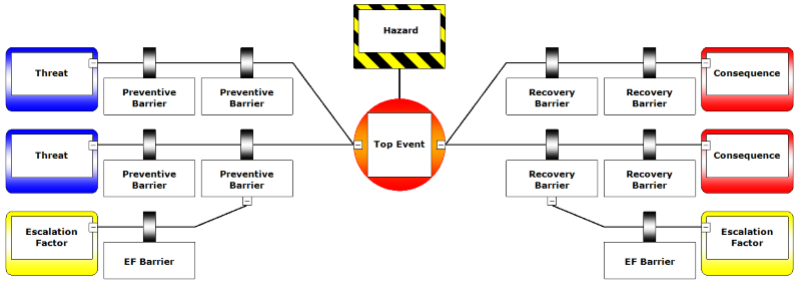
Workshop Planning

Background	• The Technical Instructions contain a requirement that stand-alone lithium-ion batteries (UN3480) be shipped at a state of charge (SOC) not exceeding 30%.
	• Limiting the state of charge was accepted as providing a safety benefit for batteries packed on their own and extending the requirement to UN 3481 might further reduce the risk of a lithium battery incident during transport.
	• While there was some support for extending the existing state of charge limit for UN 3480 to UN 3481, particularly for lithium batteries packed with equipment, the dangerous goods panel (DGP) could not reach consensus on mandating such a requirement without first conducting a thorough safety risk assessment (SRA)
	• Varying views on the safety impacts and feasibility of a state of charge limit are identified in the DGP/28 report:
	  ○ Members of the battery industry reported that applying a state of charge limit to equipment would be difficult to do and that the economic impact would be enormous. Some expressed a view that there is insufficient data to justify a state of charge limit, including a lack of testing, an extremely low incident rate relative to the number of electronic devices transported and the belief that most incidents involved lithium batteries carried in the cabin and in checked baggage.
	  ○ Publicly available FAA data and data from a reporting system established by UL (Thermal Runaway Incident Program (TRIP)) was discussed suggesting that more air cargo incidents involving lithium battery powered equipment occurred than what was reported through mandatory reporting mechanisms.
	  ○ Testing on lithium ion batteries indicates a reduced state of charge reduces both the likelihood and the severity of a thermal runaway event.
	  ○ Concerns over impacts of a state of charge limit to the delivery of certain equipment applications, such as medical devices, were raised. It was suggested that certain medical devices must be shipped at full charge for immediate use and in case of implantable devices, the batteries are extremely small.
	• The impact on the battery industry would be considered when evaluating risk mitigation measures, should they be necessary.

Objectives	• Using the bow-tie methodology, assess the risk of uncontrolled fire involving batteries packed with or contained in equipment, and identify existing proactive and reactive safety measures. • Take into consideration the perspectives of States, operators, and stakeholders from the entire supply chain to ensure a global view is considered. • Quantify the resulting risks in terms of likelihood and severity to understand risk in the system in the context of expected continued growth in shipments (depending on quality of information available). • Document the safety risk assessment in a MS word document to support the Dangerous Goods Panel in their assessment of appropriate mitigation measures that can be applied globally to support the safe carriage of lithium batteries. **The workshop will not identify solutions or propose a state of charge limit. The workshop will focus on identifying if the data demonstrates an intolerable risk posed to the aviation transport system by the transport of lithium batteries packed with or contained in equipment in accordance with the current requirements of the TECHNICAL INSTRUCTIONS (Doc. 9284). The assessment**

