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a **WG2A** present
under stream2: **Dangerous Air Cargo**

Safe Trip by Air

how **LITHIUM BATTERIES** travel **SAFELY**

with *Air Canitgo*



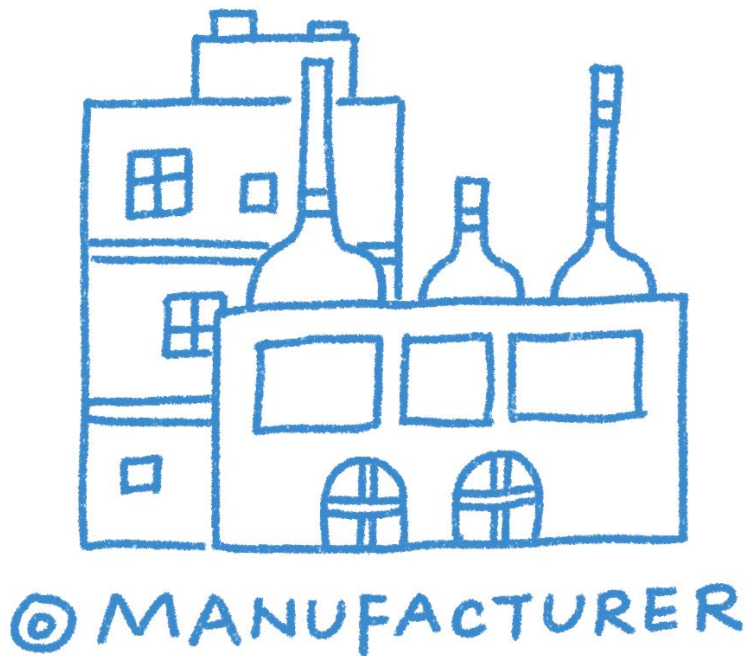
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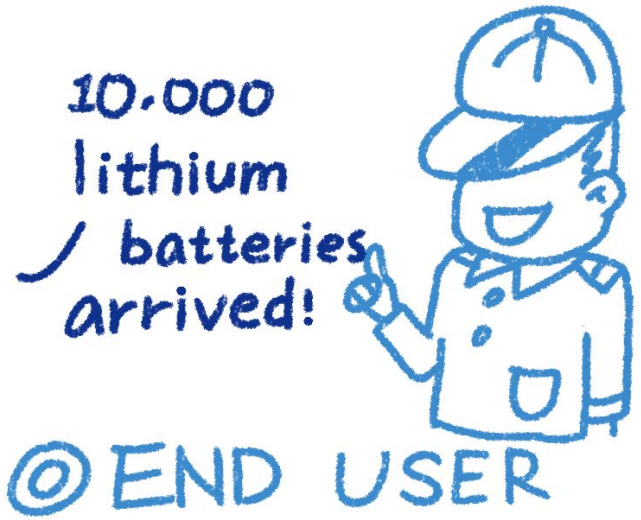
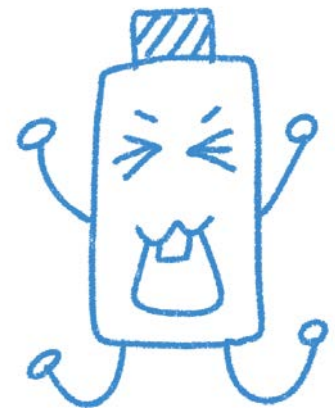
OUTLINE

- lithium battery on board – or on fire?
- safety control
 - battery manufacturers
 - airline companies
- risk assessment
- prospective solutions



