Software Development Environments

Presented by DSDC SEPG

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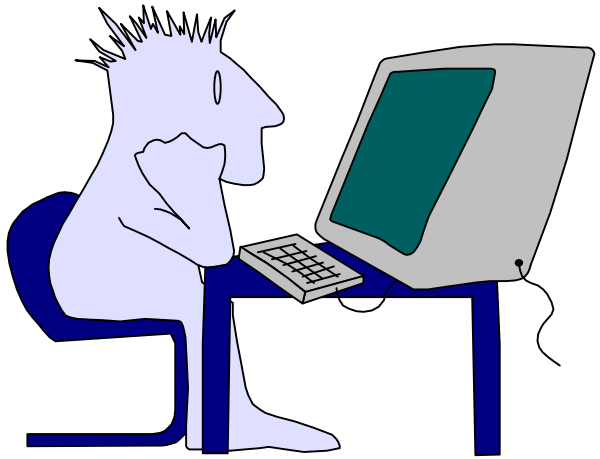
Course Description

The Software Development Environments class describes some changes in DSDC developer tools and methods planned during FY97 and FY98.



Objectives

- To understand the changes planned through the Capability Maturity Model Level 3 efforts.
- To understand a few of the changes planned that reflect computer industry changes.
- To understand the changes planned in response to the needs of DSDC and its customers.

Changes to support CMM Level 2

- **PPMT - Project Planning Management Tool**
- **CMS - Configuration Management System**
- **SQA - Software Quality Assurance**
- **Subcontractor Management**
- **DLA Project Development Plan (PDP) Process for predicting business beyond current orders**

KPAs for CMM Level 3

- Organization Process Focus
- Organization Process Definition
- Training Program
- Intergroup Coordination
- Peer Reviews
- Integrated Software Management
- Software Product Engineering

Software Product Engineering (SPE)

- Covers most requirements development and product development duties
- Includes many new ways of doing the work
- Goals emphasize definition, integration, and consistency

SPE Repeated Themes

- **Support the warfighter and the peacekeeper**
  - **Common Operating Environment (COE)**
  - **Emphasis on operational issues**
- **Use Commercial Standards**
  - **Graphical User Interfaces (GUI)**
  - **3-Tier Client/Server**
- **Less Dependence on a Specific Person, More Reliance on Process**

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SPE often requires new workstations

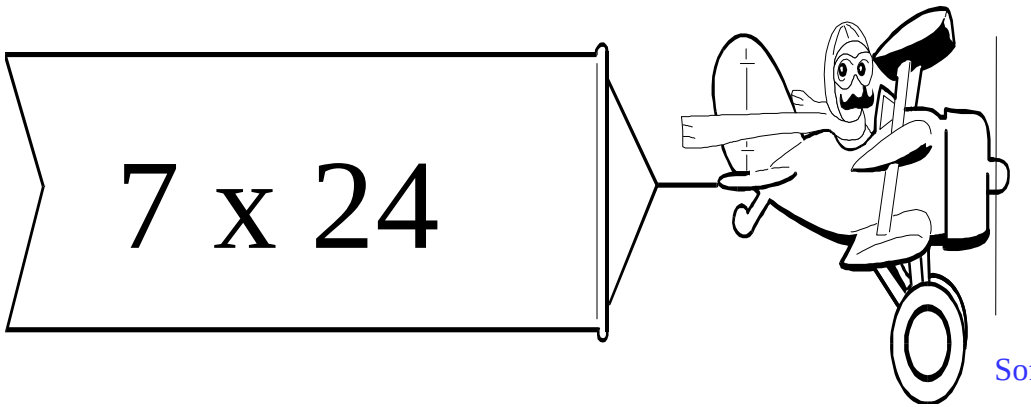
- **COE "Minimum Workstation"**
  - **133 MHZ Pentium processor(s)**
  - **32MB RAM, 1.2 GB Hard Drive, 2 MB Video RAM**
  - **8X CD-ROM, PCMCIA, LAN connection, 1.44 MB Floppy Drive**
- **Optional support for portable workstations, hardcopy, sound, and other technologies**

SPE supports new databases (Part 1)

- **Choices based on open systems**
  - **SQL standard**
  - **ODBC compliant**
  - **Fully relational schema**
  - **Support for two phase commit**

