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Abstract

This report describes the creation of a taxonomy and evaluation criteria for organizing and assessing DMSMS (Diminishing Manufacturing Sources and Material Shortages) tools, databases, and services. The taxonomy and evaluation criteria are useful in the short term to assess the state of the present DMSMS management tools and the gaps that may be present within them; and necessary in the longer term to lay the ground work for constructing an ontology that will be necessary to achieve web-centric, enterprise-wide DMSMS management solutions.

A taxonomy is a classification according to a pre-determined hierarchy, with the resulting catalog used to provide a conceptual framework for discussion, analysis, or information retrieval. The taxonomy was developed based on the reactive, pro-active and strategic DMSMS management and planning activities that currently take place and that are envisioned in the future (note, the taxonomy was not constructed to fit the current tool, database and service offering).

The taxonomy has been expanded into a detailed set of evaluation criteria that ranges from generic issues such as availability and pricing of the tool, database or service, to data update frequencies, treatment of uncertainties, and taxonomy-specific requirements. The evaluation criterion has been implemented in a forms-based evaluation tool that can be used to compare existing tool, database and service offerings, and search for and prioritize gaps. The implementation of the evaluation criteria distinguishes between users and developers in how questions can be answered, and each evaluation criteria can be weighted by importance and scored independently.

The Common Use Tools Committee (CUTC) of the DOD DMSMS Working Group is currently using the evaluation criteria and its implementation to study over 30 different tools and databases in order to characterize the needs of the DMSMS community.



Revision History

Contributor	Date	Description
Sandborn	November 27, 2006	Initial draft

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DMSMS Capability Assessment Criteria and Taxonomy (Draft 10)

In order to construct useful capability assessment criteria for DMSMS tools and databases, several activities need to be addressed:

- 1) How should tools/databases be categorized? (build a workable taxonomy)
- 2) What questions should be asked? (some portion of the questions will be specific to the categories in the taxonomy, and some will be general)
- 3) How do you get a useful and accurate answer to the questions? (what responses to the questions do you want to allow)
- 4) How do you accumulate the answers you get in order to produce the assessment information you are after (accumulated both within taxonomy categories and overall)? Some questions are more important than others, how are the questions weighted?

This document represents a taxonomy, evaluation questions, and responses. It is unlikely that any organization will choose to evaluate tools/databases using all the evaluation criteria included in this document – the hope is that this document can provide a repository of evaluation criteria from which to draw applicable criteria for performing specific evaluations.

1. Taxonomy

The next page shows the taxonomy for DMSMS tools and databases.¹ We need a taxonomy because not every tool or database in the DMSMS space is intended to cover the entire DMSMS space, and therefore it does not make sense to apply a common capability assessment to every tool or database that may be of interest, e.g., it does not make sense to assess a part obsolescence forecasting database against the same criteria as a redesign synthesis tool. Note, there will of course still be some portion of the assessment criteria that is common to everything.

The taxonomy is not (and does not contain) any assessment criteria or requirements, only subject categories. The taxonomy has to stay at a workable level, i.e., there isn't a great value in making the taxonomy too detailed – the assessment criteria effectively increase the detail level considerably. An attempt has been made to draw a line around the tools and data that have specific knowledge of DMSMS issues and not allow the line to encompass all the tools involved in the design and management of a system, e.g., reliability analysis tools play an unquestionably important role, but are not part of the DMSMS tool/data space.

¹ A taxonomy is a classification according to a pre-determined system, with the resulting catalog used to provide a conceptual framework for discussion, analysis, or information retrieval.

