

MANPRINT

U.S. ARMY MANPRINT PROGRAM

FALL / WINTER 2010

DIRECTOR'S CORNER

*Dr. Michael Drillings, Director,
MANPRINT*

Since the last Newsletter, we have held the MANPRINT Practitioners' Workshop. A link to the Workshop papers is on the MANPRINT web site. I deeply appreciate all the contributions that made the Workshop a success. First, my own staff of Dr. Beverly Knapp, Taylor Jones, Teresa Hanson, Janine Bourgault, and Connie Dancaster did a great job. Dr. Knapp supervised the technical issues and Ms. Hanson supervised the logistics of the meeting. The workshop was a great success. The papers were great, we recognized some outstanding work, and Al Shaffer, Principal Deputy Director, Defense Research and Engineering, gave a terrific talk that fully supports the MANPRINT mission. For me, the workshop also serves as a reminder of the great work that our community performs. If I were a Soldier or the parent of a Soldier, I would be pleased to

know that someone in the acquisition process is specifically designated to account for usability, safety, Soldier survivability, and health hazards. We all have to remember who our ultimate customer is—the Soldier. Every time I sign a MANPRINT Assessment, I think about the Soldiers who are going to be using that system and what is best for them.

In the last Newsletter, I discussed the new DoDI 5000.02 and its implications for MANPRINT. Congressional and high-level OSD concern about the effectiveness of the acquisition system continues. For the most part, many of the criticisms involve the length of time it takes to produce a system, the growth of requirements, the inclusion of immature technologies, and, because of these deficiencies, the growing cost of acquisition. The current budget crisis is also already affecting the acquisition world. We see more systems being cancelled before fielding and a greater tendency to go with improvements to legacy systems, rather than to fund com-

pletely new systems. The Vice Chief of Staff has also begun the Warfighting Portfolio reviews that take a holistic view of capabilities. This new approach, which has been cited positively by Secretary Gates, is already eliminating systems that provide redundant capabilities like Non-Line-of-Sight Launch System (NLOS-LS) short-range guided missile.

Let's consider how MANPRINT plays in these issues. Much of the MANPRINT process occurs in parallel to other development activities, so MANPRINT does not lengthen the acquisition process. Because MANPRINT is often able to identify usability and other problems early in the acquisition process, MANPRINT actually reduces costly redesign ef-



*Dr. Michael Drillings
Director for MANPRINT*

(Continued on page 3)

INSIDE THIS ISSUE

MANPRINT Information	2
Human Systems Integration-Assessment Tool (HSI-AT)	4
MANPRINT Assessment System	8
MANPRINT Training	10
Upcoming Events	10

Joint Perspective for the Joint HSI Display

The Joint Human Systems Integration (HSI) Display highlighted the contributions and potential of the human being considered early and integrated into warfighter systems across the Joint services. Over two days, the services, through the Joint HSI Working Group (JHSIWG), provided keen insight and a comprehensive perspective into the practical application of HSI in the Department of Defense Acquisition Life Cycle. The display at the Pentagon showcased the remarkable amount of

HSI technology, research, and development and its application to significantly impact our nation's warfighting systems in the field.

A few of the display highlights included: 1) the Army's application of the Improved Performance Research Integration Tool (IMPRINT) to model the dynamic nature of soldier and system performance, 2) the Navy's integration of HSI and system engineering practices

(Continued on page 3)

MANPRINT INFORMATION

ARTICLES, COMMENTS, AND SUGGESTIONS ARE WELCOMED AND MAY BE SUBMITTED TO THE MANPRINT CONTRACTOR:

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The MANPRINT Newsletter is an official bulletin of the Deputy Chief of Staff, G-1, Department of the Army. The Manpower and Personnel Integration (MANPRINT) Program (AR-602) is a comprehensive management and technical initiative to enhance human performance and reliability during weapons system and equipment design, development, and production. MANPRINT encompasses seven key domain: manpower, personnel, training, human factors engineering, system safety, health hazards, and soldier survivability. The focus of MANPRINT is to integrate technology, people and force structure to meet mission objectives under all environmental conditions at the lowest possible life-cycle cost. Information contained in this bulletin covers policies, procedures, and other items of interest concerning the MANPRINT Program. Statements and opinions expressed are not necessarily those of the Department of the Army. This bulletin is prepared twice yearly under contract for the MANPRINT Directorate, G-1, under the provisions of AR 25-30 as a functional bulletin.

