Richard Massey, Holger Israel (Durham)
  - Nic Walton, Eduardo Gonzales-Solares, Mike Irwin (Cambridge)
- “Fifth Beatles”: Patrick Hudelot, Sami Niemi
- Minutes from monthly telecons can be found on the OU-VIS wiki

Version 5.4 15 June 2010

Integrated Defense Acquisition, Technology, and Logistics Life Cycle Management System

DoD Decision Support Systems Effective Interaction is Essential

Following the Materiel Development Decision, the Milestone Decision Authority may authorize entry into the acquisition process at any point, consistent with phase-specific entrance criteria and statutory requirements

This chart is a classroom aid for Defense Acquisition University students. It provides a notional illustration of interfaces among three major decision support systems used to develop, produce and field a weapon system for national defense. Defense acquisition is a complex process with many more activities than shown here and many concurrent activities that cannot be displayed on a two-dimensional chart. Supporting information is on back of this chart. For more information, see the Defense Acquisition Portal (http://dap.dau.mil).

Materiel Solution Analysis Phase

Complete Analysis of Alternatives to assess potential materiel solutions to capability need, identify key technologies and estimate life cycle costs. Consider commercial-off-the-shelf and solutions from both large and small business. Identify materiel solution to capability need. Complete Technology Development Strategy.

Technology Development Phase

Reduce technology risk, determine and mature appropriate set of technologies to integrate into full system, demonstrate critical technology elements on prototypes, and complete preliminary design. Identify an affordable program or increment of militarily useful capability, demonstrate technology in relevant environment, and identify and assess manufacturing risks. Provide for two or more competing teams producing prototypes of system and/or key system elements prior to or through Milestone B.

Engineering & Manufacturing Development Phase

Develop a system or increment of capability; complete full system integration, develop affordable and executable manufacturing process; ensure operational supportability; reduce logistics footprint; implement human systems integration; design for producibility; ensure affordability; protect critical program information; and demonstrate system integration, interoperability, safety, and utility.

Production & Deployment Phase

Achieve operational capability that satisfies mission needs. Low-rate initial production (limited deployment for software intensive systems with no development hardware) and full-rate production (full deployment for software intensive systems). Deliver fully funded quantity of systems and supporting material and services for program or increment to users.

Operations & Support Phase

Execute support program that meets materiel readiness and operational support performance requirements and sustains system in most cost-effective manner. Overlaps Production and Deployment Phase.

Decision Points/Milestones: MDD | MS A | MS B | Post-CDR A | MS C | FRP DR | IOC | FOC

Integrated System Design | System Capability & Manufacturing Process Demonstration | Low-Rate Initial Production | Full-Rate Production/Deployment | Life Cycle Sustainment | Disposal

FDDR For software intensive systems

Joint Capabilities Integration & Development System (need-driven)

Strategic Guidance | Joint Operations Concepts | Concept of Operations Operations Plans | Capabilities-Based Assessment

Joint Capabilities Integration and Development System – Acronyms

CDD – Capability Development Document
CPD – Capability Production Document
DCB – DOTMLPF Change Recommendation
DOTMLPF – Doctrine, Organization, Training, Material, Leadership and Education, Personnel, & Facilities
FDC – Full Operational Capability
ICD – Initial Capabilities Document
IDC – Initial Operational Capability
JCA – Joint Capability Area
JP 3-0 – Joint Publication 3-0, "Joint Operations"
JROC – Joint Requirements Oversight Council
MUA – Military Utility Assessment
KPP – Key Performance Parameter
KSA – Key System Attribute

ICD | JROC Component Validation and Approval | DCR

Joint Operations Concepts Concept of Operations Technology Development Strategy Capability Gap Report DoD Enterprise Architecture & Solution Architecture Technical Standards Profile

Draft CDD | Threshold/objective tradeoffs Revised Performance Attributes

Information Support Plan

System Threat Assessment | Force Protection KPP | Survivability KPP | Supportability Requirements | Net-Ready KPP | Technical Standards & Interfaces | Information Assurance | Net-Centric Data & Services | Selectively Applied System Training Efficiency KPP | KPPs Threshold & Objective

Joint Staff Review J1 – Joint manpower; J2 – Intelligence; J3 – Operational suitability, sufficiency & effectiveness; J4 – Logistics supportability & sustainment; J5 – Alignment w/ strategic & policy; J6 – C4I interoperability & supportability; J7 – Training; J8 – Resources

Component/JROC Validation & Approval | CDD | KPPs

MUA/Final Demo Report to Acquisition Authority for Milestone B or other evaluation events

Reliability KSA | Availability KPP | Ownership Cost KPP | Materiel Availability & Operational Availability

Joint Operations Concepts Concept of Operations System Threat Assessment AoA (if updated) DoD Enterprise Architecture & Solution Architecture Information Support Plan Technical Standards Profile

Threshold/objective tradeoffs Revised Performance Attributes

Joint Staff Review | Component/JROC Validation & Approval | CPD | KPPs

MUA/Final Demo Report to Acquisition Authority for Milestone C or other evaluation events

Joint Operations Concepts Concept of Operations System Threat Assessment AoA (if updated) DoD Enterprise Architecture & Solution Architecture Information Support Plan Technical Standards Profile