Supporting Tools and Data

- General information access systems
- Technical data repositories
- Workflow planning

- General parts database content

- Reliability prediction
- Sparing analysis
- Availability analysis
- Maintenance planning
- Life cycle cost analysis
- Workflow planning
- Configuration mgmt.
- Logistics Mgmt Systems

- Technology roadmapping and surveillance
- Project planning assistants

DMSMS Tool/Data Space

- BOM management services
- Integration and shared tool/data services
- Solution guidance services (wizards)
- Case management services {
 - Logging
 - Reporting

- Part procurement and inventory status
- Obsolescence risk and/or date forecasting
- Alternative/substitute part identification
- Notice collection, archiving and alerting
- Part procurement logistics

- Part status and inventory tracking

- Mitigation planning and mgmt. {
 - Mitigation approach identification
 - Lifetime buy quantity determination
 - Design refresh costing
 - Re-engineering and emulation

- Collaborative parts mgmt - data sharing/surveillance across multiple enterprises
- Consolidated inventory and demand {
 - Demand forecasting
 - Inventory surveillance
- Metrics generation and reporting

- Material risk indices
- Design refresh planning
- Redesign planning (technology insertion)

Aggregation/
Collaboration
Environments

Part Data Mgmt.
(Parts Data Owners and
Part Chasers)

Parts List Monitoring

Platform/System
Analysis and Mgmt.
(Consolidated BOM Mgmt.)

Strategic Planning
(Lifecycle Optimization)

2. Evaluation Criteria

This section is a compilation of evaluation questions. The questions are divided into general questions that could be asked of every tool/database, and questions that are specific to the various categories in the taxonomy. This set of criteria errs on the side of being too detailed; the hope is that this can be a repository from which to draw criteria for performing specific evaluations.

For simplicity we will refer to the objects of our evaluation as “tool/database,” however, we understand that these criteria may be applied to other types of activities that are not tools or databases, e.g., services.

General

The following criteria are general and in many cases not DMSMS specific (outside of the specific taxonomy categories). These criteria could be applied to every tool/database in the space.

Availability

- How is the tool/database available? (license purchase, subscription, free, fee for service)
- What are the licensing terms? (Site or Seat License?)
- What does it cost to license or use? This is the effective annual cost/seat. Explain in comments the form of the license.
- Is Technical/User Support (24/7) from the supplier included in the cost?
- Is a Service-specific version of the tool/database available? (e.g., Army, Navy, etc...)
- Is tool's current use constrained, i.e., is the tool only available to a specific group of users (e.g., only the Navy)? (if so, who is it limited to?)
- What is its country of origin?
- Is the tool/database export controlled from its country of origin?
- (if US origin) What is its Commerce Control classification?
- (if US origin) Who performed the classification? (internal, consultant, Dept. of Commerce)
- Does the providing organization have export licenses for the tool/database?
- Type of providing organization (commercial tool vendor, service vendor, DoD organic, university, consultant, other)
- Is a free demonstration version of the tool/database available?
- Is maintenance available? (if so what does it cost and how does it work, i.e., is maintenance separate from upgrades, what is the model and how do costs typically escalate?)
- How are upgrades handled? Are they part of the service agreement, purchased separately, etc.
- How are tool/database upgrades performed/accomplished? (CD upload, web, etc)
- Is there a cost associated with the quantity of data involved?

Platform (Hardware and Software)

- What operating system(s) does the tool/database run on? (Windows, macOS, UNIX, Linux, etc...)
- What is the minimum hard disk space required ?
- What is the minimum RAM required? (may depend on problem size you want to run)
- What is the minimum clock speed required?
- Is the tool/database netcentric? Netcentric = distributed client/server architecture with components and/or services available across and throughout an enterprise.
- What additional software/services are required to run the tool/database? (i.e., what other databases or other software tools do I have to have a license for, includes plug-ins for your browser, e.g., java, etc.)
- What additional software can be optionally used with the tool/database? (what does it interface with for import/export)
- Does the tool have a published API (Application Protocol Interface)?
- How can other tools connect/integrate with this tool? i.e., file (batch) based, sockets, DLLs?
- Is the tool/database open systems (ODBC compatible)?
- Is the tool/database backward compatibility with older versions ensured? (how is this accomplished, automatic or conversion utility)

Documentation and Support

- Does the tool/database have a written user guide/reference manual?
- Does the tool/database have built-in help?
- Is technical support available? (24/7?)
- How is technical support obtained? (email, phone, web)
- Is training needed?
- Are there training materials available for the tool/database?
- Is there a training course available for the tool/database?
- What is the form of the available training? (i.e., on-line, instructor onsite, etc.)
- If training is available, how much does it cost and how long does it take?
- What is the learning curve?
- Does the tool/database have a written or on-line tutorial?
- Does the documentation include information security and tool security topics?