DIRECTOR'S CORNER

(Continued from page 1)

forts and makes delays less likely. Moreover, MANPRINT helps to control the proliferation of requirements by so carefully considering the workload on crews. Of course, MANPRINT has also been shown to significantly reduce the life-cycle cost of new systems.

Joint Perspective for the Joint HSI Display

(Continued from page 1)

in the development of the High Speed Craft semi-active suspension seat and Littoral Combat Ship 30 mm gun control, and 3) the Air Force 711th Human Performance Wing's Remotely Operated Vehicle Adaptable Tracking/Training System (ROVATTS) providing a PC-based simulation capability with a reconfigurable architecture allowing for development of air-, ground-, or sea-based Unmanned Aerial Systems (UAS) simulations.

These demonstrations attracted several VIPs including a dozen flag and senior executive service officers, namely the Assistant Secretary of the Army for Acquisition, the Honorable Malcolm O'Neil; Assistant Secretary of the Army for Manpower and Reserve Affairs, the Honorable Thomas Lamont; Military Deputy, Assistant Secretary of the Air Force for Acquisition, Lieutenant General Mark Shackelford; Surgeon General of the Air Force, Lieutenant General C. Bruce Green; Associate Deputy Chief of Staff, Operations, Plans and Requirements, Mr. Harry Disbrow; Assistant Deputy Chief of Staff for Operations, Plans and Requirements, Major General Johnny Weida; Director, Navy Training and Education, Mr. Scott Lutterloh; Director, Army MANPRINT, Dr. Michael Drillings; and Deputy Director of Research and Engineering, Systems Engineering, and Mission Assurance, Mr. Nicholas Torelli. Each dignitary was provided the opportunity to receive in-depth briefs on the showcased material and subject matter, including "flying"

In the challenging times we now live in, everyone in the MANPRINT community has to be ready to tell the

"MANPRINT story." In recent years, with the institution of HSI programs in the other Services, an HSI proponent in OSD, and Congressional support, the value of

the Predator with recommended new symbology via the ROVATTS simulator.

The JHSIWG looks forward to continuing its participation in the annual Joint HSI Display. If you have any questions or would like information regarding the event, please contact the JHSIWG 2010 Chairman, Mr. Richard Etheridge at (703) 695-2421 or richard.etheridge@navy.mil.





Human Systems Integration-Assessment Tool (HSI-AT)

*Kathi MacLeod, 711th HPW/HPO
Brooks City-Base, TX*

INTRODUCTION

HSI issues have come to the forefront in all services. The HSI practitioners of each service evaluate weapon systems to ensure the integration of the following HSI domains: Manpower, Personnel, Training, Human Factors Engineering, Environment, Safety, Occupational Health, Habitability, and Survivability during systems acquisition. These “human-related” domains drive over 65% of the total ownership costs (TOC) of our weapons systems. Ideally, early application of HSI requirements leads to cost avoidance in terms of manpower, personnel, training, and human error. Currently, there is no well-defined, repeatable USAF HSI assessment methodology; no single HSI body of knowledge to aid in identifying HSI gaps, determine HSI risks, and perform trade-off analyses at various stages in the lifecycle; and no well-integrated tool that a practitioner can use that will provide all the features and capabilities desired in an HSI assessment tool.

VISION FOR THE 711TH HPW/HP HSI-AT

The 711th Human Performance Wing, Human Performance Directorate, Air Force Research Laboratory (AFRL), together with our contracting partner, is spearheading a four-year effort to develop an HSI Assessment Tool (also known as the “HSI-AT”) to assess USAF weapons systems in requirements, acquisition, and sustainment as a method to ensure all Air Force warfighting systems are designed, built, operated, and sustained in a manner that optimizes human performance at every warfighter level and at all stages of system maturity in the DoD System Life Cycle process. The

tool will run on an easy-to-use, interactive web/computer-based system and allow the HSI practitioner ready access to HSI information to conduct HSI assessments in an objective, quantifiable manner on a wide variety of weapons systems. It will enable the user to identify gaps; determine risks; help the user develop HSI and safety mitigation strategies; and overall, optimize Total System Performance while mitigating Total Ownership Costs of DoD weapons systems.

The HSI-AT will lead users through a process that rapidly and systematically identifies HSI domain considerations and assessments that will enhance operator, maintainer, and sustainer performance; operational safety, suitability, and effectiveness; usability and avoidance of occupational health hazards by identifying and then mitigating or eliminating most human causes of weapons systems incidents, mishaps, and accidents.

