

# Achieving Desired Results

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Human Performance Technology: A  
Discipline to Improve C2 Concept  
Development and Analysis

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# Briefing Objectives

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- Define Human Performance Technology (HPT)
- Introduce HPT models and theories
- Describe current NATO HPT methodical C2 research project (HFM 156).

# Human Performance Technology...

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... a systematic and systemic set of methods and processes for solving problems -- or realizing opportunities, related to the performance of people... individuals, small groups, or large organizations.

([www.ispi.org](http://www.ispi.org))

HPT can be an enabler for C2 Analysis

# Human Performance Technology...

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... Valued results

... Produced by people

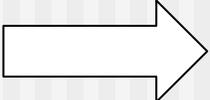
... Working in a system.

■ Technology?

# Technology – a definition

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- **1** : the application of scientific knowledge to practical purposes : applied science

Technology  Scientific Technique

HPT has roots in scientific management, behavioral sciences, systems design, instructional design, cognitive engineering, psychometrics, and other disciplines

# Hallmarks of HPT

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- Focus on Results not Means
- Determine Performance Gap
- Identify Causes not Symptoms
- Identify efficient interventions / solutions while maintaining systemic / holistic awareness
- Evaluate results of implementation

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Let's see what Human  
Performance Technology has  
in common with Command  
and Control Analysis

# HPT Standards of Performance – A C2 Analyst Can Appreciate Them

([www.ispi.org](http://www.ispi.org))

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1. Focus on outcomes and results.
2. Take a systems view.
3. Add value.
4. Collaboration.
5. Systematic needs analysis.
6. Systematic cause analysis.
7. Design systematic Interventions.
8. Develop systematic solutions.
9. Implement and manage change.
10. Evaluate.

# Harless' Front End Analysis Progression – A C2 Analyst can appreciate this

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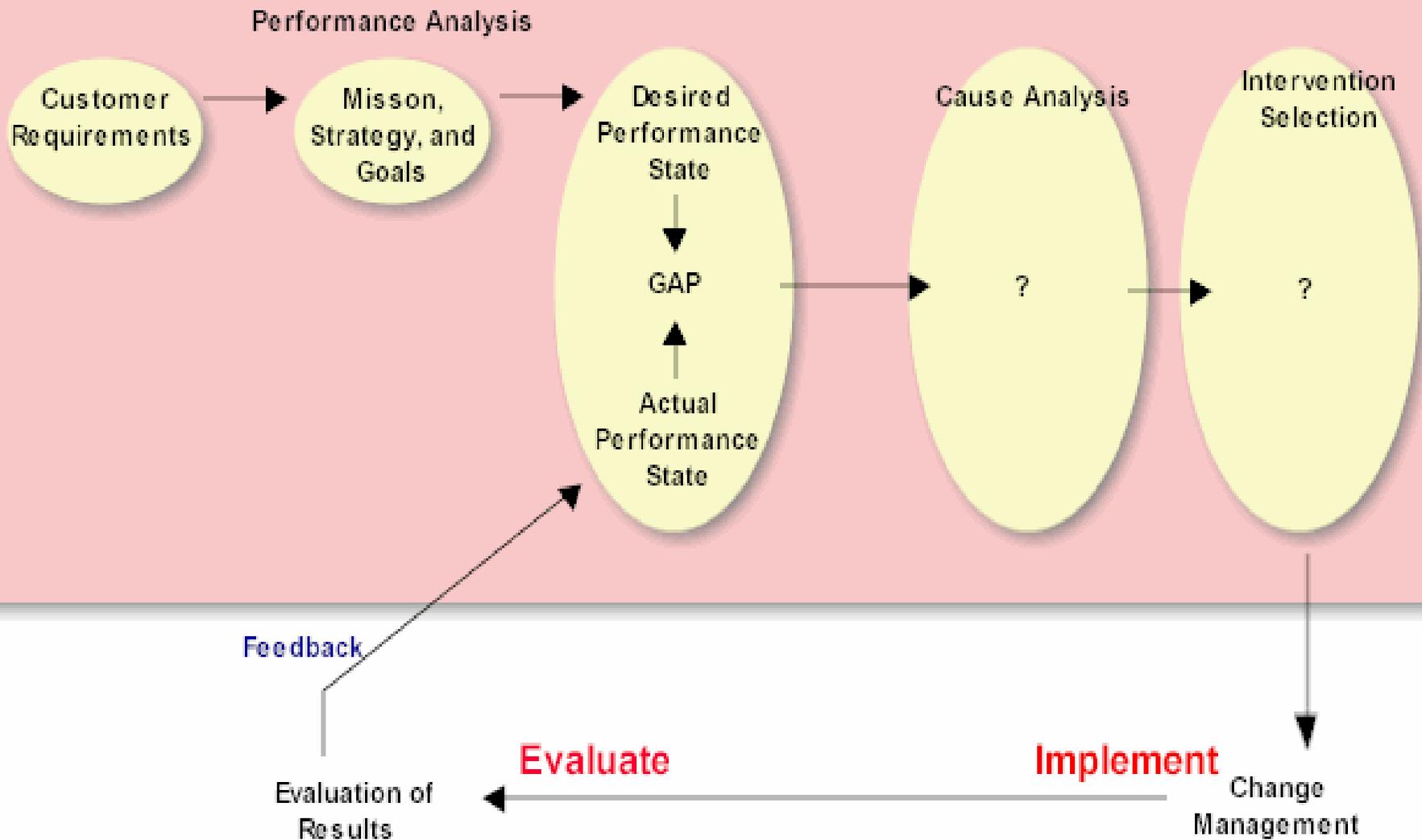
1. Do we have a problem?
2. Do we have a performance problem?
3. How we will know when the problem is solved?
4. What is the performance problem?
5. Should we allocate resources to solve it?
6. What are the possible causes of the problem?
7. What evidence bears on each possibility.