User Base, Usage Model and History

- What organizations use the tool/database today?
- Who within the organizations uses the tool/database today (target user)?
- What do they use it for?
- How often does it need to be used? (i.e., does it need to be used once per design, every quarter for every design, every day for every design, ...)
- When was the first version of the tool/database released?
- What was the date of the most recent release?
- Is there a roadmap of planned future development and enhancements?
- How is the development effort funded? (government budget, government contracts, from commercial sales, unfunded, etc.)

- Does a user group exist?

User Interface and Input/Output

- Does the tool/database have a Graphical User Interface (GUI) that allows interactive data manipulation?
- What formats are available for inputs? (spreadsheet, text, other tools, etc...)
- What formats are available for outputs? (spreadsheet, html, text, other tools, etc...)
- Is there password control on user entered data (application-specific) data
- Is there password control on non-user entered data (use and modification)
- Is there user recognition and persistent customization? E.g., can the desktop be customized for a specific user and is the customization recognized and remembered?
- Does the tool/database support design/document version control? Tracking of changes made by users to their data.
- Can it be customized? How much customization of the tool/database is available?
- Do you have to customize to use? What degree of customization is necessary to prepare the tool/database for a specific organization? Is it plug and play out of the box, or does it require the supplier's customization in order to use?

Aggregation/Collaboration Environments

The “environment” (or infrastructure) within which the tools and databases that comprise the DMSMS management solutions reside. The environment provides a range of “services” that enable the use of a suite of tools and databases for performing application-specific analyses. The specific tools and databases that the environment enables the use of are included within the other portions of the taxonomy.

BOM Management Services (including Query/Search)

- What form does the BOM have to be in?
- What pre-processing of the BOM is required?
- Is additional user input necessary to support sharing of BOMs (and/or other data) with other systems or services?
- Can the tool/service access (query) across multiple data sources?
- Are security issues with multi-database searches managed? Does the tool/service understand what databases can be searched based on who the user is?
- Who can edit (load, delete) BOM data after it is loaded?
- Who can view BOM data after it is loaded?
- Can the BOM data and research comments be unloaded into a flat file? (for archiving, or at the end of subscription)
- Can BOM data be formatted for uploading into other databases such as the Air Force API (automatic export capability)?
- Can specific types of parts be filtered out of the BOM?
- Is data cleansing of syntactical issues available? Does the environment understand and accommodate the syntactical requirements of the tools the BOM is passed to ("dashes", wildcards, etc.)?
- Is data cleansing of semantic issues available? Does the environment understand the meaning of the part numbers, i.e., even if the part number can not be matched, can the environment still figure out what type of part it is?
- Is there capability to add notes/comments to BOM components?
- Are BOM changes flagged to the user? I.e., is there an alerting mechanism?
- Is conflict resolution available? (i.e., what happens when multiple data sources don't agree?)
- Who backs up the BOM data?
- How often is the BOM data backed up?
- Where is the BOM data stored (local versus remote server)? If a server is involved:
 - Is component data or BOM data sent to a server?
 - What are the security protections for the data stored on your server? What is the server password and authentication process? Is there server protection from other users? Is there data sharing capability with other users?
 - Who can data be shared with (who are the other users, e.g., same Service, Industry, other Government)?
 - Are commercial and DoD data stored on the same server? Are there other nation's BOM data stored on the server?