The HSI-AT will provide the USAF HSI Program with a tool for a well-defined, consistent, and repeatable HSI assessment process relative to a system’s life cycle. The HSI-AT will provide the framework for users conducting HSI assessments, and provide a body of knowledge and information to draw upon. This will encompass not only the effects of warfighter performance on overall system performance, but also the assessment of the effects of combat operations, training operations, and the operation of the system upon the operator, maintainer, and sustainer.

The goal is for a capability that will enable effective and comprehensive system level, systems-of-systems (SoS), and family-of-systems (FoS) assessment in an objective, quantifiable manner. User-levels of the mature HSI-AT

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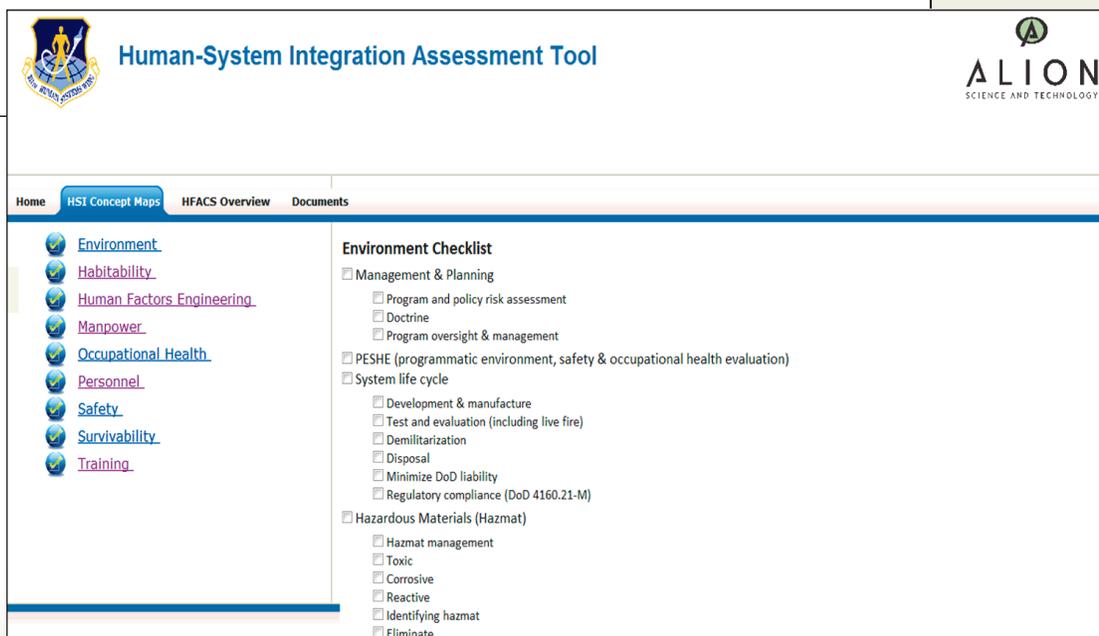
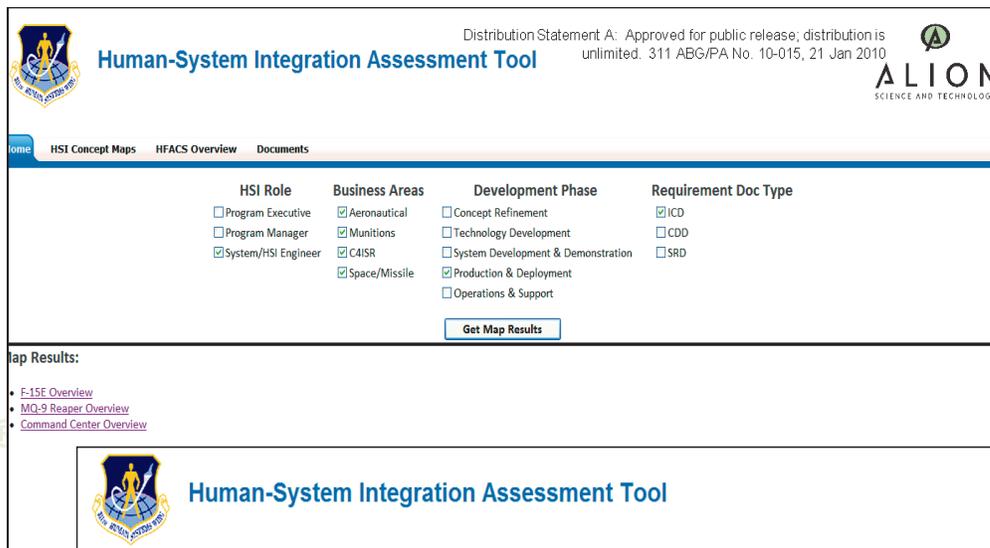
Human Systems Integration-Assessment Tool (HSI-AT) (Continued from page 4)

