Predictive model to assess personnel readiness

Abstract — Readiness within military organizations and civil defence forces is typically assessed through elaborate exercises that mimic various real-life scenarios. Evaluators assess the performance of each individual and unit to identify deficiencies and venues for improvement. Needless to say, large scale collaborative exercises are personnel and resource intensive; success or lack-of can only be assessed at the end of the event; and the risk of shortfalls increase with diversity – i.e., activities that require collaboration among military forces and first responders from multiple nations. A predictive model will be presented for maximizing the impact, efficiency and success of military, civil defence and collaborative training exercises by aligning missions/goals and operational requirements to equipment and personnel to identify deficiencies, knowledge/skill gaps and actions that would increase the chances of success.

1 Key Takeaways

Analysis is key to readiness and mission success. Knowledge and skill deficiencies as well as other factors that can prevent individuals from performing tasks to the desired standard in realistic training scenarios involving military and first responders' personnel from multiple nations can be identified through a predictive model during the planning phase along with actions that would increase missions/goals chances of success.

2 Introduction

The US Department of Defense defines Operational Readiness as the capability of a unit/formation, ship, weapon system, or equipment to perform the missions or functions for which it is organized or designed. The US Army maintains readiness by balancing the following six fundamental imperatives: Quality of People, Doctrine, Equipment, Force Mix, Training and Leadership Development.

Fig. 1. US Department of Defense Balancing the Imperatives

Although conducting realistic training scenarios is a top priority among military and civil defence professionals, there are multiple challenges with current practices. These include: (a) difficulty in assessing the effectiveness of learning especially when dealing with soft skills such as decision making, innovation, leadership, collaboration, etc.; and (b) the success or lack-of can only be assessed at the end of the event. In other words, opportunities for improvements are inherently limited in collaborative exercises that are personnel and resource intensive

3 Approach

To overcome current shortcomings, a predictive model is presented to improve units/formations chances of success. The model is based on the premise that readiness and successful execution of missions and goals is predicated on supplying the right mix of skilled, operation ready individuals with the prerequisite equipment to achieve goals.

The right mix of skilled, operation ready individuals as well as equipment needed to achieve missions/goals (i.e., baseline) can be identified by uncovering tasks needed to perform each mission/goal; equipment needed to perform each task; jobs required to perform those tasks; and knowledge/skills/competencies needed by each job to perform tasks to the desired standard under the prescribed conditions.

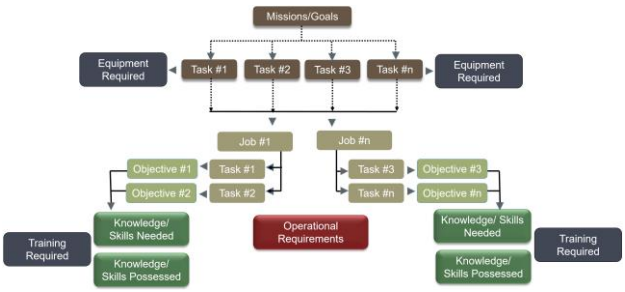

Fig. 2. Identifying the Right Mix of Individuals & Equipment

These types of analyses are typically conducted in the planning phase using Training Systems Requirements Analysis (TSRA), Training Needs Analysis (TNA), and/or Manpower, Personnel & Training Analysis (MPT) to uncover individual and collective training requirements.

Adequacy of proposed equipment and personnel mix for a training scenario/exercise is assessed by comparing them to baseline requirements to identify shortfalls. Moreover, the qualifications of proposed personnel is assessed by mapping operational requirements (i.e., knowledge/skills/ competencies needed by each job/role) to those possessed. Competencies possessed by each job/role is determined from training courses/activities undertaken.

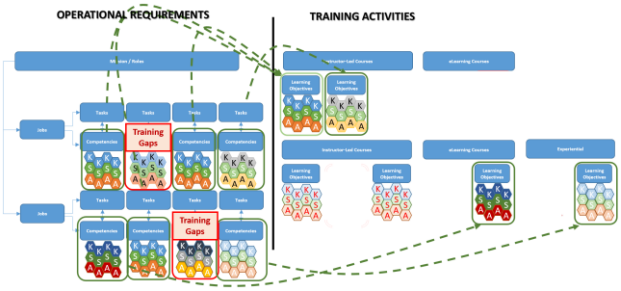

Fig. 3. Assessing Personnel Readiness

Next, data is compiled to identify knowledge, skills and competencies gaps for each job/role; and presented in a bar chart to indicate the % of required knowledge, skills, and competencies that each job/role lacks. In other words, areas of greatest concern.