(additional specific query and search evaluation criteria is in the “Data Sources and Management” category)

Integration and Shared Tool/Data Services

- Is single sign-on supported (single point of entry)?
- Is personalization available? E.g., can the user specify data and tool preferences.
- Is there workflow support? E.g., are there mechanisms to track progress in tool use.
- Is the environment web-based?
- Are linkages to manufacturing resources available? (if so what and who?)
- Is there access to emulation services? E.g., can you see the Sarnoff catalog.
- Are the data fields used in case management compatible with other data sources/tools information for potential sharing purposes (SDW, AVCOM, OMIS)?
- Are the data fields used/required documented and readily available to users?
- Security and information assurance criteria:
 - Does the application/web server have an SSAA and DITSCAP certification?
 - Does the web server operate in HTTPS mode?
 - Is PKI (Public Key Infrastructure) supported?
 - Is the application DADMS listed? (Navy)
 - In addition to DADMS listing is the application specifically NMCI certified? (Navy)
 - What is the current NMCI expiration date? (Navy)
 - Is the system listed in DITPR-DON (Navy)
 - Is the system listed in NITESTAR? (Navy)

Solution Guidance Services (“Wizards”)

Solution guidance services are intended to lead users through the process of resolving DMSMS issues by providing an automated flowchart or framework for case resolution (automation of the thinking that experts do). Solution guidance services are not intended to perform the calculations necessary to optimize the resolution process, but rather, lead the user by telling them which tools to use, what result should be sought from the tools, and actions to take based on those results.

- What is the scope of the wizard? What analyses does the wizard incorporate into its advisory knowledge?
- Does the wizard distinguish between the differing business practices of different organizations? (different Services, commercial organizations)?
- Does the wizard incorporate the entire DMSMS case resolution guide?
- Does the wizard build DMSMS solutions that in accordance with the DoD DMSMS Guidebook?
- What is the wizard usage model? (who uses it and how should they use it?)
- What is the nature of the guidance in the wizard? (e.g., knowledge base, AI, etc.)
- Does the wizard learn?
- How much customization is necessary to prepare the wizard for use in a specific organization?

Case Management

- Is there a case repository?
- If there is a case data repository, where is it kept?
- Does the management of cases provide an audit trail?
- Can case resolution criteria be specified and automatically applied? This does not mean that an automatic closure has to be specified by the user.
- Can open cases be viewed?
- Can closed cases be viewed?
- Are cases automatically opened and propagated to other relevant tools? E.g., the SDW.
- Are DMSMS case statistics available (i.e., open cases, resolution time, etc.)?
- What case metrics are available:
 - number received
 - number resolved
 - number open
 - number funded
 - time to resolve
 - type of resolution
 - sustainment cost avoided
 - sustainment time avoided
 - Type of category, e.g., material unavailable, technology obsolescence, lead-free, etc.

Part Data Management

The tools and databases that collect and manage data that supports the analysis of DMSMS issues. This category is dominated by (but not limited to) electronic part databases that can be used during part selection and management for original part selection, alternative part identification, part procurement and individual part management.

General

- What is the update frequency on the data?
- Is the currency of the data clearly identified?
- Part number formatting and cleansing (BOM scrubbing) – what part identification options are available? (NSN, OEM part numbers, NIIN, Cage, ... see JCOMMS)
 - Is manufacturer acquisition history captured and used in part number recognition, i.e., has the manufacturer changed hands, who has bought who?
 - How are non-stock listed (non-NSN) parts handled?
 - Can part descriptions be synthesized if a real part number cannot be interpreted?
 - Does the BOM scrubbing functionality “learn”?
- What is the source of the data?
- Has the accuracy of the data been measured? (if so, how? what was the result?)
- Are there any disclosure/proprietary issues with any of the data?
- If there are disclosure/proprietary issues, how is access to confidential data controlled?
- What is the tool/database supplier’s taxonomy?
- Is the tool/database provider associated with particular part distributors or manufacturers? (i.e., is there any possible conflict of interest in the data)
- Are data conflicts resolved? I.e., when different sources of information disagree, is there a process for providing a status?
- How are data conflicts resolved? (what happens when multiple data sources disagree?)
- Breadth of coverage:
 - Are military parts included? (if so what and how many)
 - Are COTS parts included? (if so what and how many)
 - Are passive parts included? (if so what and how many)
 - Are foreign vs. domestic sourced parts identified? Is the source identified in the database?
 - Are die (and/or wafers) treated separately from packaged chips?
 - Base materials, package bodies, other critical process objects?
 - Are lead vs. lead-free parts specifically treated?
 - “Lead free” parts?
 - “RoHS (Restrictions on Hazardous Substances) compliant parts?
 - Are Material Declaration Statements (MDS) parameterized?
 - How is risk of no manufacturer part number change handled (tin-lead to lead-free)?