Threshold/objective tradeoffs Revised Performance Attributes

Joint Staff Review | Component/JROC Validation & Approval | Validated and approved CDD & CPD for each increment of evolutionary acquisition

MUA/Final Demo Report to Acquisition Authority for FRP DR or other evaluation events

Oversight & Review

Initiate Evolutionary Acquisition Strategy

Evolutionary Acquisition Strategy

Clinger-Cohen Act (IT Incl NSS) Compliance | CIO Confirmation of Compliance

DAB/ ITAB | MDA | ADM | Exit Criteria | PSR | Exit Criteria Met | DAB/ ITAB | MDA | MS A Cert | ADM | Exit Criteria | TRA | PSR | APB | Exit Criteria Met | DAB/ ITAB | MDA | MS B Cert | ADM | Exit Criteria | TRA | PSR | APB | Exit Criteria Met | DAB/ ITAB | MDA | ADM | Exit Criteria

Increment 2 | Increment 3

Total Life Cycle Systems Management

AoA Study Guidance | AoA Study Plan | AoA | Initial RA&C Report

TLCSM

Technology Development Strategy (TDS)
- Business Strategy
- Resource Management
- Program Security Considerations
- Capability Needs
- Top-Level Integrated Schedule
- Test & Evaluation Strategy
- Interoperability Summary
- International Cooperation
- Risk & Risk Management
- Technology Maturation & Industrial Capability & Manufacturing Capabilities

Acquisition Strategy
- Acquisition Approach
- Source & Related Documents
- Capability Needs
- Top-Level Integrated Schedule
- Test & Evaluation Strategy
- Interoperability Summary
- International Cooperation
- Risk & Risk Management
- Technology Maturation & Industrial Capability & Manufacturing Readiness
- Business Strategy

Oversight & Review and Contracting Acronyms
ATIR – Acquisition Decision Memorandum
AoA – Analysis of Alternatives
APB – Acquisition Program Baseline
CDR – Critical Design Review
CBRN – Chemical, Biological, Radiological & Nuclear
DAB – Defense Acquisition Board
ECP – Engineering Change Proposal
ESOH – Environmental, Safety, and Occupational Health
FWR – Earned Value Management
FRP DR – Full-Rate Production Decision Review
FCDR – Full Deployment Decision Review
IBR – Integrated Baseline Review
ITAB – Information Technology Acquisition Board
LRIP – Low Rate Initial Production
MAIS – Major Automated Information System
MDA – Milestone Decision Authority
MDD – Materiel Development Decision
NSS – National Security Systems
PDR – Preliminary Design Review
PCDRA – Post Critical Design Review Assessment
PORA – Post PDR Assessment
PSR – Program Support Review
RAM-C – Reliability, Availability, Maintainability & Cost
RFP – Request for Proposals
RFI – Request for Information
TRA – Technology Readiness Assessment
TLCSM – Total Life Cycle Systems Management

Final RFP cannot be released until AoA Strategy is approved

Purpose of LRIP:
- *Complete manufacturing development*
- *Establish initial production base*
- *Ramp to production rate*
- *Produce systems for IOT&E*

Acquisition Strategy
- Acquisition Approach
- Source & Related Documents
- Capability Needs
- Top-Level Integrated Schedule
- Test & Evaluation Strategy
- Interoperability Summary
- International Cooperation
- Risk & Risk Management
- Technology Maturation & Industrial Capability & Manufacturing Readiness
- Business Strategy
- Resource Management
- Program Security Considerations
- Capability Needs
- Top-Level Integrated Schedule
- Test & Evaluation Strategy
- Interoperability Summary
- International Cooperation
- Risk & Risk Management
- Technology Maturation & Industrial Capability & Manufacturing Readiness
- Business Strategy
- Life-Cycle Signature Support Plan
- CBRN Survivability
- Human Systems Integration
- ESOH
- Military Equipment Valuation & Accountability
- Corrosion Prevention & Control

Contracting

Study Contracts | AoA | Acq Plan | Source Selection Plan | Draft RFP | RFP & Proposals | Source Selection

Technology Development Contract | IBR | EVM Surveillance | Contract Management ECPs/Changes | Contract Closeout

Engineering & Manufacturing Development Contract | IBR | EVM Surveillance | Contract Management ECPs/Changes | Contract Closeout

LRIP Contract | IBR | EVM Surveillance | Contract Management ECPs/Changes | Contract Closeout

Production Contract | IBR | EVM Surveillance | Contract Management ECPs/Changes | Contract Closeout

Post-Production Software Support Contracts

Sustainment Contracts

Major Products

Alternative Materiel Solutions | Materiel Solution | Prototypes | System Performance Spec | Prototypes | Initial Product Baseline | Production Representative Articles | Initial Product Baseline (verified) | Low-Rate Initial Production Systems | Final Product Baseline | Full-Rate Production Systems

Logistics/ Sustainment

Define Supportability Objectives | Evaluate Product Support Capabilities

Refine Supportability Objectives/ Constraints

Develop Initial Product Support Strategy | Initiate Product Support BCA (Define Ground Rules & Assumptions)