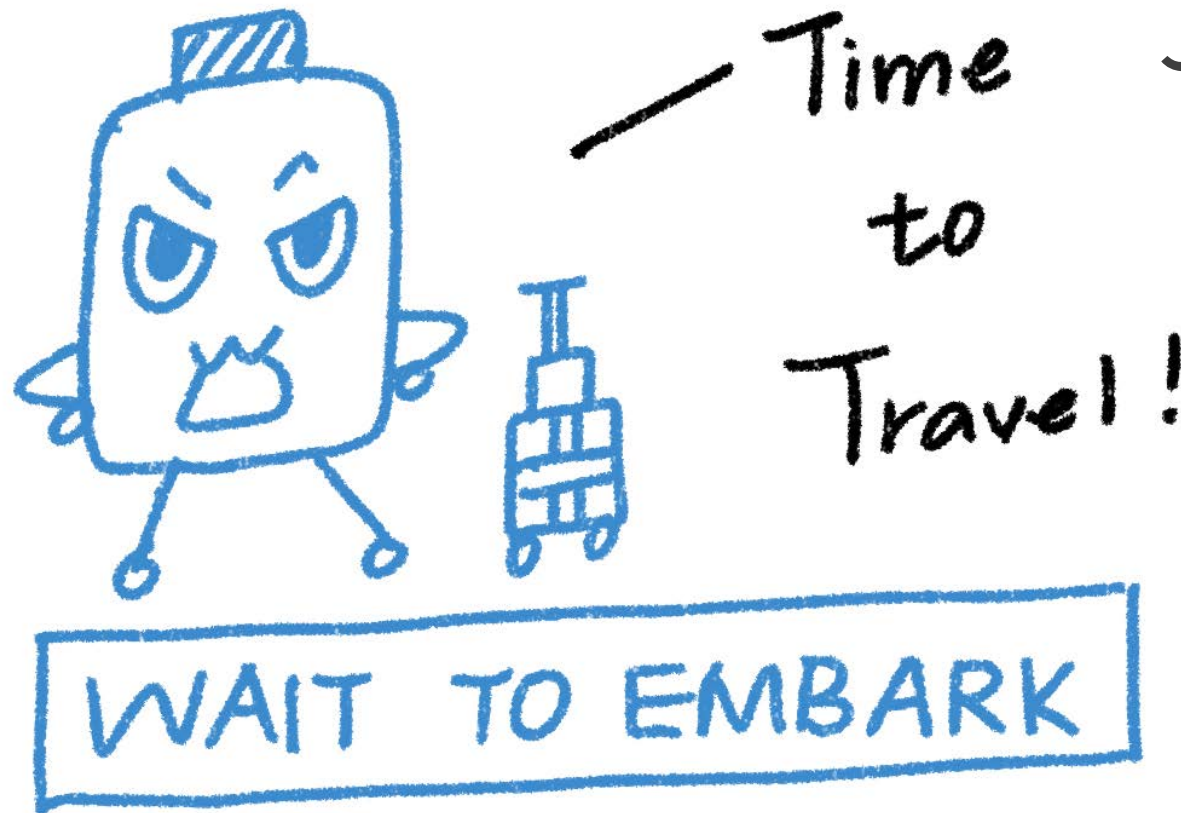


journey of
a lithium battery
LITHY





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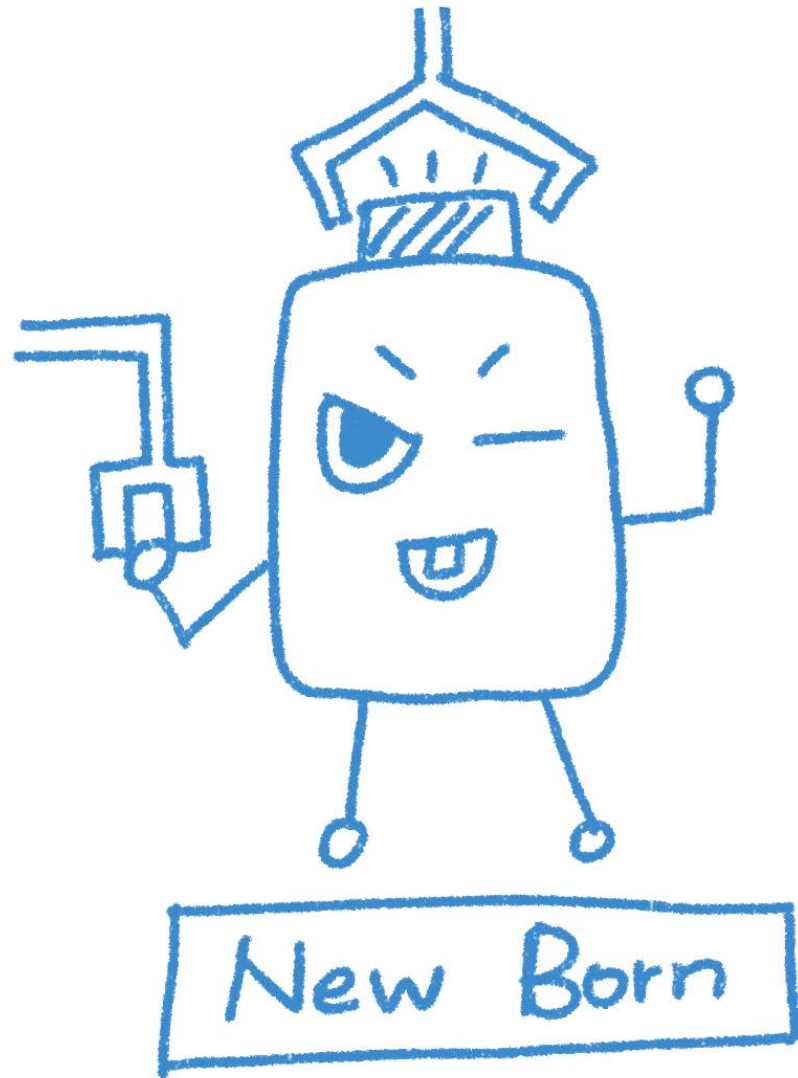