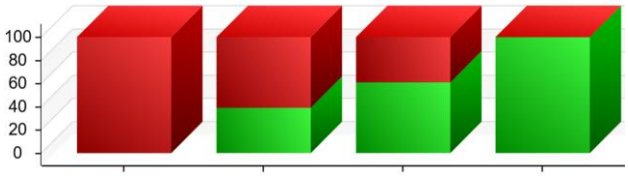

Fig. 4. Knowledge/Skill/Competencies Gaps

The impact of each knowledge, skill and competency gap on job/role ability to perform tasks and sub tasks to the desired standards under the prescribed conditions is then assessed.

Task	Sub Task	Knowledge/ Skills	Learning Objective
Maintain the Leo 2 A4 CAN MBT and ancillary equipment.	Identify Leo 2 A4 CAN exterior components.	Safety points related to exterior components.	Describe safety concerns
		Description, characteristics and performance of the Leo 2 A4 CAN MBT.	Description, characteristics and performance of the Leo 2
		Back deck lifting device bracket.	Back deck lifting device bracket.
		Back deck lifting device lower mount with hopper bin.	Back deck lifting device lower mount with hopper bin.
		Cooling air intake grills.	Cooling air intake grills.
		Tow cable mounting brackets.	Tow cable mounting brackets.
		Various mounting bracket for pioneer tools, large track tools, and fuel transfer hose.	Gap: KSAs not addressed by a specific
		Description, servicing and storage of tools.	Describe servicing and storage of tools
	Maintain the lubrication system.	Lubrication system description and components.	Describe lubrication system and components.
	Operate the heater and coolant system.	Heater and coolant ancillary equipment operation.	Gap: KSAs not addressed by a specific
		Heater and coolant system maintenance.	Describe heater and coolant system maintenance requirements.
		Operating the heating system.	Operate the heating system to include, starting and switching off the heater.
	Maintain the fuel system.	Safety points related to fuel system.	Describe safety considerations to fuel system.
		Fuel system components.	Outline fuel system components.
		Fighting compartment.	Describe fighting compartment.
		Hull underside: fuel drain access cover.	Describe the underside of the hull and how to access fuel drain cover.
		Driver compartment.	Describe driver compartment.
		Perform refuelling procedures.	Perform refuelling procedures.
		Fuel system maintenance.	Maintain fuel system.
	Maintain the electrical system.	Safety points related to electrical system.	Gap: KSA not addressed by a specific LO.
		Electrical system components.	Describe the electrical system components.

Fig. 5. Impact of Gaps on Tasks

Similarly, impact of shortfalls in equipment and personnel on the ability to perform tasks and sub tasks is also assessed.

Next, the combined impact of all factors on unit/formation ability to adequately perform missions/goals is forecasted using a performance analysis model [1-4]. The model assesses the potential impact of each performance gap by each job/role on each task, and the collective impact of inadequately performing various task combinations on the successful completion of missions/goals. In addition to identifying issues that could prevent unit/formation from adequately performing tasks needed to achieve goals, the model identifies and prioritizes actions (interventions) that would increase unit/formation chances of success.

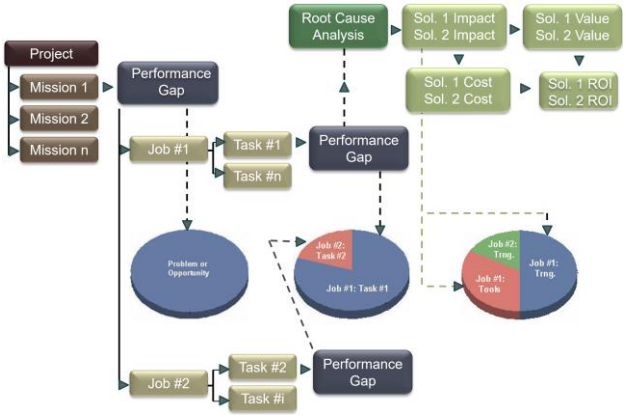

Fig. 6. Impact of Tasks on Missions/Goals

4 Conclusions

Realistic training scenarios are needed to assess readiness for military and civil defence professionals. The scenarios, however, are personnel and resource intensive; the success or lack-of can only be assessed at the end of the event; and the risk of shortfalls increases with diversity. Predictive model can mitigate these shortcomings by assessing personnel readiness during the planning phase at a fraction of the cost; and identify personnel/equipment deficiencies, knowledge/skill gaps and actions that would increase the chances of success.

References

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J. (Jay) Bahlis, Ph.D., P. Eng., President of BNH Expert Software. Assessed training requirements of multiple large scale projects, assisted dozens of organizations in developing effective and efficient training strategies, and managed design/development of training management system ADVISOR Enterprise. Holds a Doctorate in Engineering and Applied Mechanics from McGill University.