Sol Product Support Strategy

Product Support Plan
- Statutory/Regulatory
- Sources of Support
- Life-Cycle Considerations
- Product Support Elements
- Product Support Integrator
- Support Costs
- Management & Personnel

Demonstrate Product Support Capability
- Product Support Elements
- Product Support Integrator
- Supply Chain Management
- Product Support Contracts
- Finalize Product Support BCA

Product Support Package/PBL Implementation
- Product Support Elements
- Support and Cost Baseline
- Contract for Sustainment (organic & Commercial)

Product Support/PBL Management
- Public-Private Partnering
- Supply Chain Management
- PBA Modifications
- Assessment of PSI/PSPs
- Revalidate PBA/BCA
- Continuous Tech Refreshment
- Obsolescence Management
- Configuration Control
- Data Management
- Monitor Performance & Adjust Product Support

Operations and Sustainment
- Peacetime
- Training
- Revalidate BCA
- Joint Operations
- Crises
- Refine LCSP

Post-Deployment Review

Pre-IOC and Post IOC Supportability Assessments

Defense Acquisition System (event-driven)

MDD | A | B | Post-CDR A | C | FRP DR

INPUTS: ICD
OUTPUTS: Preliminary System Spec • Systems Engineering Plan • TEMP • System Safety Analysis • Support & Maintenance Concepts & Technologies • Inputs to Draft CDD • AoA • TDS • IBR • Cost/Manpower Est. • Product Support Strategy

INPUTS: ICD & Draft CDD • Approved Materiel Solution • Exit Criteria • Support & Maintenance Concepts & Technologies • Systems Engineering Plan • AoA Report • TEMP • Technology Development Strategy • System Safety Analysis
OUTPUTS: System Allocated Baseline • FDR Report • Test Reports • SEP • TEMP • PESHE • HPW • TRD • NEPA Compliance Schedule • Risk Assessment • CJCP • Updated Systems Support & Maintenance Concepts & Technologies • System Safety Analysis • Inputs to: CDD • SEP • STA • IBR • Acq Strategy • Affordability Assessment • Cost/Manpower Est.

INPUTS: Sys Performance Spec • Acquisition Strategy • Exit Criteria • APB • CDD • STA • HSI • SEP • TEMP • PESHE • HPW • NEPA Compliance Schedule • Risk Assessment • Validated Sys Support & Maintenance Objectives & Requirements • Product Support Strategy • System Safety Analysis
OUTPUTS: Performance-Based Logistics (PBL) Strategy (Preferred Product Support Approach) • Product Support Integrator • Product Support Provider • Functional Requirements • Performance-Based Agreements • Business Case Analysis • Technical & Logistics Acronyms • Operational Assessment • OTRR – Operational Test Readiness Review • PBA – Performance Based Agreement • PESHE – Programmatic Environment, Safety & Occupational Health Evaluation • PDR – Preliminary Design Review • PCA – Physical Configuration Audit • PESHE – Programmatic ESOH Evaluation • PPP – Program Protection Plan • PSI – Product Support Integrator • PSP – Product Support Provider • PCA – Product Support Performance • RMS – Reliability, Maintainability & Supportability • SEP – System Engineering Plan • SFR – System Functional Review • SRR – System Requirements Review • STA – System Threat Assessment • SVR – System Verification Review • TEMP – Test & Evaluation Master Plan • TSRC – Technology Readiness Assessment • TSS – Test Readiness Review

INPUTS: Initial Product Baseline • Test Reports • SEP • TEMP • PESHE • TEMP • NEPA Compliance Schedule • Elements of Product Support • ESH Assessment • Life-Cycle Management Plan • System Safety Analysis • Inputs to: CDD • STA • JSP • IBR • Cost/Manpower Est.

INPUTS: Test Results • Exit Criteria • APB • CPD • SEP • TEMP • Product Support Element Requirements • PESHE • System Safety Analysis

INPUTS: Service Use Data • Post Fielding Failure Reports • Discrepancy Reports • SEP • System Safety Analysis • Product Support Element Requirements

OUTPUTS: Data for In-Service Review • Input for CDD for Next Increment • Modifications/upgrades to fielded systems • SEP • Test Reports • System Safety Analysis • Product Support Package

Disposal

Most Acceptable | Acceptable | Least Acceptable

Technical

Systems Engineering Test and Evaluation Supportability

Interpret User Needs, Analyze Operational Capabilities & Environmental Constraints | ITR | Analyze/Assess Concepts Versus Defined User Needs & Environmental Constraints | ASR

Develop Concept Performance & Constraints, Definitive Verification Objectives | Assess/Analyze Concept & Verify System Concept's Performance

Decompose Concept Performance into Functional Definition & Verification Objectives | Assess/Analyze System Concept Versus Functional Capabilities

Decompose Concept Func/Constr Definition into Component Concepts & Assessment Objectives | Assess/Analyze Enabling/Critical Components Versus Capabilities

Develop Component Concepts, i.e., Enabling/Critical Technologies, Constraints, & Cost/Risk Drivers

Interpret User Needs, Analyze Operational Capabilities & Environmental Constraints | SRR | Assess & Validate System & Tech Maturity Versus Defined User Needs & Environmental Constraints

