

Practical Software and Systems Measurement

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A foundation for objective project management



***WBS Development
PSM Users Group Conference
Joe Dean***

***Department of Defense
U.S. Army***

Practical Software and Systems Measurement

WBS Development

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Objectives of the Workshop

- ***Identify the various types of WBSs used today for software development and the various levels they can be used to assist the management process.***
- ***Identify potential alternatives to known WBSs that could be used.***

Workshop Agenda

- ***List of types of WBSs used in industry today***
- ***List of application areas that can be mapped into the WBS types***
- ***Develop examples of useful WBS guidance***
- ***Identify appropriate granularity of WBS structure***
- ***Identify types of reports that can be generated from a WBS***

Workshop Techniques

- ***Brainstorming***
- ***Lessons Learned***
- ***Examples***

Workshop Background

- ***PSM has provided some examples following MIL-HBK 881***
- ***Some of these WBS elements do not match well with collected measures***
- ***MIL-HBK 881 WBSs do not match well with industries***
- ***Issues, questions, and topics***

Workshop Background Cont.

- ***Develop WBSs for data collection***
- ***Develop WBSs for EVMS***
- ***Develop WBSs for estimates***
- ***Tie in the requirements (functions) and products within a WBS***
- ***Software only WBS vs System WBS***
- ***Contract wording for collecting data at an appropriate level to develop an indicator***

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Intended Output

- ***Suggestions for moving forward***

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Sample WBS - Software

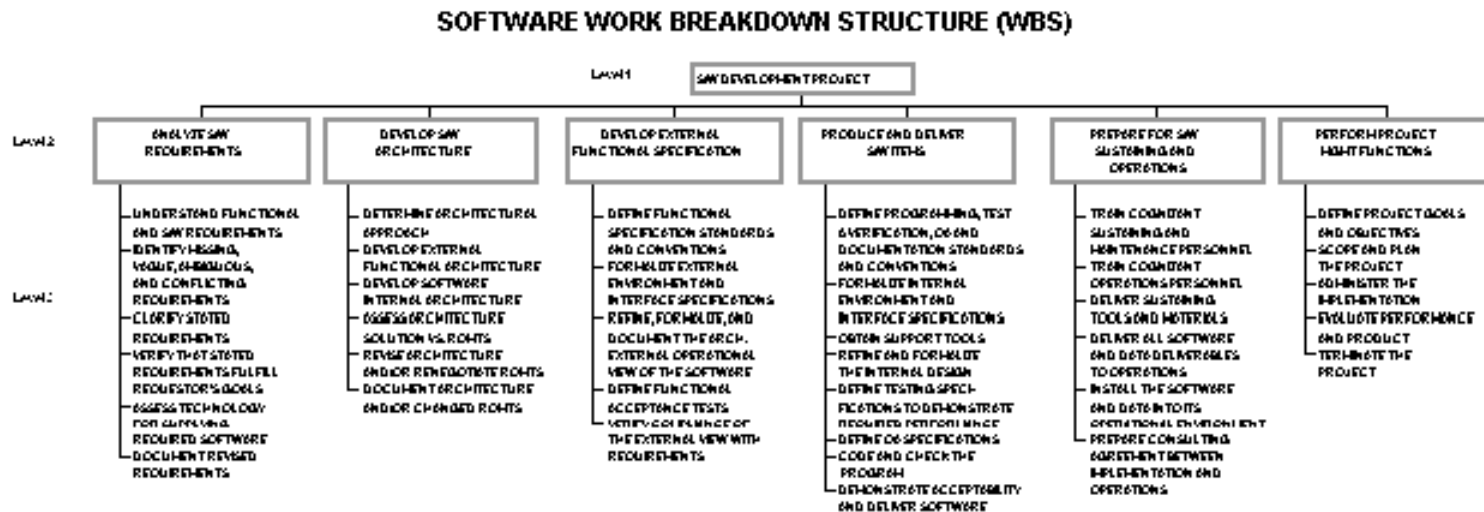


Figure 1

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Sample WBS

Software Project

Client/Server Project

Business Process Investigation

- Process Investigation
- Requirements and Opportunities
- Process Redesign
- Stage End Assessment

Application Design

- Iteration Definition
- Work Process and Object Modeling
- GUI and Prototype Development
- Iteration Consolidation
- Stage End Assessment

Distributed Deployment

- Acceptance Deployment
- Deployment Preperation
- Education Development
- Installation and Handover
- Monitor and Support
- Product & Process Improvement

Application Engineering

- Build Iteration Definition
- Client/Server Partitioning & Optimization
- Client Build
- Server Build
- Integration & System Testing
- Stage End Assessment
- Test Design