are identified as: (1) **Executive** (identified as the Milestone Decision Authority, Air Staff HSI Office, and User Commands) mainly in the form of reports; (2) **Management** (identified as the Program Manager, System Program Office, Performance Enhancement Directorate, User Commands on fielded systems) mainly in the form of gap and risk assessments and mitigation option documentation; and (3) **Technical** (identified as the Domain experts, users of fielded systems, HSI subject matter experts, system engineers). We see these being the primary operator/practitioner, each representing different levels of detail or program oversight as influenced by the acquisition category (ACAT) program level involved.

FEATURES AND CAPABILITIES OF THE HSI-AT

The mature HSI-AT will ultimately provide the following functions:

- Provide a user-friendly interface that will guide any practitioner, manager, or executive, (regardless of level of experience), through a user-tailored process to perform appropriate HSI assessment, analysis, and reporting goals
- List activities and functions at the appropriate user level and life cycle node
- Provide entry and exit criteria for each HSI phase at appropriate activity level
- Aid in performing appropriate user level assessments, checklists, and scorecard reports
- Provide a data repository for reports, documents, checklists, scorecards, and other data compatible with the MindManager file format
- Perform capability gap and risk assessments and tradeoff analyses, generate reports, and aid in the analysis of alternatives (AoA)



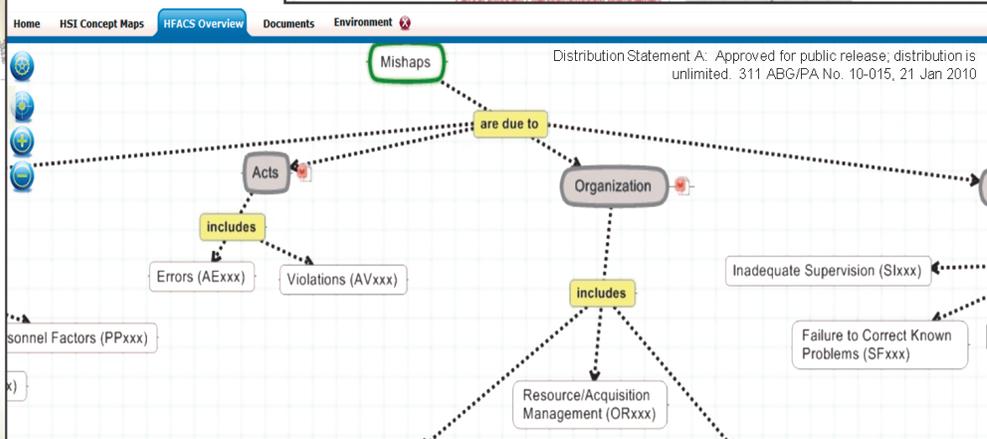
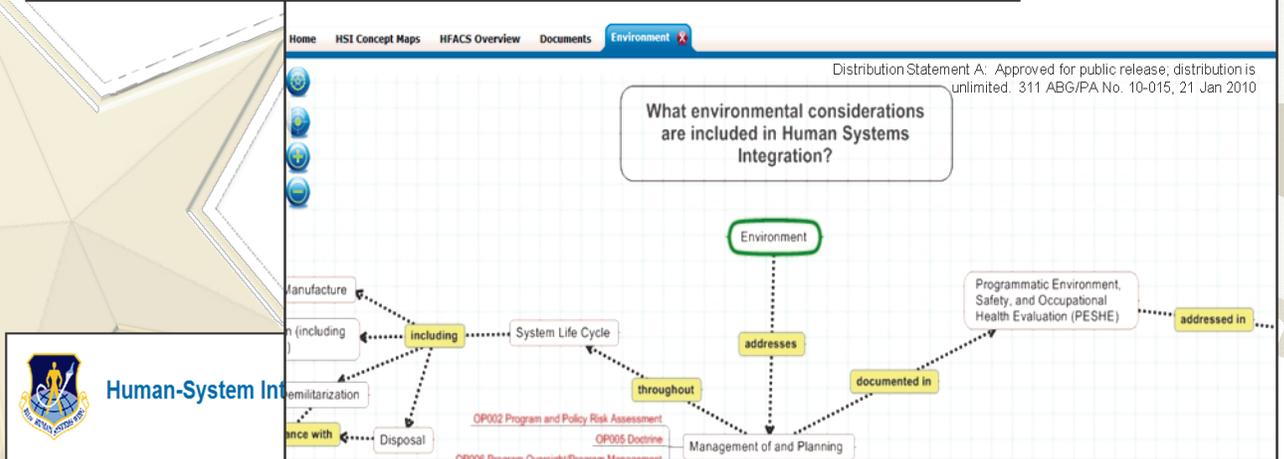
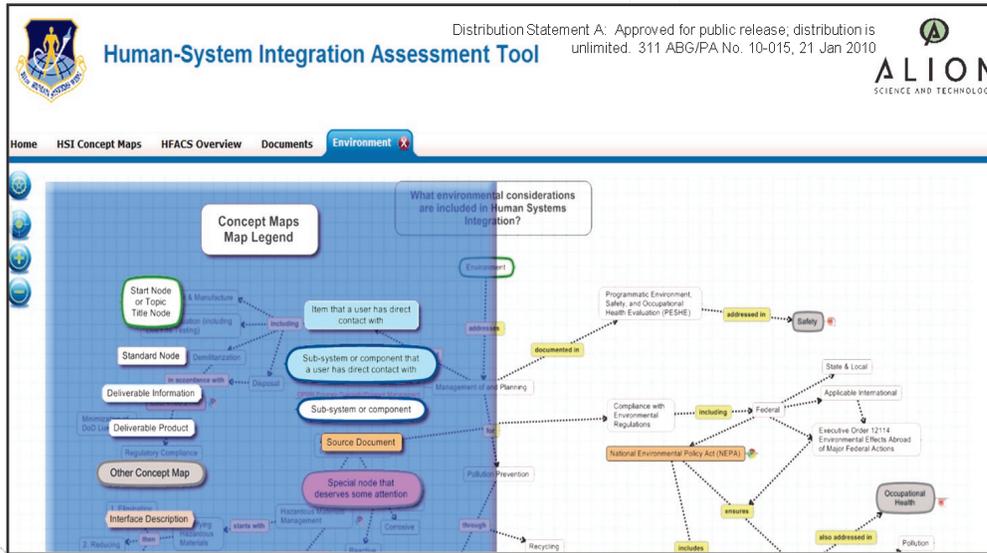
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Human Systems Integration-Assessment Tool (HSI-AT) (Continued from page 6)

- Guide, recommend, and provide access to HSI assessment tools at the appropriate user level
