Competency Based Training and Assessment (CBTA) for dangerous goods

WHITE PAPER

IATA - DGTWG

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1.0 Introduction

The ICAO Dangerous Goods Panel (DGP) undertook the development of new proposed provisions and guidance material under a competency-based approach for dangerous goods training to be first implemented in 2019-2020. The objective of the Competency Based Training and Assessment (CBTA) proposed provisions is to provide focused training in order to produce a competent workforce. It does so by identifying key competencies that need to be acquired, determining the most effective way of achieving them and establishing valid and reliable assessment tools to evaluate pre-established performance criteria.

The goals of this white paper is, on behalf of the IATA - Dangerous Goods Training Working Group (DGTWG) *to share* *the findings* of a review of the opportunities and challenges observed by IATA through several stakeholders interactions on the competency-based training and assessment (CBTA) proposed provisions by ICAO (See DGR 58th Edition, appendix H) to be applied to dangerous good training.

Additionally, the content of this white paper should serve *to facilitate* discussion points among all parties involved in the training, assessment and oversight of dangerous good training.

Finally we *encourage* *active participation* of all dangerous goods parties involved in training to provide feedback before March 31st 2017. All comments received by ICAO will be considered during the review of the provisions for potential inclusion in the 2019-2020 Technical Instructions.

2.0 Background

ICAO introduced the Procedures for Air Navigation Services—Training (PANS-TRG, Doc 9868) in the form of guidance as a first step towards implementation of competency-based training in 2006. Since then, competency-based training assessment guidance has been developed for several aviation functions including aircraft maintenance personnel, designated medical examiners, flight procedure designers, flight validation pilots, air traffic controllers and air traffic safety electronics personnel.

The ICAO Dangerous Goods Panel (DGP) undertook the development of guidance on a competency-based approach to dangerous goods training. The scope of the specific working group was to develop:

1. proposed new training provisions to replace Part 4 of the Technical Instructions (IATA DGR 1.5 Training Requirements), based on the competency based training and assessment framework to be implemented in 2019-2020 (attachment to the 2017-2018 TI's for consultation)
2. proposed guidance material (Dangerous goods competency framework, dangerous goods functions process flowchart)
3. a competency framework for dangerous goods State employees

The competency framework for dangerous goods State employees has been adopted and published as part of Doc 9284 AN/905 2017-2018 Supplement, Chapter 5.

The proposed provisions (2) and guidance materials (3) aim to assist operators and other entities involved in the transport of dangerous goods to implement a competency-based approach.

Areas	Details
TI's training provisions	Replace current provisions: _Consultation_ 1. DGR 1.5 2. Guidance Materials - Appendix H) - New training requirements TI's 2019 – 2020 Edition
States guidance material	3. Guidance to States on CBTA for States employees TI's Supplement 2017 – 2018 Edition -Chapter 5 & attachment I

For the provisions to include in 1 & 2 above, the ICAO working group is gathering feedback from all parties involved in training to consider during the next round of discussions before moving forward with the final proposal. Several regulatory bodies have organized a series of consultation activities within their local markets. IATA has played an active role in discussions with various stakeholders and more recently a webinar with our training partners and approved schools. The objective has been to create opportunities for discussion and to promote active participation in providing the ICAO working group with comprehensive feedback from a broad reach of industry.

To provide feedback visit (before March 31st, 2017):

http://www.icao.int/safety/DangerousGoods/Pages/NewTrainingProvisions0630-4506.aspx

3.0 What is competency-based training and assessment (CBTA)?

The CBTA is a systematic training methodology supporting the objective to provide focused training in order to produce a competent workforce.

While the wording of the revised provisions have changed, the principle of "commensurate with responsibilities" and the goal of ensuring all employees perform their functions competently has not.

The revisions aim to emphasize these principles by supporting a competency-based approach to training and assessment and providing guidelines and tools for implementation.

3.1 What are the CBTA principles?
a. Focus on job function. Function driven methodology - Clear training needs assessment (TNA) or task analysis (T/A).
b. Specific measurement of the competency – Assessment design to measure performance standard to be achieved (both regulatory and business requirements).
c. Tailored content - Then design the course with the objective to be able to demonstrate the competency.
d. Continuous assessment that verifies performance standard.