Develop System Performance (& Constraints) Spec & Enabling/Critical Tech & Prototypes Verification Plan | Demo/Model Integrated System Versus Performance Spec

Develop Functional Definitions for Enabling/Critical Tech/Prototypes & Associated Verification Plan | Demo System & Prototype Functionality Versus Plan

Decompose Functional Definitions into Critical Component Definition & Technologies Verification Plan | Demo Enabling/Critical Technology Components Versus Plan

Design/Develop System Concepts, i.e., Enabling/Critical Technologies, Update Constraints, & Cost/Risk Drivers

Interpret User Needs, Refine System Performance Specs & Environmental Constraints

Develop System Functional Specs & Verification Plan to Evolve System Functional Baseline | SFR | Evolve Functional Performance Specs into System Allocated Baseline | PDR | Evolve CI Functional Specs into Product (Build to) Documentation & Verification Plan | CDR | Fabricate, Assemble, Code to "Build-to" Documentation

FMECA | ETA | MCM | LORA | MTA

OTA/IOT Witness (if appropriate) | (with alternate LFT&E Plan)

Integrated DT&E/OT&E/LFT&E Demonstrate Systems to Specified User Needs and Operational Constraints | TRR | Individual CI Verification DT&E

System DT&E, OT&E, LFT&E & OAs Verify System Functionality & Constraints Compliance to Specs

Integrated DT&E, LFT&E & EOAs Verify Performance Compliance to Specs

Analyze Deficiencies To Determine Corrective Actions | Modify Configuration (Hardware/Software/Specs) To Correct Deficiencies | PCA | Verify and Validate Production Configuration

Monitor & Collect Service Use & Supply Chain Performance Data | Analyze Data to Validate Failures & Determine Root Causes | Determine System Risk/ Hazard Severity | Develop Corrective Action | Assess Risk of Improved System | Integrate and Test Corrective Action | Implement and Field

- Process Change
- Operations/Maintenance Support
- Materiel Change
- Hardware/Product Support Package

Financial Management

Cost Estimation Methods: Analogy | Parametric | Engineering | Actual Costs

Types of Funds: PMO POM Input | PMO Budget Estimate

RDT&E – Advanced Technology Development | RDT&E – Advanced Component Development and Prototypes | RDT&E – Systems Development & Demonstration | RDT&E – Management & Support | Procurement | Operations and Maintenance

MSA Phase Fully Funded | TD Phase Fully Funded | Full Funding In FYDP

Economic Analysis (MAIS) | Manpower Estimate (MDAP) | CARD | CCE | CCP | ICE | MDAP/MAIS | MDAP | MDAP | Affordability Assessment

Cost Acronyms
CARD – Cost Analysis Requirements Description
CCE – Component Cost Estimate
CCP – Component Cost Position
ICE – Independent Cost Estimate
MAIS – Major Automated Information Program
MAIS – Major Automated Information System
PMO – Program Management Office
RDT&E – Research, Development, Test & Evaluation

Planning, Programming, Budgeting & Execution Process (annual-calendar-driven)

Military Departments and Defense Agencies | Office of the Secretary of Defense and Joint Staff | White House

Appropriated Funds To Support Contracts

POM/Budget Formulation | July | POM/Budget Submit

National Military Strategy | National Defense Strategy | National Security Strategy | National Strategy Documents (updated as necessary)

Defense Planning & Programming Guidance | Fiscal Guidance | April | Fiscal Guidance | March

FYDP updated

Issue Nominations/Disposition

Integrated Program/Budget Review | August - November | Decisions | November | SECDEF Option | MBI | December | DoD Budget

OMB | January | President's Budget to Congress | February (1st Monday) | FYDP updated

Planning, Programming, Budgeting, and Execution Acronyms
FYDP – Future Years Defense Program
MBI – Major Budget Issues
OMB – Office of Management and Budget
PBO – Program Management Office
POM – Program Objectives Memorandum

