Contractor Cost Data Reporting (CCDR) System

Focus Group Meeting #9

May 24-25, 2000

Agenda

- Introduction and administrative matters
- Reengineering topics
  - Proposed manual changes
  - Processing feedback on plans and reports
  - Replacement of plant-wide data report
  - Training
  - *Software metrics reporting proposal*
- Automation status (CRS and web page) and demonstration
- Summary and wrap-up

Administrative Matters

- Available parking and validation (see receptionist)
- Available telephones and messages (703-845-6940)
- Restrooms (please use coin operated only)
- Lunches and refreshments provided (cafeteria also available)
- Briefing materials

Meeting Schedule
Wednesday May 24th

Introduction and working lunch	12:00 - 12:45
Update to CCDR manual	12:45 - 2:00
CCDR-PO processing feedback on CCDR plans and reports	2:00 - 2:45
Break	2:45 - 3:00
Status of elimination of Plant-Wide Data Report and Forward Pricing Rate (FPR) replacement procedures	3:00 - 3:30
Training update	3:30 - 4:00

Meeting Schedule

Thursday May 25th (Concluded)

Review of software metrics reporting proposal	8:30 - 10:00
Break	10:00 - 10:15
Software metrics reporting proposal (continued)	10:15 - 11:45
Lunch	11:45 - 12:30
Software metrics reporting proposal (concluded)	12:30 - 1:30
Automation status	1:30 - 2:30
Break	2:30 - 2:45
Web page update	2:45 - 3:15
Summary and wrap-up	3:15 - 4:15

Software Metrics Reporting Proposal

Tom Coonce, CCDR-PO

John Bailey, IDA

Software Metrics Proposal

- Software metrics background
- Proposal summary
- Recap of where we have been
- Discuss recent events
- Review comments and resulting DD Form 2630
- Review proposed processes
- Discuss DoD 5000.2-R SW Metrics Language
- Discuss Request for Proposal language
- Discuss next steps

Software Metrics Background

- Cost Analysis Improvement Group (CAIG) within PA&E is responsible for developing independent estimates for weapon systems (ACAT IC and ID programs)
- Service Cost Centers are responsible for estimating ACAT IA, IC, and ID programs)
  - Interested in better data on both embedded and business applications (MAIS)
- PA&E is responsible for reviewing and advising C^3I on MAIS life cycle cost estimates and Acquisition Program Baseline breaches
- CAIG sponsors a Contractor Cost Data Reporting Project Office that collects weapon system costs to support all estimators (CAIG and Service Cost Centers)

Software Metrics Background (Concluded)

- **Service Cost Centers requested CCDR-PO research how community can obtain better data to estimate software systems (weapon systems and MAISs)**
  - **Need historical cost and metric data to estimate similar future systems**
  - **Tried and failed to match CARDs with CCDR data**
    - **Only initial metric data contained within CARD**
    - **WBS did not go low enough to provide software cost data**
- **Goal is to collect a common parsimonious set of software data from embedded and MAIS systems to support estimating**

Summary of Proposed Approach

- Propose change to DoD 5000.2-R that requires software metric reporting on all ACAT I programs
- Content:
  - Software metric data contained on two pages
- Frequency:
  - Report will be submitted at three points: At time of CARD submission, 60 days after contract award or MOA, and 60 days after product completion/delivery
- Process:
  - Cost Working-Level Integrated Product Teams (CWIPTs) identify elements that need metrics, tailor data elements, create software metrics data plan and data dictionary
  - For MDAPs:
    - » CAIG Chair approves software metric plans and submits to PM who places on contract
    - » Contractors submit data to central web site

Summary of Proposed Approach (Concluded)

- **Process (concluded):**
  - **For MAIS (very tentative):**
    - **Information Technology Working Integrated Product Team (ITWIPT) submits software metric plan to PM who either places on contract or obtains data through other means**
    - **PM submits data to central web site**

Software Metrics Research
Where We Have Been

- Held several meetings with service cost centers and PA&E reps to determine needs (February - May 1999)
- Developed a proposed form that appeared to meet the needs of all estimators -- a new CCDR form
- Conducted joint industry/government meeting to discuss data elements and collection process (May 25, 1999). Comments/concerns were:
  - Metric data does not belong within CCDRs
  - Data reporting is duplicative of existing voluntary efforts
  - Some data elements are of questionable value
  - Recommended we do a business case and research a voluntary approach -- Practical Software Measurement (PSM)