- Can ASICs (Application Specific Integrated Circuits) be analyzed? (i.e., manufacturing capability and IP obsolescence)
- Are Aftermarket sources considered?
- If Aftermarket source, does the component status indicate whether they have finished OEM products, manufacturing capability or both?
- Are Street/Distributor sources separate from Aftermarket sources?
- Are AQEC (Aerospace Qualified Electronic Component) parts included?
- Are thermally upratable parts identified? (more generally, higher screening requirements)
- Are high risk of counterfeit parts identified? (or known instances of counterfeits flagged, source of the parts, quantity, how to identify)
- Are electro-mechanical parts included? (if so, what)
- Are non-electronic parts included? (if so, what)
- Are card-level part numbers recognized?
- Is process obsolescence treated?
- Are software drivers and/or firmware included?
- Is COTS software treated?

Part Procurement and Inventory Status

- How many parts have DMSMS status information?
- Is the original manufacturer's status separated from the "street"/distributor status/availability?
- Are there connections to parts availability from distributors?
- Is (recent) part history included?
 - low/high price
 - supply chain quantity
 - historical demand
- Is there any particular part sector focus (is the database stronger for one type of part than another)
- How are the results reported? (format)

Future Obsolescence Risk and/or Date Forecasting

- What is the form of the forecast (date, risk color, life-code, etc.)?
- What is the source of the data (or how is the forecast determined)?
- Is historical data obsolescence data available?
 - last order dates of previously obsolete parts
 - final ship dates of previously obsolete parts
 - introduction dates for parts
- Are uncertainties on forecasts estimated?
- Has accuracy of the data been measured? (if so, how? what was result?)
- Have historical accuracy metrics for the data forecasting been generated, i.e., matching old predictions to current obsolescence? If so, how many years of prediction history are available and what is the result of the comparison?
- Are connections to parts available from aftermarket suppliers (or is the likelihood that a part will be available from aftermarket suppliers) provided?
- How are the results reported? (format)

Alternative/Substitute Part Identification

- How are alternate/substitute parts identified? (what criteria are used to make or rank a match)
- Are there connections to parts available via emulation (are Sarnoff databases visible)?
- Are there connections to parts available from aftermarket suppliers?
- Query capability
 - Is exact part search available?
 - Are wildcard characters allowed in parts search?
 - Is parametric search available?
 - Are predefined and *ad hoc* queries supported?
 - Can manufacturer websites be queried in addition to internal databases?
 - Can a customer's internal databases and approved vendor list be connected with the system? Can I filter the search for alternative parts based on my approved vendor list?
- What happens when no match can be made to a part number? (are searches made for drawings of the part, i.e., in MEDALS?)
- What is the performance (speed) of the alternative/substitute part identification process?
- Connection to any type of DFX (Design For x) assessment?
- How are the results reported? (format)
- Customized Reports?
- Customized Reports?
- Are there engineering options available besides alternate/substitute parts?
- New Technology Insertion recommendations?
-
- Ease of obsolescence report usage (readability, format, graphics...)