DoD Testimony | DoD Appeals | Allocation | Apportionment

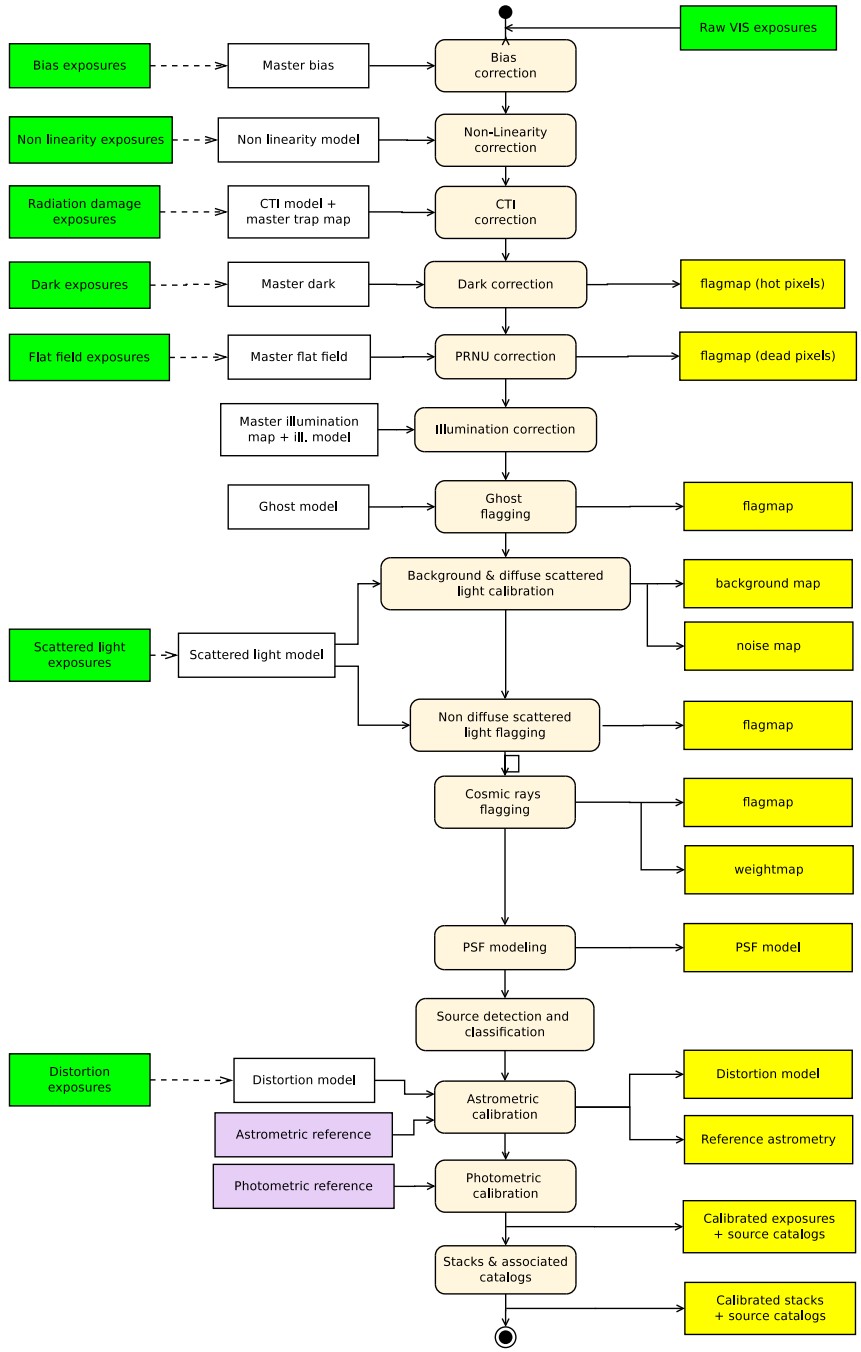
Budget Committees | Authorization Committees | Appropriation Committees | Authorization/ Appropriation Acts Passed