Software Metrics Research
Where We Have Been (Continued)

- Researched PSM approach (July 1999)
- Revised data content and proposed that it replace an existing form required of embedded systems (DD Form 2630)
- Reconvened joint industry/government members (August 3, 1999)
  - Presented anecdotal evidence of benefits of software measurement
  - Proposed issue driven (PSM) approach and industry agreed
  - Industry suggested we develop a Data Item Description (DID) and a Contract Data Requirements List (CDRL) to facilitate contracting
  - Industry encouraged to see that CCDR-PO would be doing the coordination, but concerned about lack of coordination for the ACAT II and ACAT III programs

Software Metrics Research
Where We Have Been (Continued)

- Met separately with NCCA and PA&E analysts (August 10, 1999)
  - Provide quality and detailed schedule data on page two
  - PA&E expressed desire to have PM report the data on MAIS; not the developers
- Briefed industry at NDIA meeting (August 24, 1999)
  - Reiterated opinion that software metrics not be a part of the CCDR system
  - Objected to page 2; were afraid it would become expected
  - Reiterated concern about ACAT II and ACAT III action officers asking for all data on the two pages without thinking
  - Indicated that data may already be available from DCMA

Software Metrics Research
Where We Have Been (Continued)

- Researched possibility of obtaining alleged DCMA-collected data (August 13, 1999). Data source did not contain actuals
- Reconvened government cost analysts to discuss DCMA data source, to clarify and simplify proposal (September 27, 1999)
  - Group confirmed need for 2nd page of DD Form 2630
  - Emphasized need for flexibility, i.e., tailoring of DD Form 2630
  - Agreed that software data needs for ACAT I (Cs & Ds) will be coordinated by the CWIPT
  - Agreed that weapon system developers will prepare and submit the data directly to central location

Software Metrics Research
Where We Have Been (Continued)

- **Government cost analyst meeting of 27 September 27, 1999 (concluded)**
  - **Agreed that MAIS software metrics will be required through regulation**
  - **Agreed that MAIS developers will prepare and submit the data to the PMs who will submit to a central location**
  - **Agreed to develop a written proposal and submit to cost center managers for comment/concurrence**

Software Metrics Research
Where We Have Been (Continued)

- **Met with OSD's General Counsel to obtain informal opinion of issue-driven approach (October 15, 1999)**
  - **Doable, but seems cumbersome and more work for the contracting officer**
  - **Functional user would not be in the loop to ensure data needs were met (can't be involved in negotiating process)**
  - **Too easy to be negotiated out**
  - **Suggested we:**
    - **Develop a Data Item Description (for the DD Form 2630);**
    - **Develop a careful set of definitions for the desired data elements;**
    - **Encourage -- maybe even require -- tailoring (including definitions of data elements); and**
    - **Develop and use a CDRL that requires submission of contractor's definitions, report dates and distribution**

Software Metrics Research
Where We Have Been (Continued)

- Met with AT&L's director for software intensive systems (November 16, 1999)
  - Positive about initiative
  - Recommended detailed schedule data be consolidated
  - Willing to participate in future coordination meetings

Software Metrics Research
Where We Have Been (Continued)

- **Presented full proposal to CCDR Focus Group (November 30, 1999)**
  - **Agreed that software metric data is needed to support cost estimating**
  - **Agreed to proposed processes, but expressed concern about mechanics**
    - **RFP/SOW language needs to be clear that tailoring is encouraged**
    - **Industry concerned that tailoring the DD Form will be perceived as non-responsive**

Software Metrics Research
Where We Have Been (Continued)

- **FG 8 responses to software metric proposal (continued)**
  - **Software Metric Report – Page 1**
    - **Agreed that data collection is feasible across software systems**
  - **Software Metric Report – Page 2**
    - **Less general agreement over utility of data**
    - **Some members argued that page two should not be characterized as tracking information -- that data is needed for cost estimating**
    - **Group agreed to proceed with pilot test with page 2, but to exclude section 7 (Product Quality Metrics)**
      - **Some key members of the group were not present for this discussion and subsequently argued that section 7 should be included in the pilot**
      - **Agreed to do more research on utility of defect and Mean Time to Defect data**

Software Metrics Research
Where We Have Been (Concluded)

- **FG 8 responses to software metric proposal (concluded)**
  - **Need to understand PM's need for software data**
    - **Agreed to schedule coordination meeting with PMs, DoD labs and other government stakeholders to review metric forms in January 2000**
    - **Agreed to invite contractors to meeting**