# Harless' Front End Analysis con't

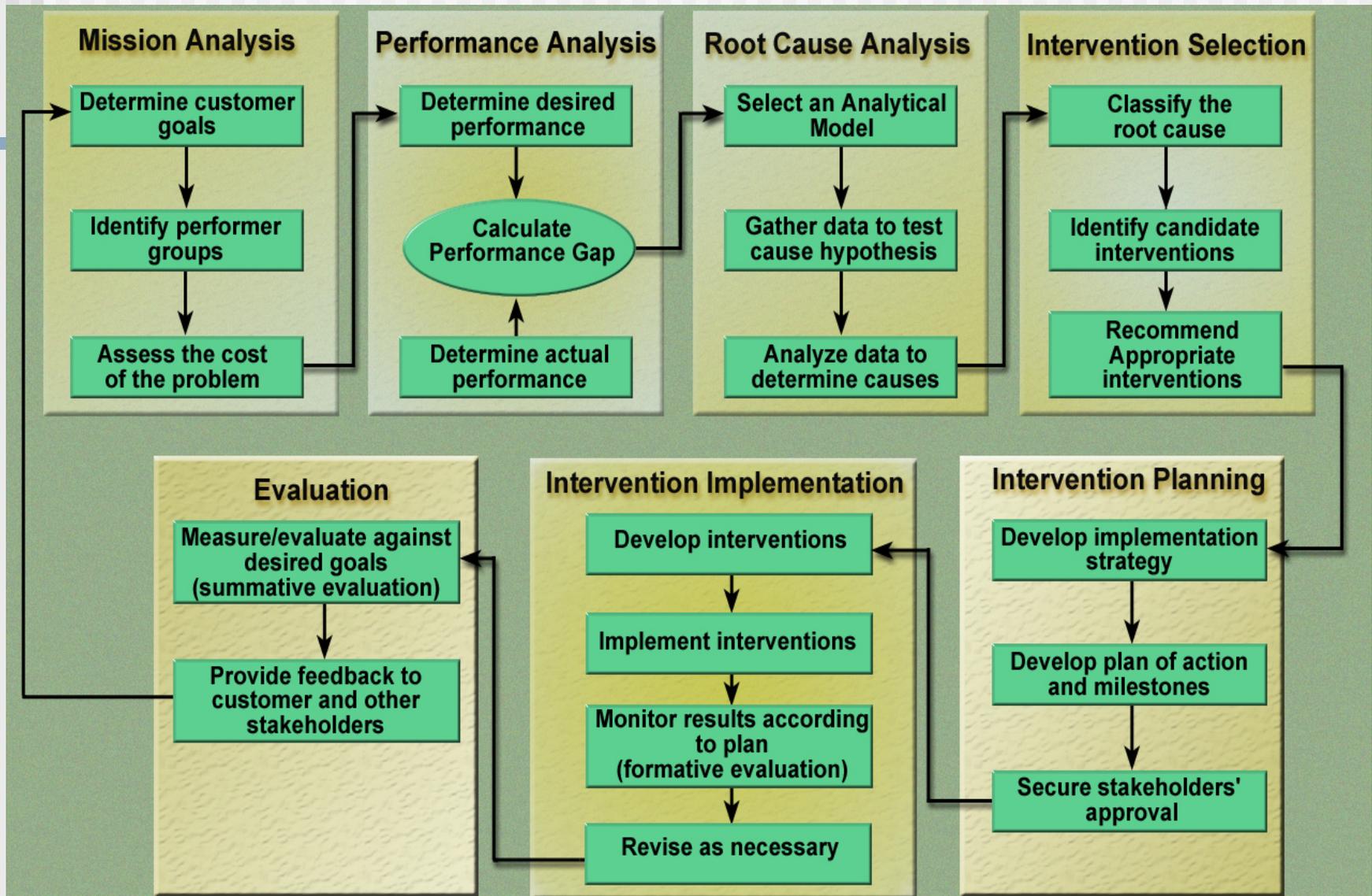
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8. What is the probable cause?
9. What general solution type is indicated?
10. What are the alternate subclasses of solution?
11. What are the costs, effects, and development times of each solution?
12. What are the constraints?
13. What are the overall goals