- Based on analytically determined HSI gaps, derive and specify tailored mitigation alternatives and options consistent with both life cycle stage and system/subsystem type

- Store the HSI body of knowledge to prevent loss of information, and duplication of information and efforts
- Provide the ability to be updated by HSI practitioners to improve the tool (open architecture)
- Provide Configuration Management functions for project documentation:
 - ◊ Internal to the HSI-AT for information input, produced, or stored in HSI-AT
 - ◊ External to the HSI-AT for revision control (spirals) on HSI-AT software development



(Continued on page 7)

Human Systems Integration-Assessment Tool (HSI-AT) (Continued from page 6)

CURRENT EFFORT

We are currently in Phase II of the development phase of the HSI-AT. During the Phase I effort, concept map representations of three USAF weapons systems (F-15E Strike Eagle; MQ-9 Reaper; and the Global Operations Center (GOC)) and all nine HSI domains were generated and linked to tailored HSI tools and processes. The concept maps provide a graphical representation of information sources and issues for a domain expert to consider when conducting an HSI assessment. The domain concept maps have also been linked to the DoD Human Factors Analysis and Classification System (DoD HFACS) nanocodes that allows the practitioner to consider possible accident mishap hazards during the assessment process.

The first version of the HSI-AT prototype is currently being refined and runs on Microsoft Silverlight, which is already part of the DoD’s MS suite of software. The prototype will eventually be uploaded to the AF HSI Community of Practice (CoP) website to enable us to receive feedback from users and HSI practitioners across all Services that will be incorporated in successive evolutionary developments.