Notice Collection, Archiving and Alerting

- Is an archive of supplier notices available?
- What type of notices are available (PCN – Product Change Notice, PDN – Product Discontinuance Notice, recalls, etc.)
- Are alerts automated?
- If alerts are automated, how are they sorted?
- If alerts are automated, to whom do they go to?
- What filters can be used?
- Timeliness of obsolescence notifications and updating of database?

Part Procurement Logistics

- Are acquisition lead times included?
- If lead time is included, explain what kind of lead time(s) are tracked, i.e., administrative lead time (ALT) that incorporates the time to do contracting details and technical consultations, testing, etc, and/or production lead time (PLT) that incorporates the time to produce. Demonstrating that the tool provides this data requires ensuring that the correct lead times are captured.

- Is the price included?
- If price is included, explain what variations are tracked. Price quotes may be dependent upon priority deliveries and quantity levels ordered among other factors. E.g., what is the unit of issue assumed?
- Is there a contract vehicle? (how can you pay?) – are available contractual vehicles included (specify in comments)
- Is there a Contract Line Item Number (CLIN) that covers the purchase?
- Is the condition of the item specified?
 - Fully mission capable/ready for installation (RFI)
 - Partially mission capable; needs testing, calibration, some modification, software loaded, etc.
 - Non-mission capable; a carcass with the right part number but it's got to go to the depot facility to test and insure it's the right model number (anything bought off ebay) – out of MIL STD 1388
- How many are available?
- From whom can I get it?
- Is supply data provided?
- If supply data is provided, what is its source?
- Is the manufacturing date of the item specified?
- Is the shelf life of the item specified?
- Is the tool capable of identifying selected applicable items down to their specific serial number?

Part List Monitoring

Part status tracking and inventory tracking for lists of parts or individual bills of materials treated independently from the application context.

- How is the status of parts monitored over time?
- How are part monitoring results delivered to the user?
- Can part lists (as opposed to single parts) be monitored?
- Is there continuous monitoring of the status of the part list (can the database be used as an application-independent background process)
- Is the inventory of the parts in the part list tracked? If so, what inventories are included in the monitoring?

Platform/System Analysis and Management

The use of DMSMS data combined with platform/system descriptive and lifecycle information to enable platform/system lifecycle management across multiple enterprises. These tools provide tactical planning/optimization at the platform/system level (“this is my situation right now, what is the optimum decision to make?”). This category includes application-specific management of multiple BOMs.

Mitigation Planning and Management

- Is guidance for choosing mitigation approaches provided? If so,
 - How is it done? (knowledge base, quantitative calculation, decision network, risk-based, etc.)
 - What mitigation approaches are included?
 - Are mitigation approaches costed (can a budget be created)?
 - If a mitigation budget is generated, has it been verified, validated, and accredited? If so, by whom?
 - Is the mitigation approach selection process tied to life cycle cost analysis? If so, how?
- Are lifetime buy/bridge buy quantities determined? If so,
 - How are they determined?
 - How are penalty models formulated (models of the cost penalties applicable for under-buys and over-buys)?
 - Are inventory (storage and handling) costs considered?
 - Is equal run-out (matched sets) considered? (equal run-out = when a part in a system is no longer available from any source it renders the system unproducible or unsupported. As a result other parts in the system that were being used for producing the system are left unused in the inventory. The effect of one part’s run-out on the need for another part is referred to as equal run-out.)
 - Are the lifetime buy quantities optimized? (a combination of cost and risk minimization driven by the consequences of buying too few or too many items)
 - Can application-specific simple policies be determined? (i.e., buy 114% of demand)
 - Are uncertainties included in the analysis? If so, how?
 - Are budget and/or contractual constraints considered?
 - Are financial impacts included (i.e., cost of money)?
- Design refresh costing
 - Are re-qualification costs included?
 - Are prototyping costs included?
 - Are software re-hosting costs included?
 - Are software obsolescence costs included?
 - Are retraining costs included?
 - Are documentation costs included?
 - Does the tool capture Engineering Change Proposal (ECP) cost, which is a roll-up of all technical and logistic integration and implementation costs?
 - Are uncertainties included in the analysis? If so, how?