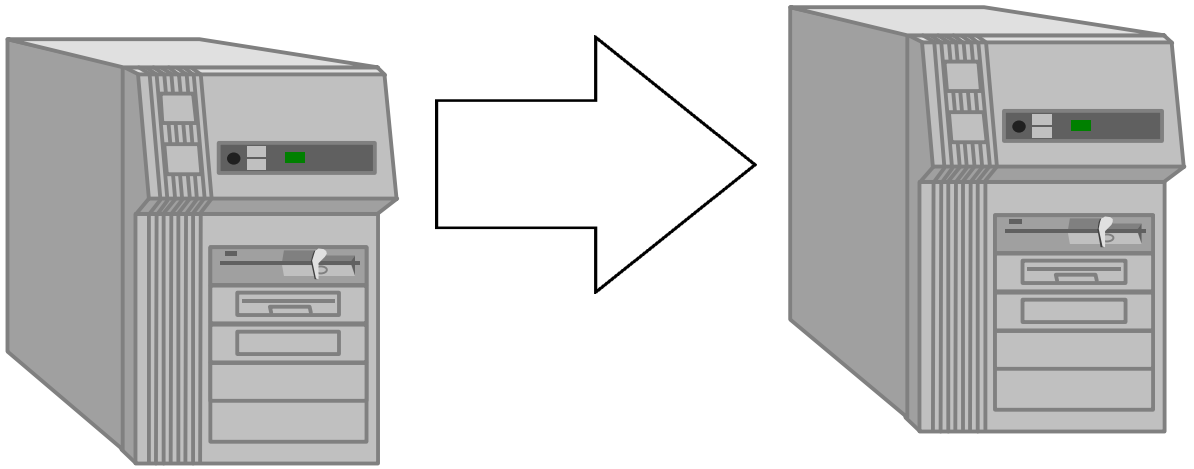
SPE supports new databases (Part 2)

- **Choices based on Operational Requirements**
  - **High reliability, availability, and maintainability (RAM)**
    - **Backups during operations**
    - **Schema changes during operations**
    - **Support for RAID storage units**
  - **Automated monitoring**
  - **Security features**



SPE supports new databases (Part 3)

- **Choices based on Performance Requirements**
  - **Multiple processors supported**
  - **Views of summary data elements supported**
  - **Replication**



SPE supports new databases (Part 4)

- **Choices based on Functional Requirements**
  - **Loading utilities and other tools provided by vendor**
  - **Data warehousing tools available**
    - **Powerful ad hoc user tools like Cognos Powerplay and Impromptu**
    - **Data warehouse summaries can be drilled down to operational data**
  - **Triggers technique to enforce business rules uniformly**
  - **Cursors technique to simplify expressions of business rules**

SPE supports new requirements tracking tools

- **Integrated CASE**
- **BPWIN/ERWIN**
- **Rochade and Emeraude Repositories**
- **DoD Data Dictionary**

SPE supports new requirements elicitation tools

- **JAD sessions**
- **Interview training**
- **Prototyping**
- **Function Points**
- **Iterative Life Cycle**
- **DoD 5000 documentation requirements (more on this later)**

SPE supports new analysis and design methods

- **Domain Analysis**
- **Information Engineering**
- **Object Orientation**
- **Data Administration**
- **Software Architecture**