Technical Architecture Definition

- development and Test Environment
- GUI Standards
- Stage End Assessment
- Technical Architecture Modeling
- Technical Architecture Pilot

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Sample WBS

MIL HBK 881

Electronic/Automated Software System

Prime Mission Product (PMP)

- Subsystem 1...n (Specify Names)
- PMP Applications Software
- PMP System Software
- Integration, Assembly, Test and Checkout

Platform Integration

Systems Engineering/Program Management

System Test and Evaluation

- Development Test and Evaluation
- Operational Test and Evaluation
- Mock-ups
- Test and Evaluation Support
- Test Facilities

Training

- Equipment
- Services
- Facilities

Data

- Technical Publications
- Engineering Data
- Management Data
- Support Data
- Data Depository

Peculiar Support Equipment

- Test and Measurement Equipment
- Support and Handling Equipment

Common Support Equipment

- Test and Measurement Equipment
- Support and Handling Equipment

Operational/Site Activation

- System Assembly, Installation and Checkout
- Contractor Technical Support
- Site Construction
- Site/Ship/Vehicle Conversion

Industrial Facilities

- Construction/Conversion/Expansion
- Equipment Acquisition or Modernization
- Maintenance (Industrial Facilities)

Initial Spares and Repair Parts

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Sample WBS – FAA Basic

WBS/Item Number WBS/CES Description

FAA Standard WBS

- 1 **Mission Analysis**
- 2 **Investment Analysis**
- 3 **Solution Development**
 - 3.2 **System Engineering**
 - 3.3 **HW/SW Design, Development and Production**
 - 3.3.1 Hardware Design and Development
 - 3.3.2 Software Design and Development
 - 3.3.3 HW/SW Integration, Assembly, Test and Checkout
 - 3.3.4 Production Engineering
 - 3.3.5 Production
 - 3.4 **Facilities and Physical Infrastructure Design and Development**
 - 3.5 **Test and Evaluation**
 - 3.6 **Documentation**
 - 3.7 **Support**
- 4 **Implementation**
 - 4.1 **Program Management**
 - 4.2 **Engineering**
 - 4.3 **Environmental and Occupational Safety and Health Compliance**
 - 4.4 **Site Selection and Acquisition**
 - 4.5 **Construction**
 - 4.6 **Installation and Checkout**
 - 4.7 **Commissioning/Closeout**
 - 4.8 **Telecommunications**
 - 4.9 **Implementation Training**
- 5 **In-Service Management**
- 6 **Disposition**

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Sample WBS

AIS

CES Number WBS/CES Description

	DoD Automated Info Sys (AIS)
1	My Program INVESTMENT
1.1	Program Management
1.2	Concept Explor
1.2.1	Engr Anal/Spec
1.2.2	Conc Expl H/W
1.2.3	Conc Expl S/W
1.2.3.1	COTS
1.2.3.2	Other S/W
1.2.3.3	S/W Explor
1.2.4	Conc Expl Data
1.2.5	Documentation
1.2.6	Conc Expl Test
1.2.7	Facilities
1.2.8	Other
1.3	Development
1.3.1	Sys Dsn & Spec
1.3.2	Dev/Proto/Test Site Invest
1.3.3	Software Dev
1.3.3.1	COTS Mod
1.3.3.2	App/Msn S/W (Non COTS)
1.3.3.3	Comm S/W Dev/Mod
1.3.4	Sys Document'n
1.3.5	Data Dev/Trans
1.3.6	DB Stds & Dict
1.3.7	Training Dev
1.3.8	Test & Eval
1.3.9	Dev Log Spt
1.3.10	Facilities
1.3.11	Environmental
1.3.12	Other Dev
1.4	Sys Procurement
1.5	O/C/M Center Invest
1.6	Sys Init/Impl/Fld
1.7	Upgrade/P3I
1.8	Disposal/Reuse
2	My Program SYSTEM OPNS & SPT
3	My Program ALT PHASE OUT

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Workshop Participants

- ***Joe Dean – Moderator***
- ***Harpal Dhama***
- ***Khaled El Emam***
- ***Mark Szemberski***

Restatement of Objectives

- ***Identify the various types of WBSs used today for software development and the various levels they can be used to assist the management process.***
- ***Identify potential alternatives to known WBSs that could be used.***

Summary

- *Do different types of WBSs apply for various applications?*
- *How much should a program cost before it requires a WBS?*
- *What is the proper level to report externally? Internally?*

Conclusions, Recommendations, and Results

- ***Develop a study to see which type of WBS works best for management. (Functional, Activity, Product)***
- ***Develop a case study to manage a project using a WBS and identify the changes through the development***
- ***Develop a compendium of WBSs with descriptions***