JOURNEY OF LITHY

a lithium battery



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production period
MANUFACTURER



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Manufacturer

Stringent Prohibition Protocols

weight

quantity

item

UN 38.3

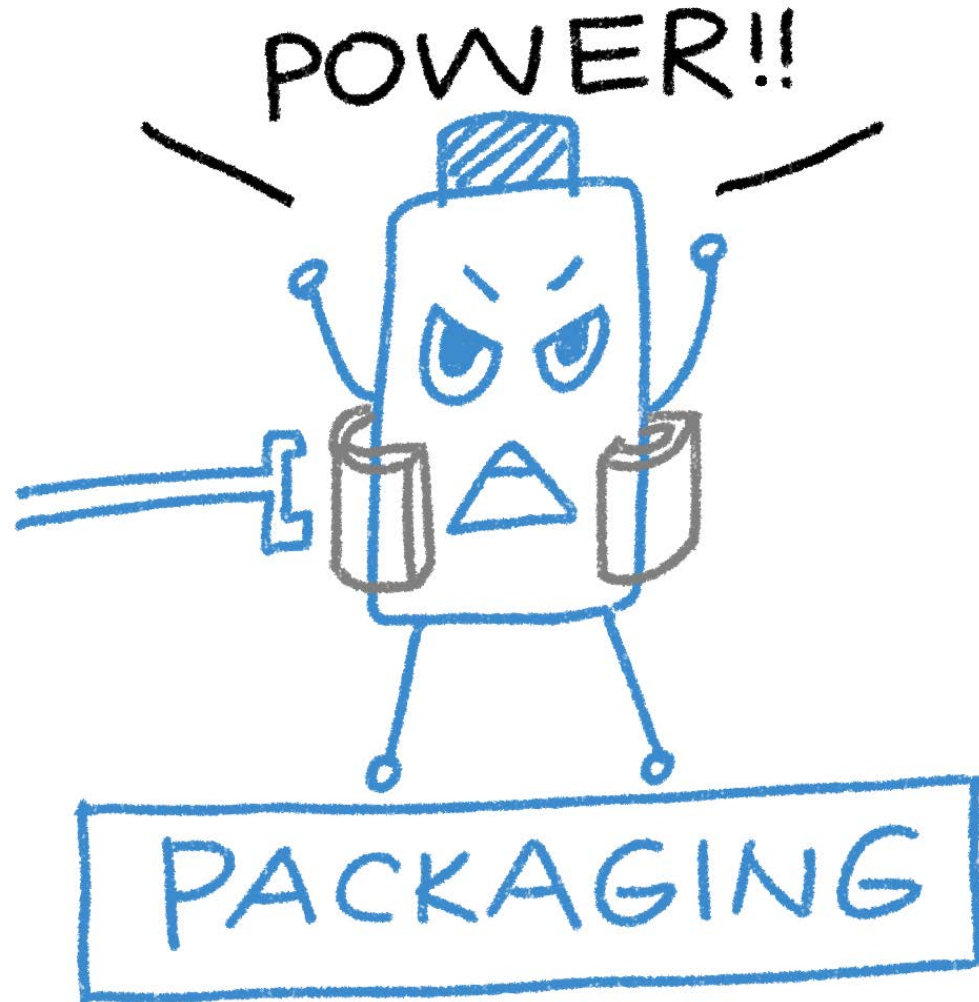
packing

labeling

packaging



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packaging

Chapter 5, Annex 18
the Convention on
International Civil Aviation
"Safe Transport of Dangerous Goods By Air"