Software Metrics Research
Recent Activities

- **Held a Software Metrics Technical Interchange Meeting (March 16, 2000)**
  - **One MAIS PM explained how they use software metrics to help manage their program**
  - **Heard how QSM collects and uses software metric data**
  - **Industry representatives were present**
  - **Proposed frequency not intended to meet oversight needs**
- **Documented the software metrics proposal (March 9, 2000). Requested and received comments from:**
  - **Service cost center managers**
  - **Industry representatives**
  - **Comanche program office**
  - **NAVAIR & DDR&E**

Software Metrics Research
Recent Activities (Continued)

- **Presented proposal to Delores Etter (DUSD, Science and Technology) (April 11, 2000)**
  - **Receptive to idea**
  - **Expressed interest in including data with the Defense Acquisition Executive Summary (DAES)**
- **Presented proposal to working level of C^3I (April 27 and May 9, 2000)**
  - **Positive about idea**
  - **C^3I revealed separate software metric data collection plan**
    - **Eight pages of metrics**
    - **Proposed monthly reporting**
    - **Proposed to include in DAES report**

Software Metrics Research
Recent Activities (Concluded)

- **C^3I's proposal (concluded):**
  - **C^3I proposed to assume full responsibility for collecting metrics and to feed the cost community the data it requested (the data contained on the revised DD Form 2630)**
- **Reviewed comments, revised proposal, and collection processes with cost center representatives, PA&E and CAIG (May 17, 2000)**

Software Metrics Reporting Comments and Changes

Overall Changes

- Reduced from eight to six parts
  - Context
  - Description
  - Size
  - Schedule and Effort
  - Staffing
  - Quality
- All submissions use both pages
  - Eliminates schedule redundancy
  - Tailoring still allowed
- Three submission points
  - CARD
  - Within 60 days of contract award
  - Final delivery

Page One: Context, Description

- **Part 1: Report Context**
  - Deleted Report Number
  - Changed CMM Certifier to Lead Certifying Analyst and Affiliation
  - Relevant Milestone - clarified as one of three submissions
- **Part 2: Product and Development Description**
  - Third and Fourth application types added as options
  - Instructions allow more to be added electronically or with attachments
  - Removed language from application type, added primary and secondary languages and percentage
  - Changed Development Method to Development Process

Page One, continued: Size

- Part 3: Product Size Reporting
  - Eliminated check box for actuals (3rd submission is always actuals)
  - Number of External Interface Requirements – clarified as requirements and not system-level interfaces
  - Generated Modified and Unmodified Code – separately sized
  - Reused Modified and Unmodified Code – separately sized
  - External reuse and internal reuse – separately sized
- Eliminated High-Level Resource and Schedule
- Eliminated Remarks and Sign-Off
  - Added space for name of Software Metrics Data Definition file

Page Two: Resources, Schedule, Staffing

- No Context required (reports will always be 2 pages)
- Part 4: Resource and Schedule
  - No requirement to give hours as of report date (no interim reports in untailored use)
  - Clarified that only direct labor is reported
  - Added Software Operational Test and Evaluation (phase or activity)
  - Dictionary to be used to explain if indirect charges contribute to the software effort (training, process improvement, etc.)
- Part 5: Staffing Profile
  - Dropped “since last report” peak and average staff
  - Replaced Management FTE with month number of peak
  - In combination with Part 4, gives sufficient information about staff and manpower loading

Page Two, continued: Quality

- **Part 6: Product Quality Reporting**
  - **Initially, removed MTBF estimates and actuals but then added back early estimates of MTTD**
    - **Reasoned that assumptions about duration of defect-free operation are an important part of system requirements**
    - **Deleted reporting of operational quality (MTTD) at project end**
      - **Too confusing; too many possible definitions**
      - **Will be able to estimate frequency from defect counts**
  - **Eliminated predictions of defect counts**

Page Two, concluded

- **Part 6: Product Quality Reporting**
  - Clarified two points to report actual defects
    - End of Software Qualification Test
    - End of Operational Test and Evaluation
    - Eliminated actual defect counts at delivery
  - Limited cumulative defect reporting categories to priority 1 (Critical) and priority 2 (Serious), plus total defects
  - Added cumulative resolved defects in all three categories
    - Considered whether to request unresolved defects
    - Hoping to avoid a possible sensitive issue

Revised DD Form 2630, Page 1

SECURITY CLASSIFICATION

Interim DRAFT DD2630-R version (date) 05.22.00

Software Product Development Report
Page 1: Report Context, Project Description and Size