# HPT Model



# ASTD Human Performance Improvement Process

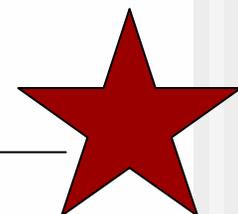


# The Means and the End

## The Means

-- what you'll use and do

(systemic and systematic processes)



The process of selection, analysis, design, development, implementation, and evaluation

of programs to most cost-effectively influence human behavior and accomplishment

## The End

-- what you'll get

(organizational results)

# HPT

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- “...open to all means, methods, and media”
  - flexible, not dogmatic.
  - practice is systematic
  - methods address root causes
  - practitioners use various interventions that fit best for the situation

# Gilbert's Behavior Engineering Model (BEM)

	Information	Instrumentation	Motivation
<b>E:</b> <b>Environmental Supports</b>	1. <b><u>Data:</u></b> Provide clearly defined roles and clear expectations of performance outcomes	2. <b><u>Instruments:</u></b> Provide effective tools and equipment.	3. <b><u>Incentives:</u></b> Provide recognition / rewards for good performance
<b>P:</b> <b>Person's Repertory of Behavior</b>	4. <b><u>Knowledge:</u></b> Provide systemically designed training programs	5. <b><u>Capacity:</u></b> Give appropriate amount of work at a time	6. <b><u>Motives:</u></b> Job diagnosis – good fits. Provide challenging work.

# An HPT / C2 Analysis Initiative

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NATO HFM-156:

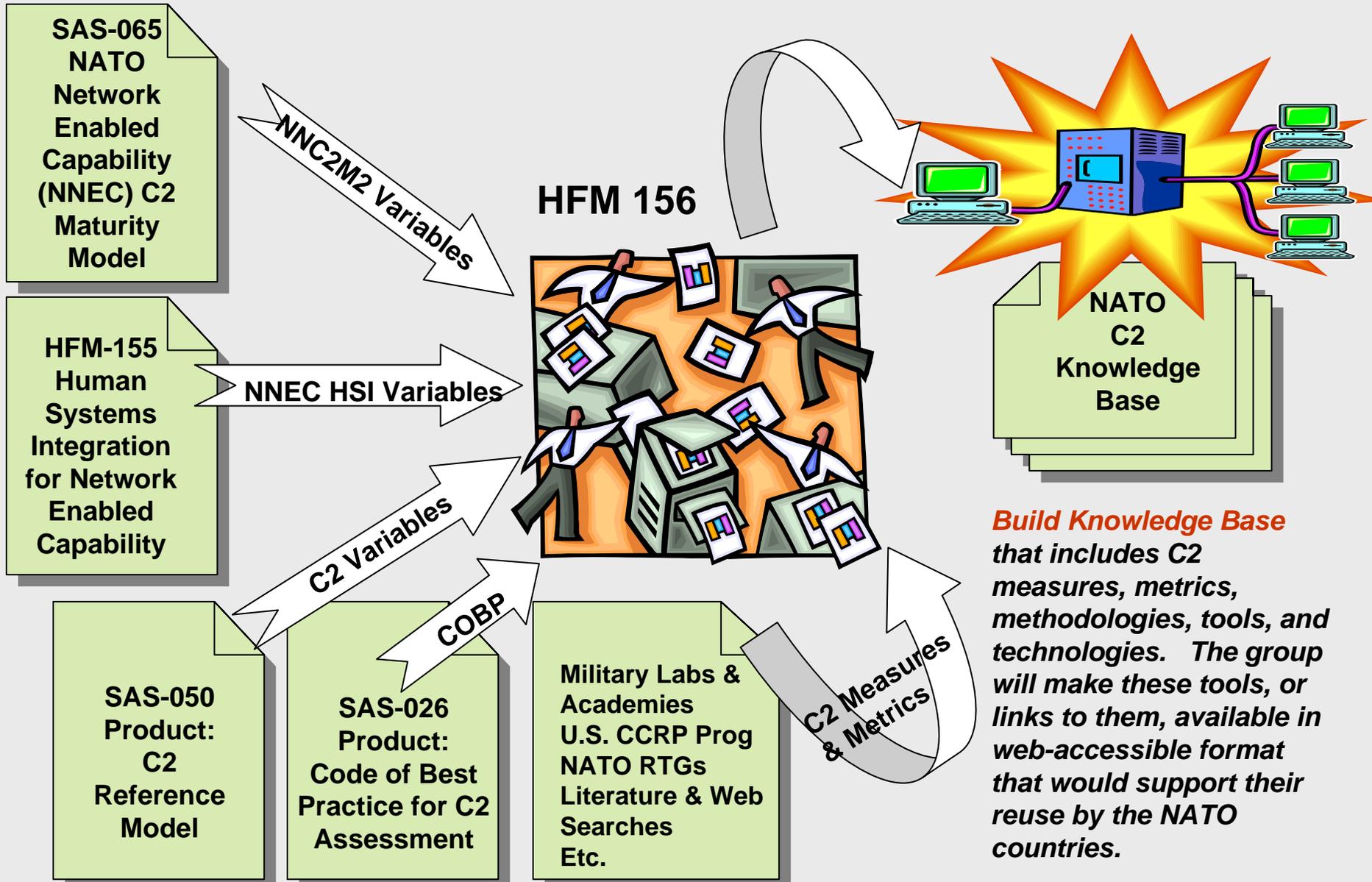
“Measuring and Analyzing  
Command and Control  
Performance Effectiveness”

# HPT / C2 Analysis Initiative

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- NATO Human Factor and Medicine Panel 156 was initiated in Oct 2006 to research “Measuring and Analyzing C2 Performance Effectiveness”.
- HFM-156 is an initiative to introduce HPT to NATO processes.
  - ❖ *The systematic performance improvement approach can provide NATO with a means of determining root causes for performance issues affecting readiness, and with a means of effectively resolving them.*

# HFM 156: *Measuring and Analyzing Command and Control Performance Effectiveness*



**Build Knowledge Base** that includes C2 measures, metrics, methodologies, tools, and technologies. The group will make these tools, or links to them, available in web-accessible format that would support their reuse by the NATO countries.

# Use Case: U.S. Navy Combat Information Center Watchstation Assessments

**\*\* NATO Knowledge Base would reflect metrics used so that future efforts conducting similar assessments could leverage them \*\***

	Measures	Instruments	Methods	Technologies
<b>Sense-making</b>	Accuracy Timeliness (Reaction Time)		<u>Intrusive</u> : Situational Awareness Global Assessment Technique (SAGAT) (Real-time probes) <u>Non-Intrusive</u> : Real-time probes (calls for situation updates) built directly into scenarios	
<b>Decision-Making &amp; Mission Outcome</b>	Accuracy, Timeliness (Reaction Time) Critical Thinking Scales	ATPI (Air Warfare Team Performance Index)	Event-Based Approach to Training (EBAT)	ShipMATE, with evaluators linked by NetMeeting (includes timestamping)
<b>Teamwork</b>	Teamwork Scales	ATOM (Air Warfare Team Observation Measure)	Team Dimensional Training After-Action-Review Techniques	ShipMATE
<b>Workload</b>	Physical, Mental, Temporal Workload Scales	NASA Task Load Index (TLX)		