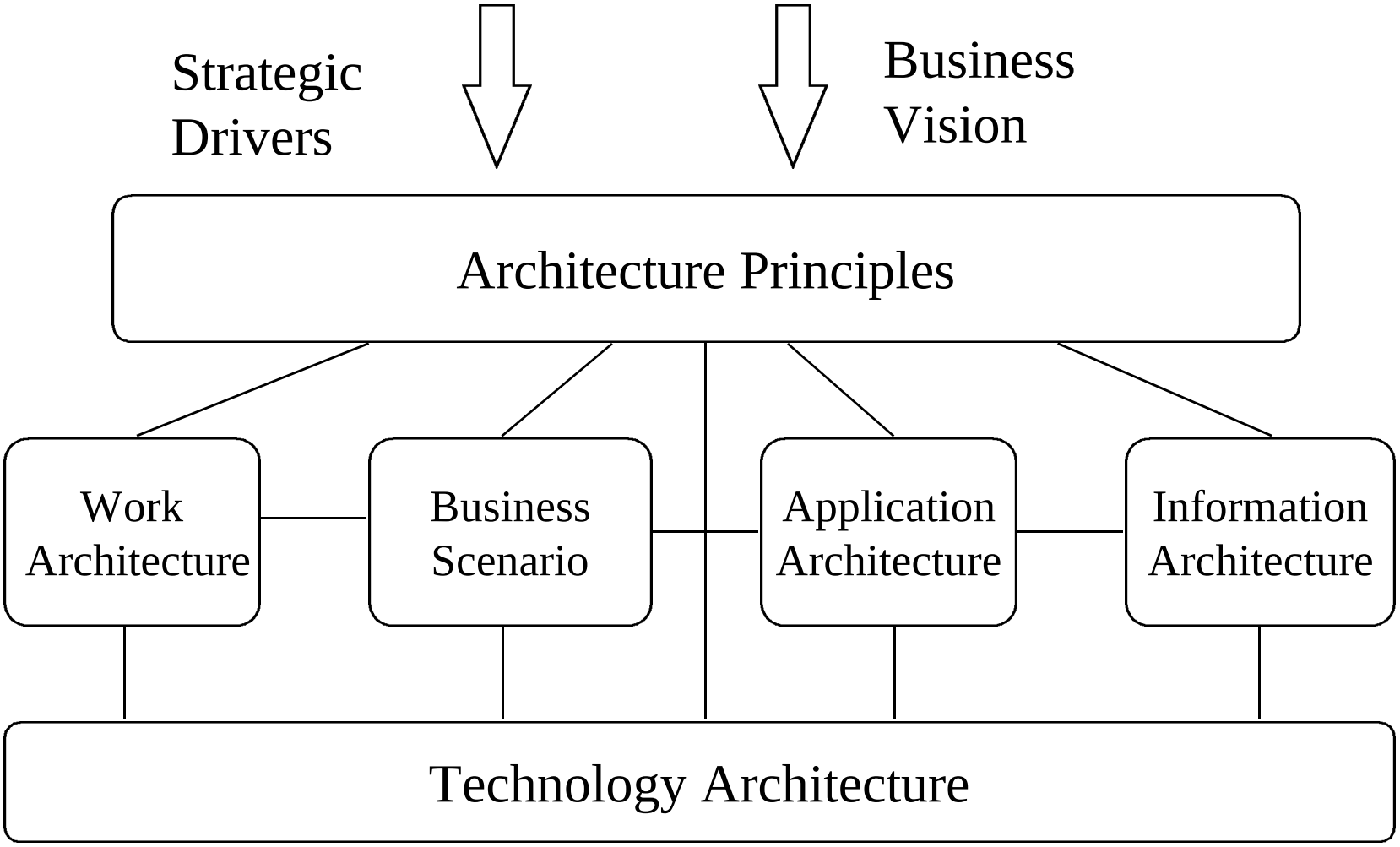
SPE supports testing

- Testing against functional requirements
- Testing against operational requirements
- Test planning
- Test methods

SPE supports documentation specialists

- **Project Team members**
- **Parallel with other activities**
- **Functional Testing brings the players together**

Architecture Modeling Framework



The Information Systems Industry is Changing

- Communications
- Processors
- Workstations
- Storage Technology
- Software Tools

Mainframe Architecture Evolution

	Current	Target	Standards Based
Hardware	IBM/Plug Compatible	IBM/Plug Compatible	IBM/Plug Compatible
Operating System	OS/MVS	OS/390 (POSIX)	OS/390 (POSIX)
DBMS	DatacommDB, Supra,DB2	Oracle	ANSI SQL, CORBA
Networking	SNA, TCP/IP	TCP/IP	TCP/IP , DCE, WWW

Mid-Tier Architecture Evolution

	Current	Target	Standards Based
Hardware	HP, AT&T, 486, SUN	HP, SUN, Pentium/Plus	HP, SUN, Pentium/Plus
Operating System	HP/UX, SVR4, Solaris, SCO	HP/UX, Solaris, NT	HP/UX, Solaris, NT
DBMS	Unify, Oracle	Oracle	ANSI SQL, CORBA
Networking	TCP/IP, IPX/SPX, NT	TCP/IP, IPX/SPX, NT, WWW	TCP/IP, NT, DCE, WWW

LAN Server Architecture Evolution

	Current	Target	Standards Based
Hardware	486, Pentiuim NT	Pentium, Pentium/Plus	Pentium, Pentium/Plus
Operating System	NT, Netware	NT	NT
DBMS	None	None	ANSI SQL, CORBA
Networking	TCP/IP, IPX/SPX, NT	TCP/IP, WWW, IPX/SPX, NT	TCP/IP, DCE, WWW, NT

Workstation Architecture Evolution

	Current	Target	Standards Based
Hardware	386, 486, Pentium	486, Pentium	Pentium/Plus
Operating System	DOS, Win 3.1, Win95, NT	Win 95, NT	NT
DBMS	None, Access	None, Access	ANSI SQL, CORBA
Networking	TCP/IP, IPX/SPX, NT	TCP/IP, IPX/SPX, NT, WWW	TCP/IP, NT, DCE, WWW