	will help the DGP make an informed decision on the appropriate risk mitigation measures to be considered (which could be an SoC limit) based on a documented safety risk assessment that has been conducted in an objective manner.
Methodology	The workshop will follow a safety risk assessment process which is based on guidance contained in the Safety Management Manual (Doc. 9859). The safety risk assessment will be performed using the Bow-Tie methodology to visualize the hazard, the risk, the resulting consequences, and the reactive and proactive controls/measures designed to prevent unwanted outcomes. Depending on the quality of information available, the risk may also be quantified in terms of likelihood and severity  Further details on the bowtie methodology can be accessed through: https://www.cgerisk.com/knowledgebase/The_bowtie_method Considerations for the safety risk assessment include: • Historic trends and future projected growth of air cargo traffic • Evolving nature or configurations of electronic devices and the batteries e.g. increased battery size and energy density relative to the overall size of consumer electronics such as tablets and power tools. Increased production of micro-mobility devices e.g. e-bikes and scooters. • Existing and anticipated air cargo fire suppression capabilities • Dangerous goods safety information and proactive hazard identification • Fire safety impacts of state of charge • Changing business models • Available technical and administrative controls

Workshop participant and experts	**ICAO safety experts**	**Contributing experts**	**Notes**
	Consultant (SAF) Elizabeth Gnehm (SAF) Devan Panchal (SAF) Lynn McGuigan (CSS) Katherine Rooney (CSS) Virgilio Alegria (CSS)	The working group on Energy Storage Devices consisting of panel members and advisors from 10 States: Brazil, Canada, China, France, Italy, Japan, Netherlands, Qatar, UAE, USA. 6 international organizations: DGAC, IATA, ICCAIA, IFALPA, EASA, GEA. Information from the wider supply chain will be obtained as appropriate to inform the risk assessment process.	ICAO safety experts will guide and facilitate discussions. Contributing experts will form an expert group that will undertake the SRA, under the guidance and facilitation of ICAO safety experts. It is strongly advised contributing experts have a good grasp of safety management principles, where possible in the context of transporting dangerous goods.
Workshop timeframe	1. Workshop 1 (May 2022, 2 hours) 2. Workshop 2 (May 2022, ½ day) 3. Workshop 3 (June 2022, ½ day) 4. Workshop 4 (June 2022, ½ day) *The workshop outputs are expected to be made available by August 31st 2022.*		
Workshops deliverables	- Safety Risk Assessment containing full Bow-Tie support the DGP with their assessment of identifying appropriate risk mitigation measures for the carriage of lithium batteries contained in or packed with equipment. - Guidance material to explain Bow-Tie and a description of the level of risk in the system - Guidance to be formatted professionally (English only)		
Assumptions	- All workshop sessions will be conducted remotely. - Workshop sessions will be facilitated in English only and workshop outputs will be available in English only. - BowTieXP (risk assessment software) and MURAL (a virtual collaborative platform) will be used to support the development of workshop outputs - At least 30% of participants have taken the ICAO *Fundamentals of Safety Risk Management* training prior to the workshop.		
Supporting data and information source	- Thermal Runway Incident Program (TRIP) - Incident data from Transport Canada, click here - UK CAA Lithium Bow-Tie, click here		

Workshop tasks	1. Introduction workshop a. Preparation b. Facilitation *The objective of this workshop will be to agree on the workshop scope, workshop deliverables and expectations of workshops participants. Then we will validate the scenarios to be risk assessed and the information to support the safety risk assessment.*
	2. Hazard Identification Workshop a. Preparation b. Facilitation c. Drafting of initial SRA document (v0.1) *The objective of this workshop will be to identify hazards associated with the carriage of lithium batteries either packed with equipment or contained with equipment. The focus will be on identifying hazards from the perspective of the State however the views of industry and the wider supply chain will also be required to inform the identification.*
	3. Initial Safety Risk Assessment workshop a. Preparation – review bowtie and refine based on comments b. Facilitation c. Update draft of SRA document (v0.2) *The objective of this workshop will be using the Bow-Tie methodology to develop a visual picture of the hazard, the risk, the resulting consequences and the reactive and proactive risk controls/measures that should be put in place to prevent unwanted outcomes.*
	4. Final Safety Risk Assessment workshop a. Preparation – review bowtie and refine based on comments b. Facilitation c. Drafting of final SRA document *The objective of the final workshop will focus on identifying the level of risk in the system by quantifying the likelihood and severity.*

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