Congressional Budget Process February – September

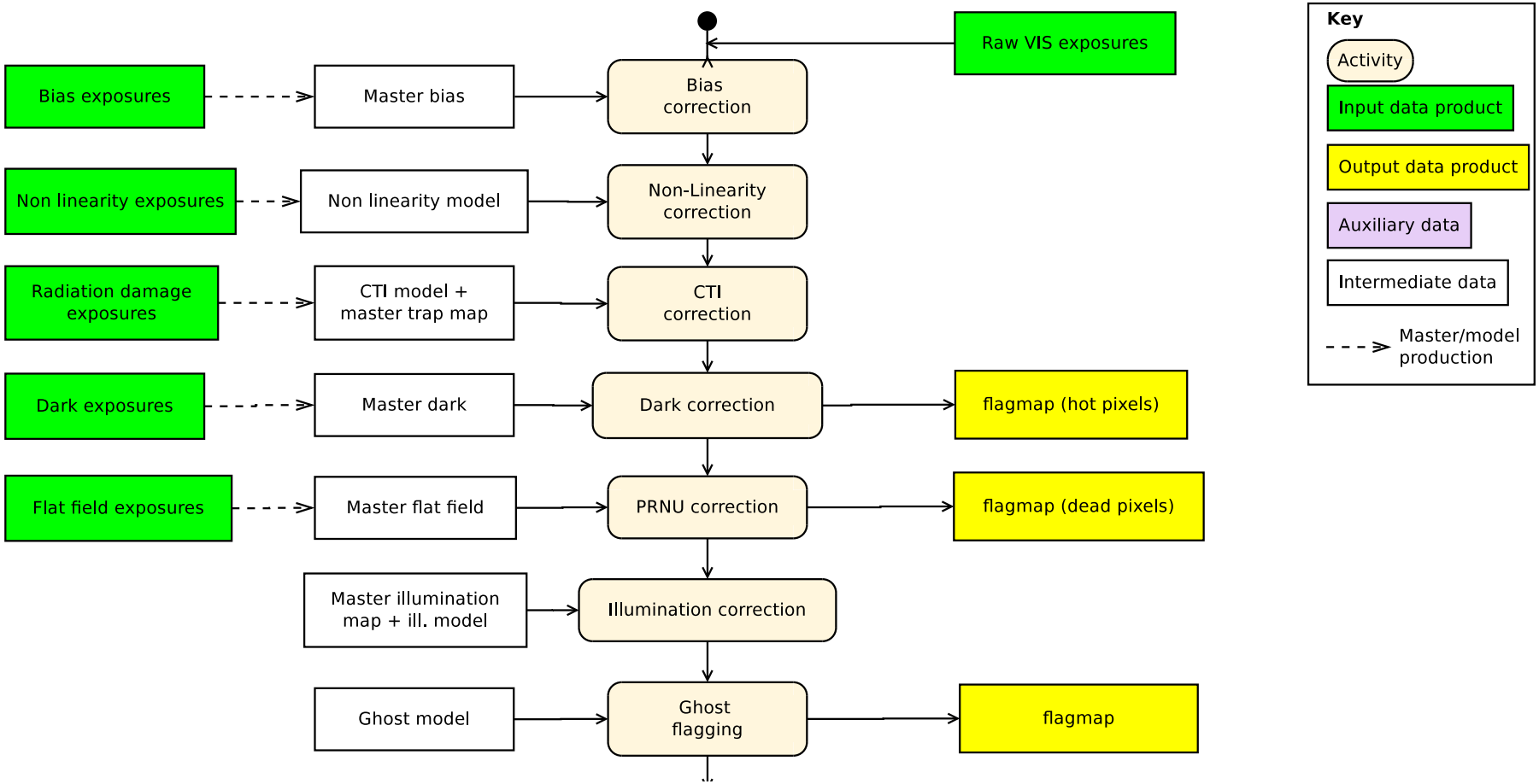
Authors Chuck Cochrane and Brad Brown

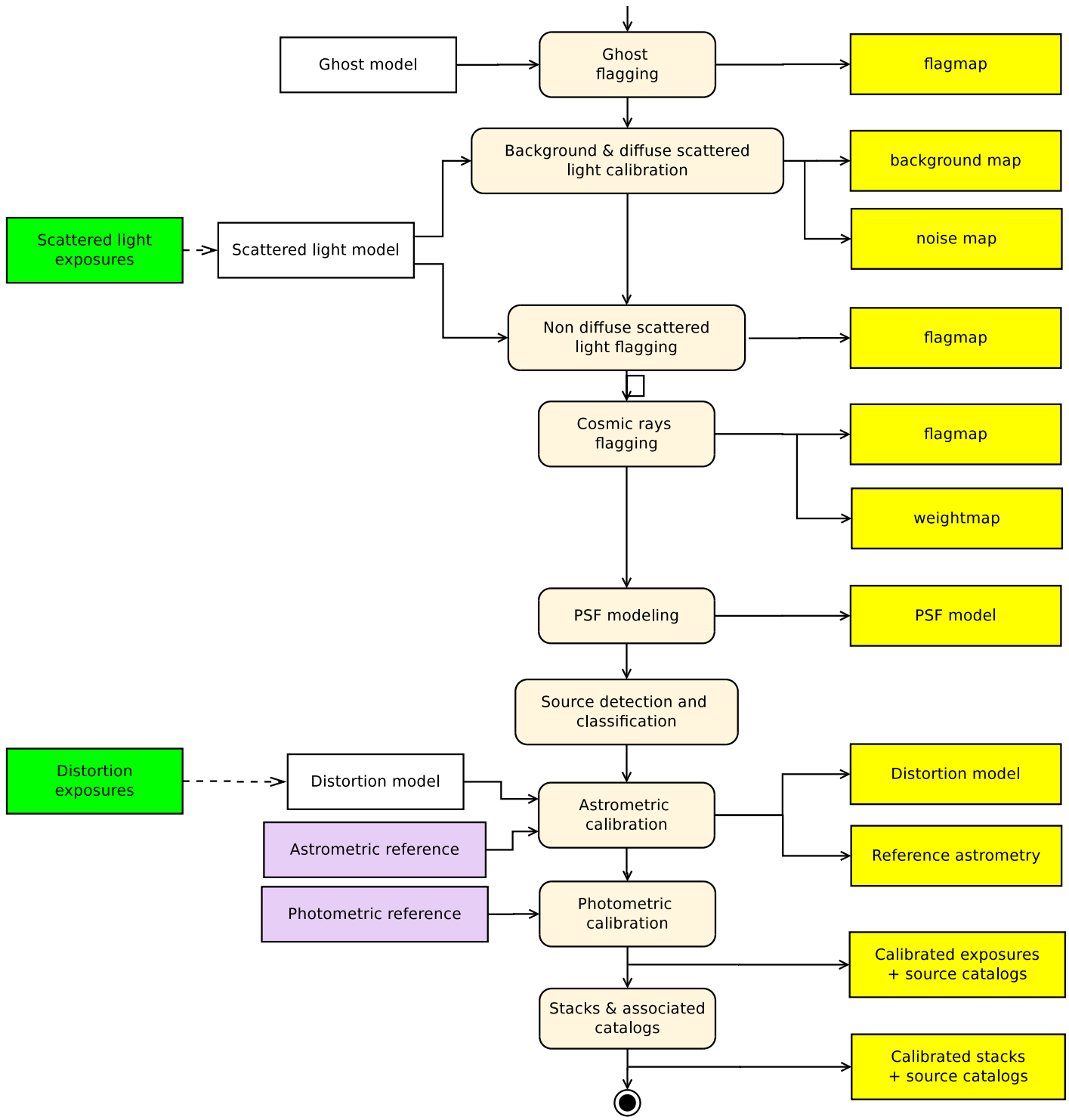
For a single copy of this chart, send a request to daupubs@dau.mil

Send recommendations to improve the content of this chart to wallchart@dau.mil



What does OU-VIS do?