# HFM 156: *Measuring and Analyzing Command and Control Performance Effectiveness*

## Evolving Concepts / Future C2 Needs:

**NNEC & “Power to the Edge”**

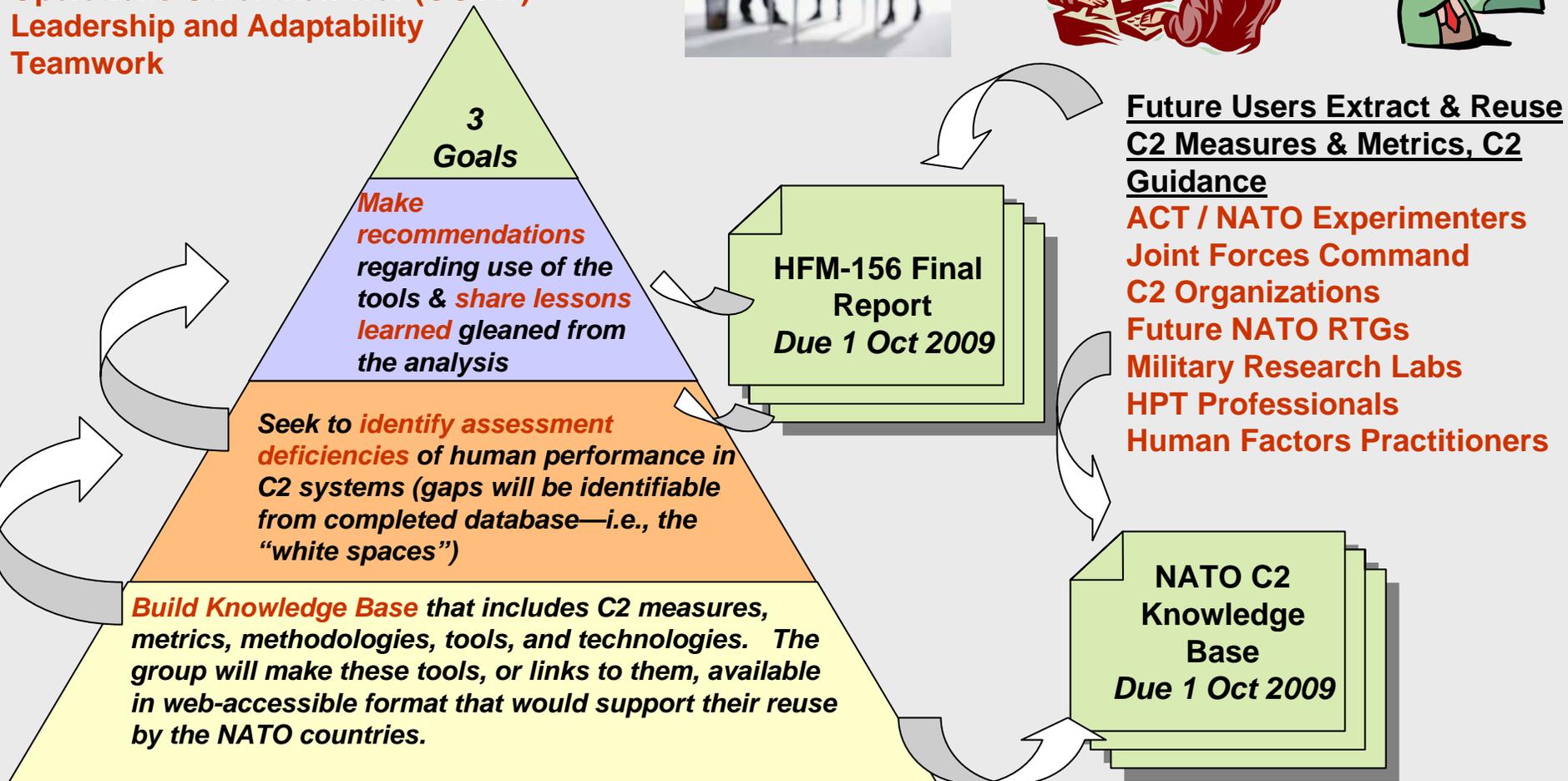
**Cultural effects upon C2**

**Extended wars against borderless enemies**

**Operations Other than War (OOTW)**

**Leadership and Adaptability**

**Teamwork**



# HFM 156: *Measuring and Analyzing Command and Control Performance Effectiveness*



## HFM 156

Oct 1, 2006 – Oct 1, 2009

10 meetings proposed  
2 meetings to date

- Mtg. 1 – Paris, Nov 2006
- Mtg. 2 – Venice, Mar 2007
- Next Mtg. – Boston, Jun 2007

***\*\*HFM-156 needs membership from as many countries as possible to build a more complete knowledge base of C2 measures.\*\****

## Tasks:

**Task 1:** Prepare for Success / Formulate the Problem

**Task 2:** Develop the NATO C2 Assessment / Taxonomy Knowledge Base and post in web-based format accessible to participating NATO nations.