The following table summarizes the basic differences from traditional training to the CBTA principles. Although CBTA has been mentioned in the regulations since some time already under current 1.5.7 the provisions proposed are more detailed and specific about the principles and elements of the approach.

TRADITIONAL	COMPETENCY – BASED
▪ Based on job tittle ▪ Subject-matter driven ▪ Wide scope of knowledge	▪ Based on job function ▪ Aims to reach performance ▪ Tailored content & measurements ▪ Continuous assessment

3.2 How to implement CBTA?
Employers are given a more explicit responsibility under this approach, where by using a competency-based-training framework. *"The employer must ensure that personnel are competent to perform any function described in these Instructions for which they are responsible prior to performing any of these functions. This must be achieved through training and assessment." (DGR, H.1.5.0)*

In other words, it is the employer who is responsible to determine the knowledge and skills needed by the employee and be able to assess the level of competency prior to them performing a specific function or functions. This responsibility implies that the employer must have a clear picture of the tasks to be performed, such as a task assessment (TA) and pre-establish the performance criteria to evaluate it.

In order to assist the employer, the ICAO provisions for dangerous goods under the CBTA approach includes a competency framework. This is a high level structure outlining the employee's expected performance for a given function(s). The framework consists of competency units, competency

elements and performance criteria. Competency standards are defined based on expected job performance in a specific work context.

The key elements of the framework identified by ICAO are:

CU – Competency Unit

CE – Competency element

PC – Performance Criteria

Six competency units have been identify by the ICAO Working Group:

CU1 - Classifying dangerous goods;

CU2 - Preparing a dangerous goods shipment;

CU3 – Processing / accepting cargo;

CU4 - Managing cargo pre-loading;

CU5 - Accepting passenger and crew baggage; and

CU6 - Transporting cargo / baggage

Each is composed of different competency elements and each of these in turn contain the specific performance criteria expected level of the observable behavior to be measure.

TABLE H.1.5.2.A Dangerous Goods Competency Framework

Template for determining the knowledge personnel performing specific functions should maintain (CU = Competency Unit CE = Competency element)																			
	Dangerous goods functions																		
	CU 1 Classifying dangerous goods			CU 2 Preparing dangerous goods shipment					CU 3 Processing/ accepting cargo				CU 4 Managing cargo pre-loading			CU 5 Accepting passenger and crew baggage		CU 6 Transporting cargo/baggage		
Dangerous goods knowledge	CE 1.1	CE 1.2	CE 1.3	CE 2.1	CE 2.2	CE 2.3	CE 2.4	CE 2.5	CE 3.1	CE 3.2	CE 3.3	CE 3.4	CE 4.1	CE 4.2	CE 4.3	CE 5.1	CE 5.2	CE 6.1	CE 6.2	CE 6.3
Scope and applicability																				
Limitation of dangerous goods on aircraft																				
Definitions																				
Training																				
Dangerous goods security																				
General provisions concerning radioactive material																				
Reporting of dangerous goods accidents, incidents and other occurrences																				
Classification—General																				
Classification—Class 1																				
Classification—Class 2																				
Classification—Class 3																				
Classification—Class 4																				

Once the CU, CE and PC have been defined, the design and development of the training and assessment can be deployed and applied. Special care should be given to the assessment, based on

the level of competency acquired during training prior to performing the job function. The assessment must be able to demonstrate that the employee can competently perform the job.

4.0 Opportunities and challenges

The Dangerous Goods Training Working Group has dedicated time to analyse the potential impact of implementing the provisions under four dimensions: the impact to the participant, the curricula or content, the instructor qualification and finally the approval processes of training programmes.

The below table is provided as the result of substantial hours of discussions, investigation and forums in which the CBTA methodology and its application to the wide spectrum of stake holders in the air transport industry has been analyzed.