For additional HSI information, please visit the 711th HSI website at: <http://www.wpafb.af.mil/afrl/711hpw/hpi.asp>.

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MANPRINT Assessment System

David B. Doane

Introduction

I would like to use a corner of the newsletter to provide a recurring update on the MANPRINT Assessment System (MAS). During the March MANPRINT Practitioners' Workshop, I gave a talk on Value-Focused Thinking (VFT) for application to MANPRINT¹ (see figure 1).

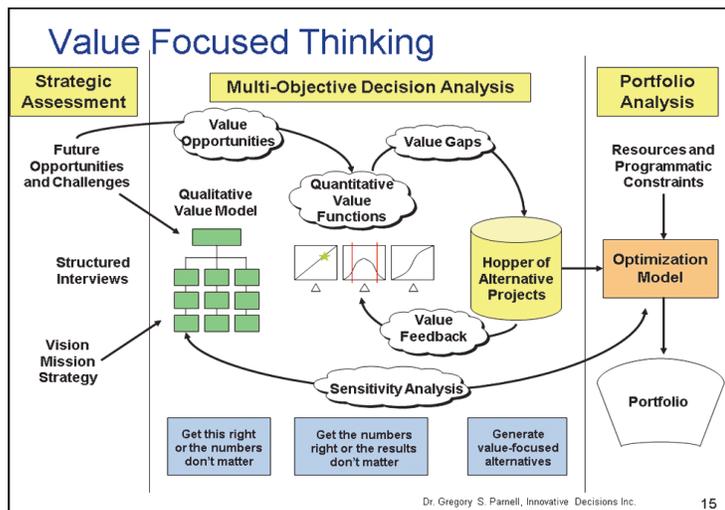


Figure 1. An overview of the Value-Focused Thinking approach to strategic management.

I also led two small group discussions. One was a Cause & Effect (C&E) workshop with an initial summary given in the plenary session². The other small group was a Metrics workshop where we discussed what we need to measure and how the data will be collected. After the conference, I conducted follow-on surveys with the C&E group to learn more about what Practitioners see as the big issues MANPRINT is facing and launched a third small group session on following the funding from Congress to the fielded system. All of this activity supports an overarching objective: implementing the MAS.

We are continuing to build and implement the MAS. The MAS draws performance data from the MANPRINT Enterprise Tracker Analyzer (META) to feed two tools: a set of nested Process Flow Charts (PFCs) and a Qualitative Value Model (QVM). Through these PFCs, the MAS describes the current or “as-is” *efficiency* of ongoing processes. Looking at measures of process cycle efficiency can help us find road-

blocks or friction points. Through the QVM, the MAS will describe the *effectiveness* of the enterprise compared to a desired or “to-be” end-state. Looking at a weighted sum system score via the QVM can provide a way to think about which set of improvements will have the most beneficial impact.

The MAS provides the MANPRINT senior leadership a means to do three important things: (a) strategic intent and expected results to both internal and external audiences; (b) score process results at any given time and analyze trends by comparing scores taken at periodic intervals (monthly); and (c) orchestrate a process improvement campaign, selecting projects and managing project portfolios based on their expected system impacts.

As mentioned, the MAS uses data from the META, a knowledge management system that is being built separately. The MAS converts performance data for two core processes into process cycle efficiency scores on the nested PFCs. The MAS also converts performance data for 27 indicators to scores and trends, and calculates a weighted sum system score on the QVM scoreboard. Since the MAS, a dynamic system model, is built in Excel, the analyst can scan all the friction points, find the system constraint, and use that information to develop targeted process improvement projects. The analyst can also manage a portfolio of projects by forecasting the expected impact of different groups of projects on the system score.

Traditional problem-solving techniques are alternative focused, that is, analysts and decision makers react to problems after they arise by developing alternative solutions and evaluating them against selection criteria. In fact, this alternative-focused approach is taught in the Lean Six Sigma (L6s) literature as the way to select L6s projects. However, the MAS introduces what Keeney (1992) calls VFT³ into the decision scenario. VFT uses structured interviews with the senior leaders to build quantitative value functions which illustrate the senior leaders' values and convert performance data to a score in the QVM (see figure 2). A QVM enables the analyst to proactively seek out senior leader values-driven problems to solve. Representing the whole MANPRINT enterprise as a dynamic system enables the analyst to test the effects of pro-

(Continued on page 9)

MANPRINT Assessment System

(Continued from page 8)

posed process improvement projects and portfolios of projects.