Raw VIS exposures
Bias exposures
Master bias
Bias correction
Non linearity exposures
Non linearity model
Non-Linearity correction
Radiation damage exposures
CTI model + master trap map
CTI correction
Dark exposures
Master dark
Dark correction
flagmap (hot pixels)
Flat field exposures
Master flat field
PRNU correction
flagmap (dead pixels)
Master illumination map + ill. model
Illumination correction
Ghost model
Ghost flagging
flagmap
Key
Activity
Input data product
Output data product
Auxiliary data
Intermediate data
Master/model production


Ghost model
Ghost flagging
flagmap
Background & diffuse scattered light calibration
background map
noise map
Scattered light exposures
Scattered light model
Non diffuse scattered light flagging
flagmap
Cosmic rays flagging
flagmap
weightmap
PSF modeling
PSF model
Source detection and classification
Distortion exposures
Distortion model
Distortion model
Astrometric calibration
Astrometric reference
Reference astrometry
Photometric reference
Photometric calibration
Calibrated exposures + source catalogs
Stacks & associated catalogs
Calibrated stacks + source catalogs

Status December 2014

- Documents delivered for the SRR review (Catherine) :
  - **VIS processing function (PF) requirement specification document (RSD)**
    - Each requirement which the OU-VIS processing function must meet is listed
  - **VIS PF software development plan**
    - This document is integrated into the SDC-FR software development plan. Identifies **who will write code**
  - **VIS PF validation plan**
    - How we will be able to check if the PF works or not.
  - These documents were a lot of work, but hopefully **they will actually be useful** for the next stage of the project.

Other main tasks in progress

- Data model definition
  - Important to understand how the processing elements and OUs will communicate. There is still some uncertainty concerning the visibility of intermediate data products between OUs
- Quality tools definition
  - We need to think how we can quickly detect problems in VIS images and provide these tools to instrument monitoring teams
- Defining LE1 and OU-VIS interface
  - We need to define what metadata should be in the VIS images

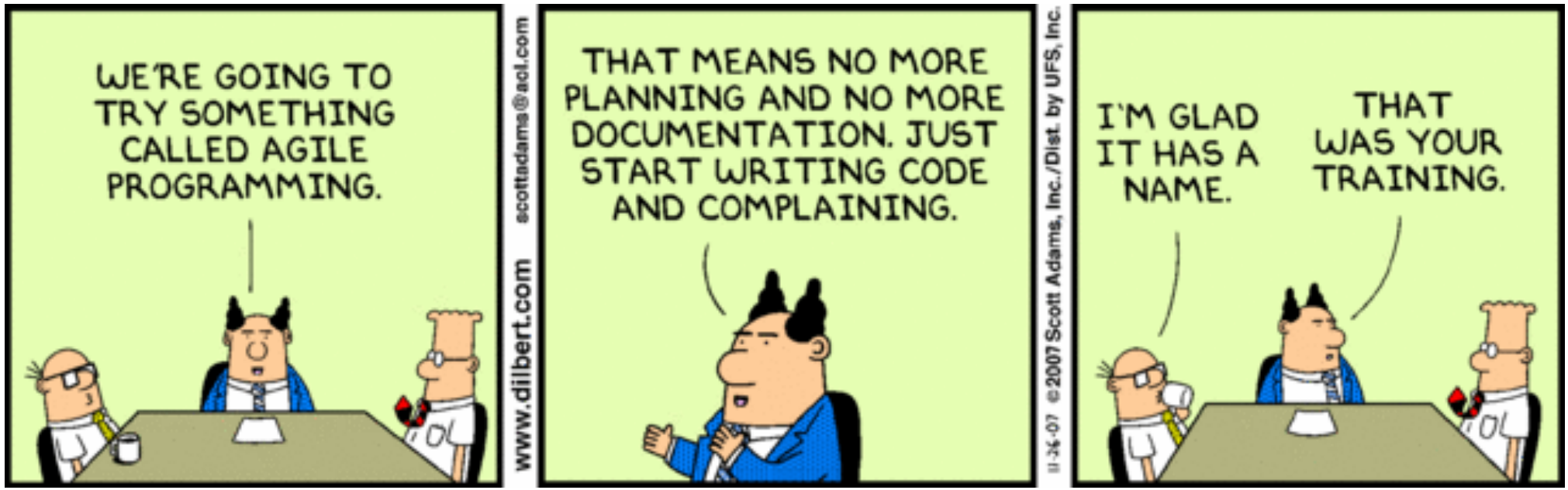
Up next:

- Now we have to start **prototyping and developing code** (yeah!) and identify candidate algorithms
  - Prototype pipeline should be provided in the first half of 2014 containing (from PF development plan)
  - See earlier discussion: hack up some code and get it work, or do something “solid”? How much of the code we write in the next 12 months will make it into the final

VIS PF V0
will implement the following components:

- Common data handling tools
- Bias and dark correction
- Non linearity correction
- CTI correction
- PRNU correction
- Ghosts flagging
- Cosmic ray flagging

at maturity level 1A, not integrated together.
The release will be an internal release, the purpose of which is to start defining algorithms.