4.1 Impact to the training participant*	
Opportunities	**Challenges**
The training participant should experience "learn by doing" approach in which both the knowledge and the skills being transmitted and assess are directly linked to the job function. The learning experience is more pertinent and relevant. It could be expected to introduce mentoring and coaching in the execution and post training assessment.	The learning job mobility is perceived as negatively impacted, the provisions however provide the guidance on changing roles, but the value of content standardization is being diminished creating the need of reassessment by each new supervisor or employer increasing cost.
The framework tools (Flow chart and Matrix) help employer and participant to more precisely choose the training and assessment (content and method) that best fits their competency needs. There is still room for better guidance on how to use the proposed tools. Knowing better the learner needs helps designers and developers to create more tailored made courses.	The methodology implies that employer must sign off on a TNA, should this sign off be made compulsory? ICAO proposed provisions do not include such a requirement and practice suggest that employers often do not get involved mainly because they do not know the details of the topic and cannot determine the requirements. Courses are often provided to employees as a mandatory requirement from either an authority or organized safety program.
It proposes the need for employers training - digital-learning for example to support the employers on deciding what training their employee needs and furthermore what kind of assessment/metrics are required.	If employer does not have the competencies, there is an expectation that the employer will proactively take the steps necessary to acquire the competencies. This expectations is particularly critical if there is no oversight nor the State possess the competencies or resources to supervise. Do the new provisions imply the addition of a training assessor role, potentially increasing cost?
	The role of the current standardized materials would become less relevant as the trainee requires multi-reference materials to meet their

	needs (e.g. international regulations, local/regional regulations, in company safety manuals)
	When competency demonstration is required, then after training on the job assessment is required, determination of the gap, documenting and then further training if required. This process is perceived to raise cost of training and required much more training, guidance or support for the responsible (employer)
	There is a need to seek more clarity on all job functions define in the DG Functions Processes Flowchart, for example pilot, cabin crew, security screeners and load master are not very well defined or missing.
	Operationally how can a training organization can have training participants from different functions in one classroom? If not possible a potential cost increase with not clear tangible benefit for certain organizations is perceived.

4.2 Impact on the training curricula/content

Opportunities	Challenges
Design of the content can be done on a modular basis to mix and match the needs of the trainee at a particular level (PC)	Uncertainty on how the after training assessment should be per CU. If the Performance Criteria (PC) will be very individually/functional oriented, would there be a minimum score or metric? For similar functions very many variations of PC metrics could co-exist.
Introduction of new content material and delivery methods (e.g. apps, gamification) for training exercises purposes.	Workbooks as they exist today will not serve the purpose, these must be redesign.
Establishing a "minimum content" criteria, a bench mark per module or CU. Perhaps a single resource in modular form to be meet (CBTA/ICAO matrix with further development)	Potentially over specification of job function that personalized the design and development.
Increases the possibility for more different types of training (diversification): assessment tools, evaluation tools, short training modules, etc. The methodology seems to fit well when the target audience is more homogeneous within company training for organizations designing and developing their own training or outsourcing it to be customized to particular needs.	Will require the design of more materials per task meaning lots of development time: (pre - task analysis, modules (task specific) course, post - assessment (task specific), follow up (continuous assessment) Far more different, courses/modules, splintered participation (disturbance). In other words the amount of customizations that may be required to properly apply the methodology which may end up with very personalized courses with low

	attendance which may create a sustainability issue for some training institutions.
Create content with the measurement tools in mind for the level of proficiency/competency.	How detailed the competency assessment will practically be. The more detailed it is the more individually focus the course end up being. This raises a question: how practical could that be? On the other hand if we wander away from the individual and focus on the function we may end up where we are today with the existing categories in the future call CU.
	Design/development complexity that current training organizations may not be able to accommodate.

4.3 Impact on the training instructors qualifications

Opportunities	Challenges
At the moment there is not such as an assessor figure, if one is needed then the profile and the certification of such a profile may be required.	Resources available to be used in the extensive time of task analysis requirements. Some organizations would have to gather originally and periodical resources.
Relaunch and validation of Dangerous Goods Training Programme guidelines (Instructors Guidelines (INSG) + Workbooks) in whatever future form and content. Better recognition as a benchmark.	For continuous assessment more resources will be needed. Will increase price/investment in the training programmes for employers.
Role change. Must be able to coach or facilitate learners to master a skill, not a category. Instructor must possess different competencies, manage different class objectives / methods	What would the role be for the instructor? Currently the instructor needs to be qualified in the same category, with widely different standards. How do we ensure "best adequate standard"
Create more guidance on how to use a TNA. Developing job tools for task analysis / ways of assessment.	Further capability/skills to "size" single topics.
	If the instructor will be expected to conduct site assessments. This activity will require additional time to assess proficiency/competency.