1. Report Context

1. System/Element Name (version/release):		2. Report As Of:
3. Authorizing Vehicle (MOU, contract/amendment, etc.):		4. Indicate Reporting Event: ___CARD ___Contract Award ___Final
Items 5 through 10 are to be answered only for Contract Award and Final reports.		
5. Development Organization:	6. CMM Level:	8. Lead Certifying Analyst:
	7. Certification Date:	9. Affiliation:
10. Precedents (list up to five similar systems by the same organization or team):		

2. Product and Development Description	Percent of Product	Development Process	Upgrade or New?
1. Primary Application Type:	2. %	3.	4.
5. Secondary Application Type:	6. %	7.	8.
9. Third Application Type:	10. %	11.	12.
13. Fourth Application Type:	14. %	15.	16.
17. Primary Language	18. %	19. Secondary Language	20. %
21. List COTS/GOTS Applications:			

3. Product Size Reporting	Provide Estimates at CARD and Contract Award. Actuals at
1. Number of Software Requirements, not including External Interface Requirements (unless noted in associated Software Metrics Data Dictionary)	
2. Number of External Interface Requirements (i.e., not under project control)	
3. Code Size Measures for items 4 through 8. For each, indicate S for physical SLOC (carriage returns); Snc for noncomment SLOC only; LS for logical statements; or provide abbreviation _____ and explain in Software Metrics Data Dictionary.	
4. New Code developed for COTS/GOTS Integration and under Configuration Control (Size in _____)	
5. All Other New Code under Configuration Control (Size in _____)	
6. Modified Generated Code under Configuration Control (Size in _____)	
7. Unmodified Generated Code under Configuration Control (Size in _____)	
8. Modified Internally Reused Code under Configuration Control (Size in _____)	
9. Unmodified Internally Reused Code under Configuration Control (Size in _____)	
10. Modified External Reused Code under Configuration Control (Size in _____)	
11. Unmodified External Reused Code under Configuration Control (Size in _____)	

DD Form 2630-R **Page 1 of 2**

SECURITY CLASSIFICATION

Revised DD Form 2630, Page 2

SECURITY CLASSIFICATION

Interim DRAFT DD2630 version (date) 05.22.00

Software Product Development Report
Page 2: Project Resources, Schedule, Staffing and Quality

4. Resource and Schedule Reporting	Provide estimates at CARD and Contract Award, Actuals at Final		
Show Start and End Month after contract award (counting from month 1 at contract award), and Total Labor Hours for each phase or activity shown	Start Month	End Month	Total Hours
The following seven items should account for all direct hours charged to the software development project (use item 7 for any direct hours not accounted for in items 1 through 6). Explain any contribution of indirect hours in the associated Software Metr			
1. Software Requirements Analysis			
2. Software Architecture and Detailed Design			
3. Software Coding and Unit Testing			
4. Software Integration and System/Software Integration			
5. Software Qualification Testing			
6. Software Operational Test and Evaluation			
7. All Other Direct Software Engineering Development Effort (Describe:_____ _____) Report hours only:			

5. Staffing Profile		
1. Peak FTE's directly charging to project:	2. Month number of start of peak:	3. Duration of peak staffing, in months:
3. Percent of personnel: Highly experienced in project domain: ___% Nominally experienced: ___% Entry level, no experience: ___%		

6. Product Quality Reporting		
1. Required (or estimated) Mean Time to Defect (MTTD) at Delivery (do not complete in Final submission) _____ hours		
Report cumulative defect counts **since project start** in each category. Use associated Software Metrics Data Dictionary to define counting rules as necessary.	Actuals After Completion of Software Qualification Test	Actuals After Completion of Operational Test and Evaluation
2. Cumulative Number of Critical Defects Discovered		
3. Cumulative Number of Serious Defects Discovered		
4. Cumulative Total Number of Defects Discovered		
5. Cumulative Number of Critical Defects Resolved		
6. Cumulative Number of Serious Defects Resolved		
7. Cumulative Total Number of Defects Resolved		

Filename and Revision Date of Applicable *Software Metrics Data Dictionary*:

Name of person to be Contacted	Signature	Telephone Number	E-Mail	Date

DD Form 2630-R **Page 2 of 2**

Proposed Processes

- **For ACAT IC and ID programs:**
  - PM prepares and submits DD Form 2630 with CARD
  - PM-led CWIPT identifies software elements, prepares draft data dictionary and documents into a Program Software Measurement Plan. Sends plan to CAIG Chair for approval
  - CAIG Chair approves plan and sends to PM along with proposed RFP language
  - PM develops Contract Software Measurement plan and requests data through RFP, DIDs, and CDRL
  - Developers propose Software Development and Measurement Plans (tailored DD Form 2630) and updated dictionary
  - Developer and PM negotiate contract or MOA (for CDAs)
  - Developer submits DD Form 2630 and updated dictionary to central web site 60 days after award and after product delivery
  - PMs approve data for limited distribution
  - Cost analysts access data through secure web connection

Proposed Process (Concluded)

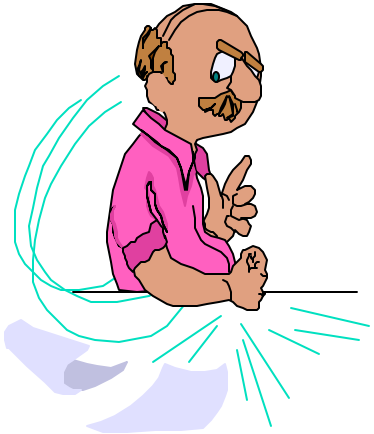
- **For ACAT IA (MAIS) programs (very tentative):**
  - **PM prepares and submits DD Form 2630 with CARD**
  - **ITWIPT likely to coordinate the Software Measure Plan similar to MDAPs, but more coordination necessary to define the process**
  - **PMs are to provide the data to the central web site**

Software Metrics Planning Process (For ACAT IDs and ICs)

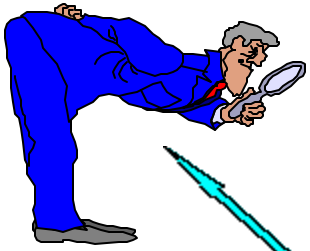
Cost Working Integrated Product Team (CWIPT) identifies software data needs. PM develops Program Software Measurement Plan and data dictionary

Program SW Measurement Plan (Identifies WBS elements)