- Are budget and/or contractual constraints considered?
- Are Configuration Control Management costs included?
- Re-engineering and emulation
 - Synthesis: Is re-engineering supported (enabled) in any way by the tool/database?
 - Synthesis: How is design extraction from the original design done?
 - Synthesis: What specification format is required (e.g., VHDL, VHSIC, etc.)?
 - Synthesis: Can the specification format be simulated?
 - Synthesis: Is hardware/software co-design supported?
 - Emulation: Is emulation supported (enabled) in any way by the tool/database?
 - Emulation: Is a catalog of emulated parts available?
 - Emulation: Are costs and delivery schedules for emulated parts determined?

Collaborative Parts Management

Data sharing and surveillance across multiple enterprises

- Is there a universal part number formatting and cleansing utility?
- Can indentured BOMs be displayed (across multiple enterprises)?
- Does the tool allow “what if” analysis? Specify the type of analyses (scenarios) that can be performed?
- Is a TDP (Technical Data Package) available and is it in a useable electronic format?

Consolidated Inventory and Demand

- Is visibility into consolidated demand rates provided?
- Is demand rate forecasting done? (quarterly, yearly)
- Is visibility into consolidated inventory provided?
- Item availability surveillance metrics based on:
 - Original equipment manufacturer
 - Broker services and aftermarket
 - Government stock (DLA, SOM, NAVICP, Depots, ...)
 - Residual/excess inventory (visibility into DRMS – Defense Reutilization and Marketing Service or ILS - Inventory Locator Service, i.e., “surplus”)
 - Decommissioned assets
- What is the update frequency for item availability surveillance information?
- Do you have access to data for:
 - DLA demand
 - Depot level demand
 - Unit level demand
- Is the demand forecasting linked to failure rate prediction (sparing analysis)?
- Are inventory surveillance and demand forecasting correlated to supportability metrics and cost resolution metrics?

Metrics Generation/Reporting

- Are metrics generated?
- What metrics are generated?
- Is platform/BOM health assessed?
- Is health assessment available throughout the system hierarchical (system, unit, circuit card, and part)? and across multiple enterprises ?
- Is BOM health mapped to some kind of system impact metric, i.e., sustainment dollars at risk (“Material Risk Indices”)?
- Are supportability metrics available throughout the system hierarchy (system, unit, circuit card, and part)? and across multiple enterprises?
- Are cost resolution tables computed and rolled up through the hierarchy?
- Are time resolution (calendar time to resolve) metrics computed?
- Is operational impact assessed? If so, how? E.g., will it show impact on aircraft availability or mission reliability or MICAP status or what?
- Are business cases generated?
- How is sparse data treated? (“sparse data” = incomplete data set)
- Is POM (Program Objectives Memorandum) generation and budgeting supported?
- Are metrics (e.g., resolution time, cost, etc...) on mitigation solutions chosen compiled?

Strategic Planning

The use of DMSMS data, logistics management inputs, and technology/business forecasting/trending to enable strategic planning, lifecycle optimization, and long-term business case development and support. These tools provide the opportunity to plan/optimize the big picture, i.e., they could be used during system design to plan the lifecycle management of a system or group of systems (“I’m architecting my system, forming business plans, and defining long-term budgets, what should I do?”).