4.4 Impact on approvals

Opportunities	Challenges
DGTWG could design and provide a standard matrix based on the guidelines provided by ICAO for Airlines/operators approval as best practice.	The approvers (appropriate authorities, IATA training partners program) must be able to identify the knowledge level required to competently demonstrate an acquired skill.
DGTWG could design and provide a standard matrix based on the guidelines provided by ICAO for GHA approval as best practice.	As it has to be more tailored it would require more time to review the training programs and documentation supporting the TNA/TA. Means

	additional time and human resources to validate and maintain the updates.
IATA could become the 1st best practice study case if we implement CBTA on experimental basis (e.g. for Lithium Batteries Shipping course)	Approval by States/appropriate authorities will have to manage ambiguity. For CAA approval - would there be a lack of consistency on what is trained as it is based on individual TNA/TA. Mutual recognition of validation will be even more difficult than it is now due to the wide range of CAA's implementation approaches.
Add more guidance on assessment tools and expectations of the output of the assessments. Could include pre-assessment, after training and continuous assessment.	Assuming specific CU(s) is required, how to keep consistency in the record of training?
	If this will be the only methodology prescribed by ICAO will regulations provide metrics to measure the output or on the job demonstration considering that the TNA/TA response to individual pre-assessment. Different countries might end up with different standards, adding lack of uniformity? Should the Technical Instructions be interpreted in the same way across the world?
	Too prescriptive or forced requirements from appropriate authorities could lead to an "extended Table 1.5.A"
	Clearly define the impact in audits that operators do on external contractors as this may directly have an impact on IOSA and ISAGO audits. Airlines and GHA's work towards IATA standards such as IOSA and ISAGO, what guidance will be given to IATA to enable us to meet with these requirements?
	Oversight and enforcement complexity that current competent authorities may struggle to accommodate.

*Under participant both employee and employer are included. The employer is ultimately the decision maker and responsible for determining the appropriate training program and assessment.

5.0 Conclusion

In conclusion we fully support the objective of improving dangerous goods competencies in the broad supply chain, as the ultimate aim is to improve safety in the air cargo industry. Design and development of training commeasurable with the employee's responsibilities is an area where improving opportunities are foreseen.

Two major positive impacts of CBTA proposal are:

- closer involvement of the employer in determining the needs and measuring performance in a more precise way;
- an increase in employee's engagement as a result of a closer correlation between the training content and job performance assessment.

While giving the employer more responsibility on the training decision process, maintenance of the competency by continuous assessment and measurement of the performance criteria, building this competency whether internally in an organization or relying on a third party training provider will be a big challenge in many cases.

It is recognized that the impact of CBTA varies for a range of organizations as per the following breakdown:

a. Operator's training their own staff – considered the most applicable area for CBTA, as many operators already implement to some extend this approach. Additionally their training programs already require competent authority's approval.
b. Operator's training delivered by external third party providers (e.g. smaller carriers, or outstations) – is a challenging expectation unless there is a good level of standard curricula (CU's) applied and continuous assessment tools facilitated where in this case cost-benefit must be clearly defined.
c. Big organizations from the rest of the supply chain training their own personnel.
d. Small and medium organizations from the rest of the supply chain outsourcing their training. Is there enough incentive (cost/benefit) for implementing CBTA? Is regulatory oversight reaching to these organisations enforcing compliance with the regulations?

While it's true that CBTA as a training approach has been implemented by ICAO in other air transport technical areas, for the dangerous goods training, it proposes a significantly wider scope (currently defined by 6 CUs). Several of the CU's are performed by individuals in organizations out of the range of appropriate authority's oversight making compliance and enforcement more challenging than the current provisions. At the same time, it is important to realise that the described CU's leave out of scope areas such as security screening and others.

The aviation industry is very dependent on standards that can be mutually recognized and applied by the key players in the supply chain and therefore a certain level of standardisation in knowledge and skills should be maintained.

Considering the benefits and challenges, the CBTA approach for dangerous goods outside the operator or ground handler services is not expected to result in an increase in training quality and there is concern this could lead to lower training standards than currently achieved. The CBTA approach has already being implemented in other aviation sectors in which the aviation industry/operators have full control and there is established compliance oversight, usually by civil aviation authorities of the State of origin of the operators.