This assessment system is a unique combination of two tried-and-true disciplines with robust methods that have not been combined before: L6s’s process improvement techniques and VFT’s quantitative value functions. The system is being applied to MANPRINT but it could be applied to many other value-driven, as opposed to alternative-driven, applications, including personal growth and development, investment portfolios, recidivism and court reform, the Global Peace Index, and winning in Afghanistan. The MAS is particularly useful in collaborative decision situations with high stakes, lots of uncertainty, and a desire for being proactive and transparent.

In a nutshell, the assessment system is performance data that is: arrayed over time; measured at regular intervals (monthly); scored (i.e., translated to a 100-point scale); analyzed for strengths, weaknesses, and trends; and modeled to forecast the expected benefit of proposed process improvement initiatives. Future articles will focus on an overview of the components of an assessment system, how to create and maintain an assessment system, and how to use an assessment system to measure the success of an organization.

Watch this corner for more MAS updates in the coming months. In the meantime, send any questions or comments to dave.doane@us.army.mil.

¹See slides at http://www.manprint.army.mil/documents/2010/Dave_Doane_1.pdf

²See slides at http://www.manprint.army.mil/documents/2010/Manprint_Cause_and_Effect_Workshop_ver2.2.pdf

³Keeney, R. L. (1992). Value-focused thinking: A path to creative decisionmaking. Cambridge, MA: Harvard University Press.

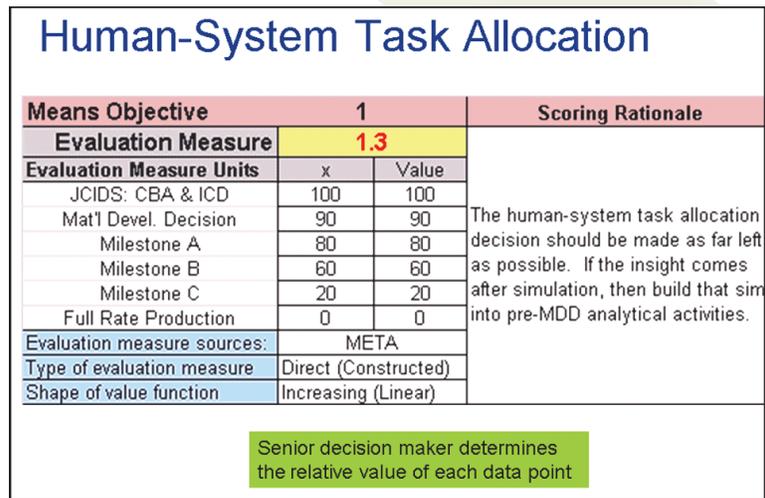


Figure 2. An example of a quantitative value function used to convert performance data to a score.

MANPRINT APPLICATIONS COURSE

Class	Start Date	End Date	Deadline	Location	POC
2011-701	19 Oct 2010	21 Oct 2010	03 Sep 2010	Fort Leonard Wood, MO	Pat Wilson COM (804) 765-4373, DSN 539-4373
2011-702	16 Nov 2010	18 Nov 2010	01 Oct 2010	Fort Bliss, TX	Pat Wilson COM (804) 765-4373, DSN 539-4373
2011-703	07 Dec 2010	09 Dec 2010	22 Oct 2010	Aberdeen Proving, MD	Pat Wilson COM (804) 765-4373, DSN 539-4373

MANPRINT FAMILIARIZATION COURSE

Date	Time	Location	POC
Oct 12	9:30-12:00	Huntsville, AL	Kelly Hopkins, Alion Science & Technology khopkins@alionscience.com
Nov 16	9:30-12:00	Huntsville, AL	Kelly Hopkins, Alion Science & Technology khopkins@alionscience.com
Dec 07	9:30-12:00	Huntsville, AL	Kelly Hopkins, Alion Science & Technology khopkins@alionscience.com

UPCOMING EVENTS

AUSA Annual Meeting & Exposition

25-27 October 2010

Washington, DC

www.ausa.org

13th Annual Systems Engineering Conference

25-28 October 2010

San Diego, CA

www.ndia.org

AUSA Winter Symposium & Exposition

23-25 February 2011

Fort Lauderdale, FL

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Army Aviation Association of America Annual Convention

17-20 April 2011

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