**Task 3:** Evaluate the usability and utility of the Knowledge Base and refine as needed.

**Task 4:** Conduct analysis to identify current gaps in C2 assessment and to establish priorities for C2 special interest areas, as identified in HFM 156 ToR.

**Task 5:** Provide for Peer Review, using appropriate RTO forum(s) (symposium, specialists' meeting and / or workshop).

**Task 6:** Provisional upon receiving the Cooperative Demonstration of Technology (CDT) label from the NATO Research & Technology Board (RTB), conduct CDT in conjunction with NATO Allied Command Transformation (ACT).

**Task 7:** Integrate, synthesize, and draw conclusions from data collected in Tasks 3 - 6.

**Task 8:** Produce and Disseminate a Final Report that includes recommendations and lessons learned.

# Use Case: Joint Forces Command (Proposed CDT-Cooperative Demonstration of Technology)

- Provide HFM-156 C2 Knowledge Base to exercise planners
- Planners use Knowledge Base and embedded C2 Model variables to extract measures, metrics, methodologies, or technologies that would apply to upcoming exercise
- Planners implement those tools in exercise
- Planners provide feedback regarding utility, benefits, lessons learned, new measures and metrics to be added, improvements needed, etc.



# Embodiment of HPT Methodologies and Principles within HFM-156

- HFM-156 efforts are analogous to (or perhaps a special instantiation of) Harless' FEA methodology and/or the organizational or mission analysis phase of the HPT model.
  - ❖ *The C2 Reference Model utilized by HFM-156 provides those variables important to the Customer (NATO / DoD). By identifying where gaps exist in terms of measures / metrics / tools to support those variables, the group is identifying a "performance problem" (i.e., lack of assessment capability) for which costs (monetary or otherwise) could be assessed for the Customer.*
- BEM is built into HFM-156's Knowledge Base, in that for each measure identified, the group is trying to indicate which root cause(s) the measure may be capable of diagnosing.
- The analysis is by nature systematic and designed to bring efficiencies to the process of C2 assessment—by enabling reuse of measures, metrics, and tools, and by bringing more standardization and consistency to the measurement process.
- Having readily identifiable measures and technologies associated with specific dependent variables of interest should facilitate future experimentation with C2 concepts.



# Embodiment of HPT Methodologies and Principles within HFM-156

- Measurement is critical to many phases within the Human Performance Improvement process (especially Performance Analysis and Evaluation), and the products to be produced by HFM-156 will support those critical components. They will enable base-lining of performance and comparisons to those baselines.
- By illuminating measurement deficiencies and gaps in the area of C2 assessment, the HFM-156 products may influence future efforts to remedy those deficiencies.
- By identifying measures and metrics that reveal root cause deficiencies, HPT practitioners can be more effective in selecting interventions to improve performance.

***\*\*In short, having the best tools in the HPT practitioner's toolbox, and the systematic application of those tools, is key to success in maximizing human performance, whether their application is in the C2 arena or elsewhere. \*\****



# Benefits

- Will help NATO and Joint Forces understand current assessment capabilities in **evolving C2 areas** important for future mission accomplishment
  - Will identify where C2 measures, metrics, methods, and technologies are lacking and need to be developed
  - Will support building a roadmap to coordinate efforts to fill the gaps (e.g., NATO RTGs, military academic institutions, & labs can research and solve)
- Improved **process efficiency and cost savings**, due to reuse and standardization
- Better measures = **more valid assessment results** (and thus, better decision making based upon those results)
- Will **bridge gap from theory** (NATO C2 Reference Model) and guidance (NATO Code of Best Practice for C2 Assessment) **to practice** (via application of HFM-156 C2 Knowledge Base)
- Will **lay groundwork** for future NATO studies or human performance improvement projects to increase C2 effectiveness of NATO forces

**\*\*Most importantly, improved assessment capabilities lead to improved performance and mission readiness\*\***

# Summary

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- HPT Compliments C2 Analysis
- Integrating HPT and C2 Analysis adds value
- Developing HPT competencies within military / civilian analysts corps adds value

# HPT Resources

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- International Society for Performance Improvement, [www.ispi.org](http://www.ispi.org)
- U.S. Navy Human Performance Center, [www.hpc.navy.mil](http://www.hpc.navy.mil)
- University Programs
  - Boise State University, <http://ipt.boisestate.edu>
  - Florida State University, <http://www.cpt.fsu.edu/>
  - Indiana University, <http://education.indiana.edu/>
  - University of Southern California, <http://cogtech.usc.edu/>
  - Old Dominion University, <http://www.odu.edu>

# Human Performance Technology

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Questions?

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