WE'RE GOING TO TRY SOMETHING CALLED AGILE PROGRAMMING.
www.dilbert.com scottadams@aol.com
THAT MEANS NO MORE PLANNING AND NO MORE DOCUMENTATION. JUST START WRITING CODE AND COMPLAINING.
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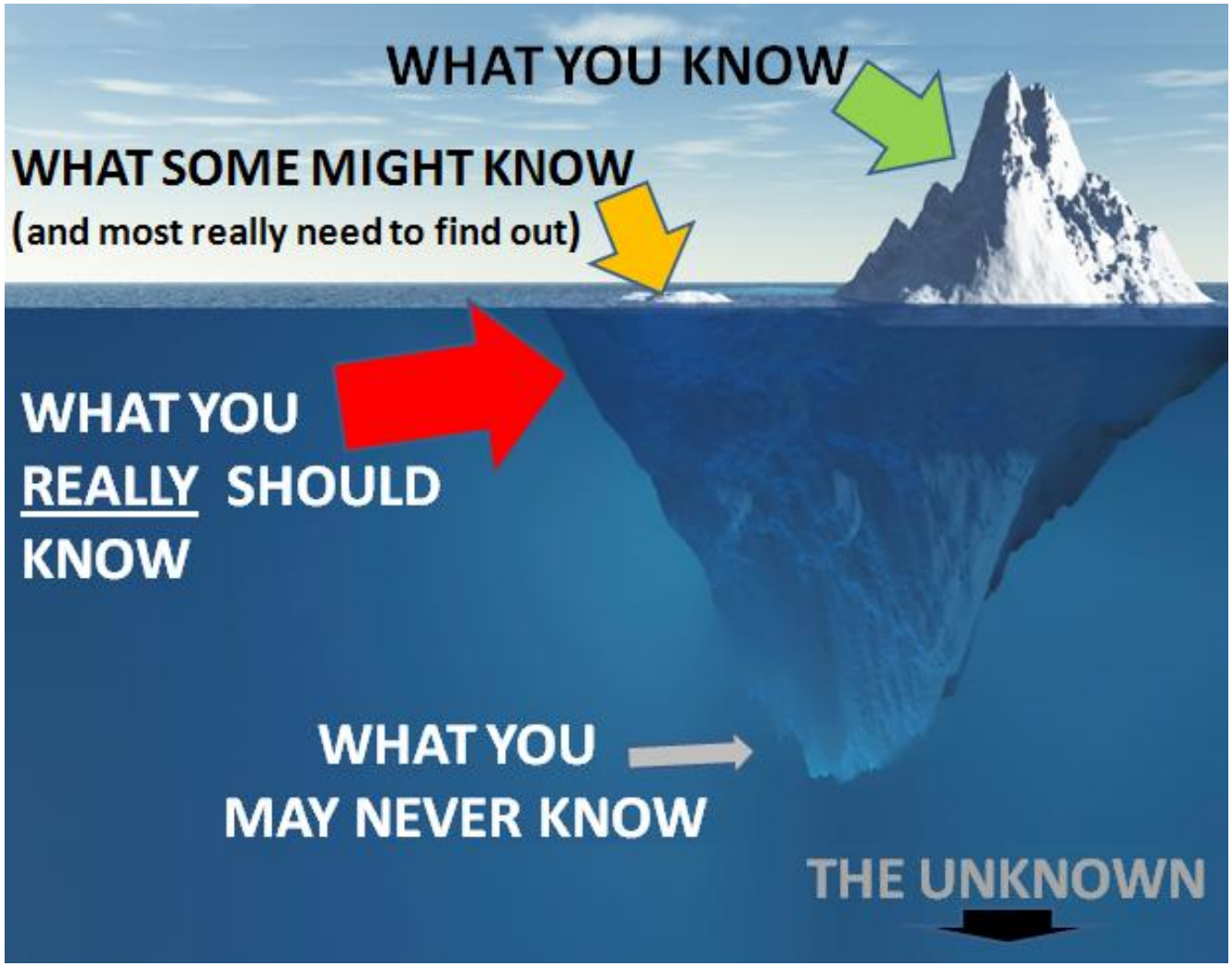
I'M GLAD IT HAS A NAME.
THAT WAS YOUR TRAINING.

Caution (1)

- The VIS PF software development team is distributed geographically
  - How will we work effectively together as a team and develop code that works?
- Do we have enough resources to develop all the elements of the processing function?
  - Can we identify **common blocks** between processing elements and between processing functions? What code can be reused?
- Do we have the **simulations** we need to start prototyping and testing algorithms?
- Have we understood all requirements (again)

VIS PF requirement review



Credit: the Internet

Caution (2)

- OU-SWG responsibilities need to be **clearly defined and agreed upon**
- Cross-OU and OU-SWG collaboration will need to be further improved
  - Garage days are probably the most useful Euclid meetings around :-)
- There are still a few uncertain / hanging requirements
  - Synchronising all the VIS PF RSD requirements with the latest version of the GDPRD is a lot of work
- We will certainly find out more once we will have created the prototype pipeline.