Past Practices need Changed

- **Better Training is needed**
- **Better Requirements Elicitation is needed**
- **Better Architecture is needed**
- **Better Contracts are needed**
- **Better Metrics are needed**

Training must be planned

- **Retooling DSDC employee skills is required**
- **Looking ahead 3 to 5 years is appropriate**
- **The unit cost business model must be considered**

Plans for Training are underway

- **The DSDC business plan includes strategies for training**
- **A survey of supervisors has baselined where we are**
- **Retooling needs must include all stakeholder skills**
- **The CMM Level 3 Training KPA provides some guidance**

Principles for Training have been agreed to

- **Retool the IRM Workforce for the Common Operating Environment**
- **Focus on standards based architecture**
- **Emphasize professional development**

Requirements Elicitation must be planned

- **New regulations will help**
  - **DoD 5000.2-R**
  - **MIL-STD-498**
- **New models will help**
  - **Software Acquisition Capability Maturity Model (SA-CMM)**
  - **Working-Level Integrated Product Team (WIPT)**

DoD 5000.2-R Documentation includes

- Mission Need Statement (MNS)
- Operational Requirements Document (ORD)
- Test and Evaluation Master Plan (TEMP)
- Acquisition Program Baseline (APB)

Architecture must be planned

- Too many DBMSs, operating systems, languages, development tools, etc.
- No documentation on choosing appropriate tools and methods
  - Partial solution is a list of Preferred Tools and Methods
- Too little layering and reuse
- Computer industry is changing
- Software not designed to be testable, etc.

Plans for having Preferred Tools and Methods are underway

- Joint effort with DLA CAN, Technology Infusion, and others being led by the Product Development ED
- Study to determine cost savings for DBMS changes underway
- Current proposal sets up penalties based on cost analysis
- Enforced through a Design Review Board and a shared Test Laboratory

Musts for Preferred Tools and Methods have been agreed to

- **Must support the Common Operating Environment**
- **Must reduce costs at DLA or equivalent level**
- **Must support and include Configuration Management**

Contracts must be planned

- Commitments back and forth with
  - Customers
  - Vendors
  - Subcontractors
- Executing contracts often takes six months or more
- Statements of work and other contract documents need to be precise
- DSDC will partner with Customers and subcontractors
- DSDC needs to focus on our mission

Plans for Vendor Contracts are underway

- **Interservice Support Agreements allow DSDC to outsource services to other organizations**
- **Outside vendors are bidding for various services**
- **Special emphasis is needed on General and Administrative efforts**

Plans for Customer Contracts are underway

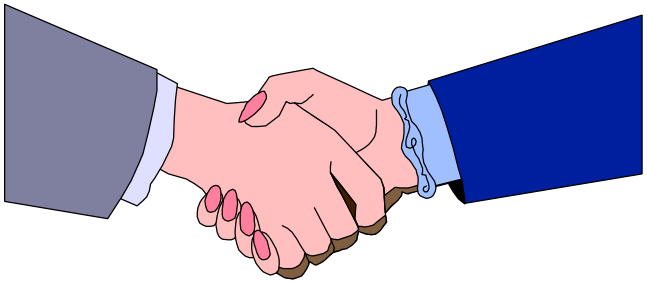
- **Interservice Support Agreements indicate how Customers will be able to fund and how DSDC will be paid**
- **Customer contract situations are each unique, so negotiations are required**
- **Infrastructure and Standard Architecture support for DLA are being transitioned to DSDC**

Principles for Customer Contracts have been agreed to

- **DSDC wants to manage as many as possible of the Information Services and Information Technology programs for DLA**
- **Business agreements of various kinds aid in communication of roles and responsibility**

Principles for Customer Contracts have been agreed to

- **Customer partnerships are critical for implementing CMM Level 2 &3**



Plans for Subcontractors are underway

- **Subcontractor changes were covered in a previous session**

Metrics must be planned

- **The unit cost metric needs improvement**
  - **DBOF currently doesn't permit any other measure**
  - **fitting the metric to the customer may resolve the problems**
- **CMM Level 3 calls for management by metrics**

Plans for Metrics are underway

- **Charges for services are being priced**
- **A draft list of metrics is being circulated**
- **The principle of Value-based metrics is being explored**

Principles for Metrics have been agreed to

- **Better metrics that support billing are needed**
- **Metrics are needed to improve productivity**
- **Metrics are needed to improve quality**
- **Metrics are needed to reduce risk**
- **CMM Level 3 is our most important metric**

Summary

- **DSDC must get to Capability Maturity Model Level 3**
- **DSDC will be affected by computer industry changes.**
- **DSDC needs to change to fulfill its mission**