- What type of planning is performed?
 - Sustainment resource requirements planning/budgeting
 - Obsolescence mitigation planning
 - Design refresh planning
 - Technology insertion planning
 - Other ...
- What type of analysis is performed within the planning?
 - Is “what if” analysis supported?
 - Is sensitivity analysis supported? (i.e., does it generate “tornado charts”, etc.?)
 - Is risk analysis supported?
 - Is optimization supported?
 - If optimization is supported, what is optimized?
 - If optimization is supported, is it “robust”?
- What is the scope of the planning/analysis?
 - Is analysis supported through a range of physical hierarchies?
 - Are hardware and software considered in the analysis?
- Is uncertainty analysis performed?
- If uncertainty analysis is performed, how is it done? (i.e., stochastic, fuzzy, etc.)
- How is sparse data handled? (“sparse data” = incomplete data set)
- Is there a linkage to life cycle cost?
- Is there a linkage to technology roadmapping?
- How is technology insertion managed?
- Are viability metrics included (viability = value + sustainability, where value is a combination of cost, performance and reliability; and sustainability is the ability to continue to manufacture, support and upgrade)?
- Is there a linkage to demand forecasting and sparing?
- Is there a linkage to logistics planning and control?
- Are business cases generated (or outputs from which business cases can be formed)?
- If yes, list what outputs are generated.
- Are plans for sustaining funding developed?
- Have verifications/demonstrations of ROI been performed?
- Does the analysis require calibration?
- Are budget and/or contractual constraints considered?

3. Responses

While many of the proposed questions require custom answers, there are also a large proportion of questions that can be answered with standard responses. Unfortunately, it is too easy as a tool/database supplier to answer “yes” to questions about functionality. Often yes can mean anything from “there are hundreds of users using the functionality everyday” to “we have thought about it and we are pretty sure we could easily extend our tool to do that if required”.

Possible responses to functionality questions (software developer’s perspective):

- 1) Customers are using this functionality today (references could be provided if requested)
- 2) It is available in our tool/database, but we are not aware of anyone actually trying to use it yet (has been shipped in product)
- 3) Has been demonstrated, but isn’t released in our tool/database yet (has not be shipped in product)
- 4) Should be straightforward to do but we haven’t done it (not demonstrated or shipped in product)
- 5) Would require further research and development work to implement (we really don’t know what resources would be necessary to do this)
- 6) No, we do not plan to support this functionality (out of scope for our tool/database)
- 7) No response

The objective of providing the possible responses above is to try to avoid the answer of “Nobody has ever asked us to do that, but I’m pretty sure we could, so let’s answer yes”.

Possible responses to functionality questions (user’s perspective):

- 1) Have successfully used functionality (Used it)
- 2) Have tried to use but have not been successful (Tried it)
- 3) Know that the functionality exists but have not used it (Aware of it)
- 4) No reason to believe that it exists (Not aware of it)
- 5) Don’t care about or need this functionality (Don’t care or need)
- 6) Unknown

4. Accumulation of Responses

The relative importance of the various questions, i.e., some questions carry more importance than others. The following algorithm is used to generate a score for each question:

$$\text{Score} = 100 \frac{\sum_{i=1}^{\text{all included criteria}} (\text{Weight}_i)(\text{Value}_i)}{\sum_{i=1}^{\text{all included criteria}} (\text{Weight}_i)(\text{Maximum Value}_i)}$$

where,

Weight_i = relative weight assigned to question I (negative numbers are allowed)

Value_i = value of the answer to question i

Maximum Value_i = maximum value that the answer to question I could have.

Only questions that have predefined answers are scored (“fill in the blank” fields are not scored). The scoring is only performed over “included” criteria, i.e., “non-included” questions, which can be appear for informational purposes, can be excluded from the scoring.

5. Evaluation Criteria Spreadsheet Implementation

The evaluation criteria detailed in Section 2 have been implemented within a spreadsheet tool for use in:

- Evaluating and comparing various tools, databases, and services
- Performing evaluation from both user and developer perspectives

The Common Use Tools Committee (CUTC) of the DMSMS Working Group is currently using the spreadsheets to evaluate DMSMS tools, databases and services.

The developer and user versions of the evaluation spreadsheet can be obtained from the following URL:

http://www.enme.umd.edu/ESCML/DMSMS_Eval_Spreadsheet-Developer.zip

http://www.enme.umd.edu/ESCML/DMSMS_Eval_Spreadsheet-User.zip