Data Dictionary



CAIG Chair approves Program Software Measurement Plan



PM evaluates requirements & finalizes RFP

Approval Letter

Program SW Measurement Plan

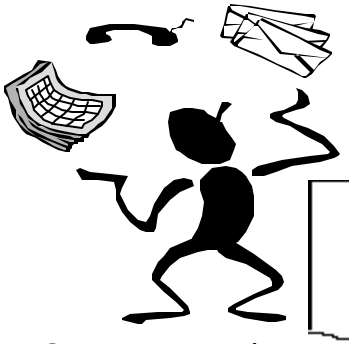
Data Dictionary

SW Measurement RFP language

Contract SW Measurement Plan & Dictionary

SW CDRL

FRP



Contractor analyzes requirements and prepares proposal

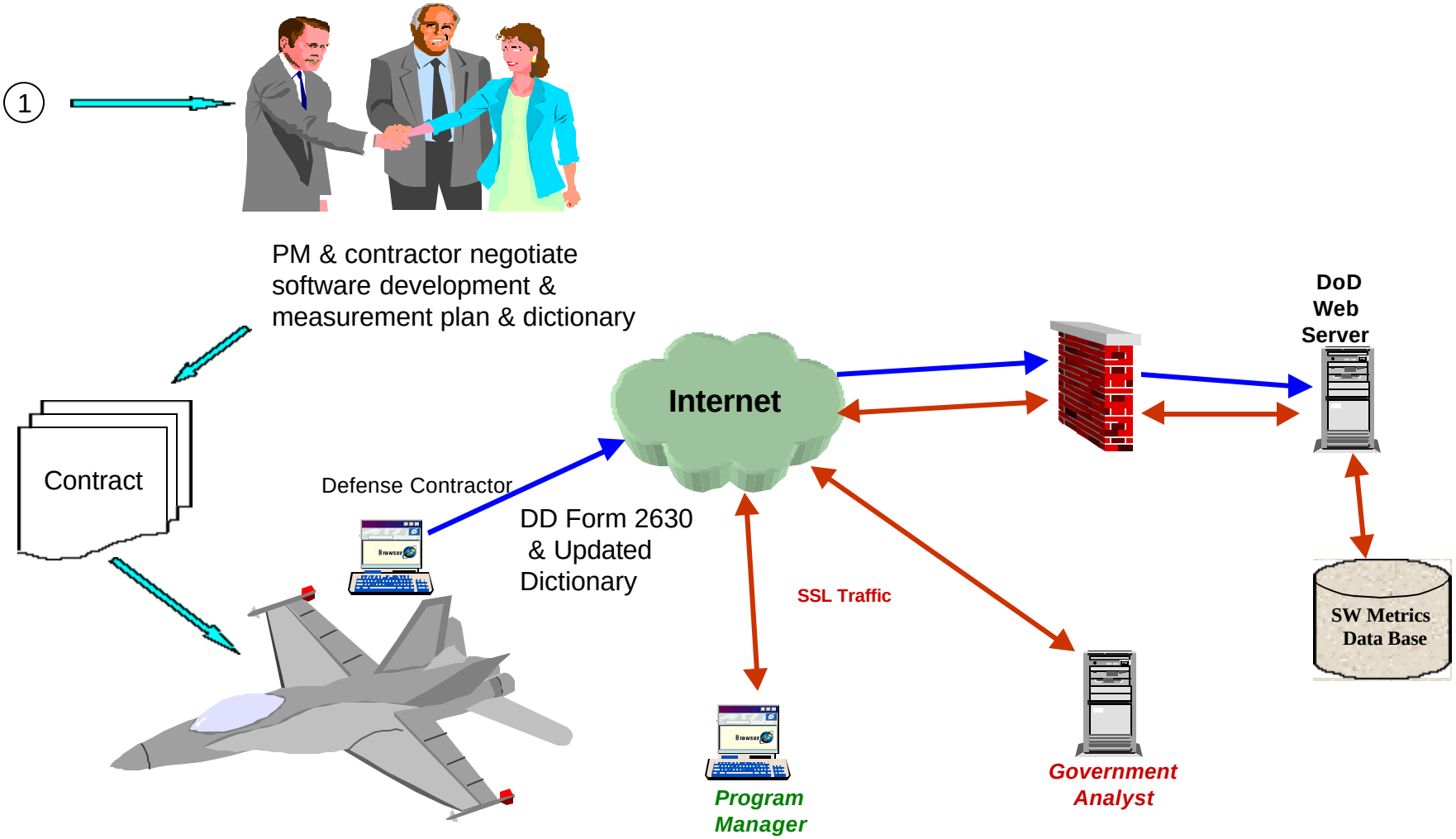
Proposal

SW Development & Measurement Plan

Updated Data Dictionary

1

Software Metrics Data Collection Process (For ACAT IDs and ICs)



Proposed Software Metric Language for DoD 5000.2-R (New Section 7.11.7.6)

ACAT I programs that contain software intensive elements must submit software metrics data. The specific data to be submitted will be determined by the IPT process using the Software Product Development Report (DD Form 2630) as the baseline. Data will be submitted at three intervals during the life of the program: at the time of cost analysis requirements description (CARD) submission, within 60 days of contract or task award, and within 60 days after software product delivery.

Proposed Request for Proposal (RFP) Language

The contractor must prepare a Contract Software Development and Measurement Plan following the structure and elements shown in the attached Contract Software Measurement Plan and dictionary. The data elements identified in the Contract Software Measurement Plan are the software elements for which the Government desires measurement information. The contractor shall report these elements at the frequency indicated in the plan. The contractor may propose additions, deletions or modifications to those elements identified in the plan if the proposed elements are used by the contractor to manage the development effort. If changes are proposed, the contractor shall so indicate in the Measurement plan and describe them in an updated Software Measurement Data Dictionary.

Software Metrics: Possible Pilot Projects

- **Expand pilot testing**
  - Test the data
  - Test the process
  - Seeking volunteer programs (on-going and “to-start” programs)
- **Questions we hope to answer with pilot tests**
  - How readily available are the data?
  - How much effort is required to provide the data as defined?
  - To what extent is tailoring needed?
  - Is it difficult to tailor the DD Form 2630?
  - How well does the specification, tailoring, collection, and reporting procedure integrate with contractor processes?
  - What improvements can we make to the form or processes?
    - Should data descriptions be more general or more specific?
    - Should we be more or less ambitious in the data categories?

Software Metrics: Next Steps

- Revise proposal, DD Form 2630, DID and processes based on today's discussion and agreements
- Expand pilot tests
- Revise the proposal, form and processes based on test results
- Seek PA&E approval of the proposal and DoD 5000.2-R language
- Continue to coordinate with C^3I on their software metric effort
- Create supporting documentation and implementing instructions -- DoD 5000.4-M-2