on **specific** conditions

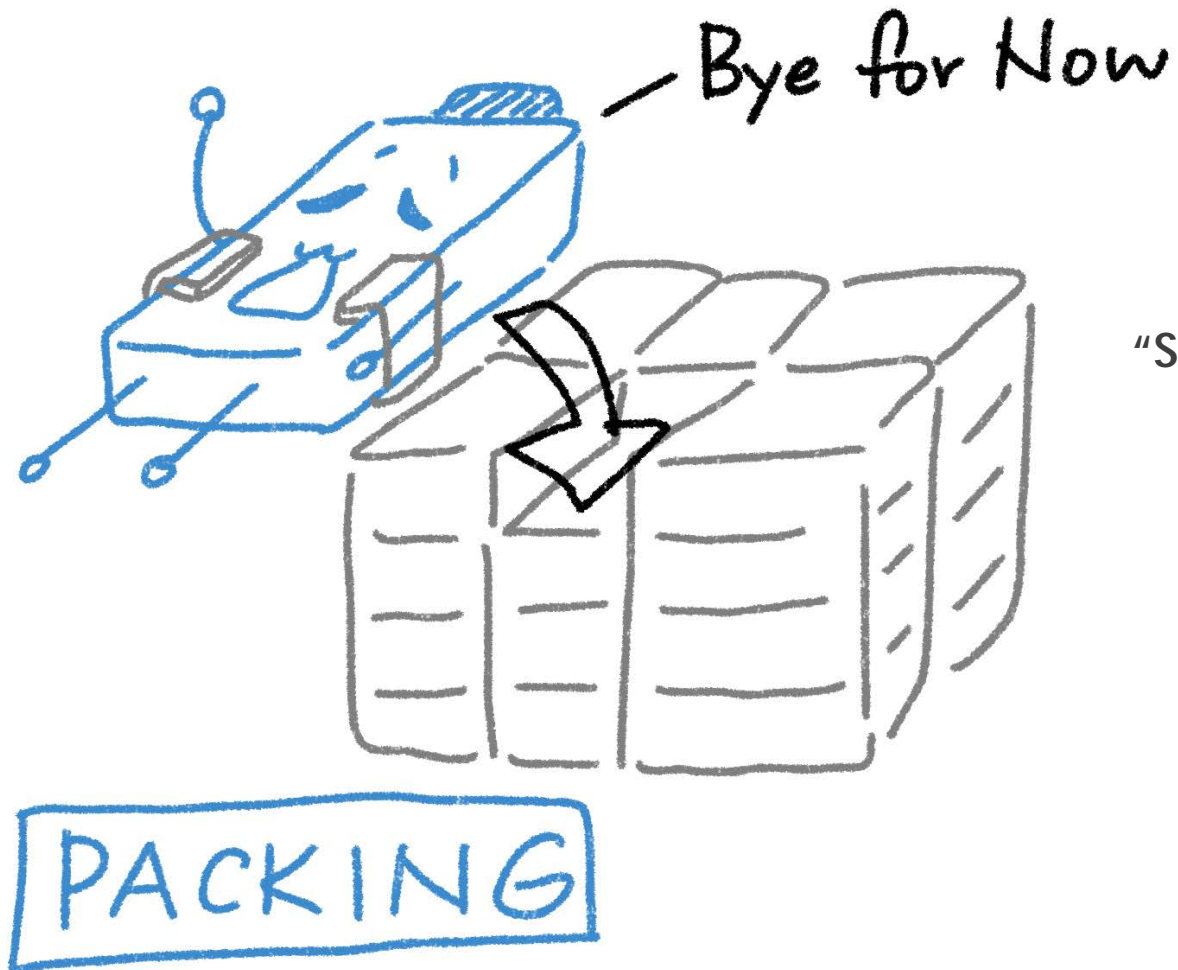
weight \geq 12kg or

quantity \geq allowance or

category falls below certain ranges

deploy **double** packaging

utilize **impact-resistant** materials

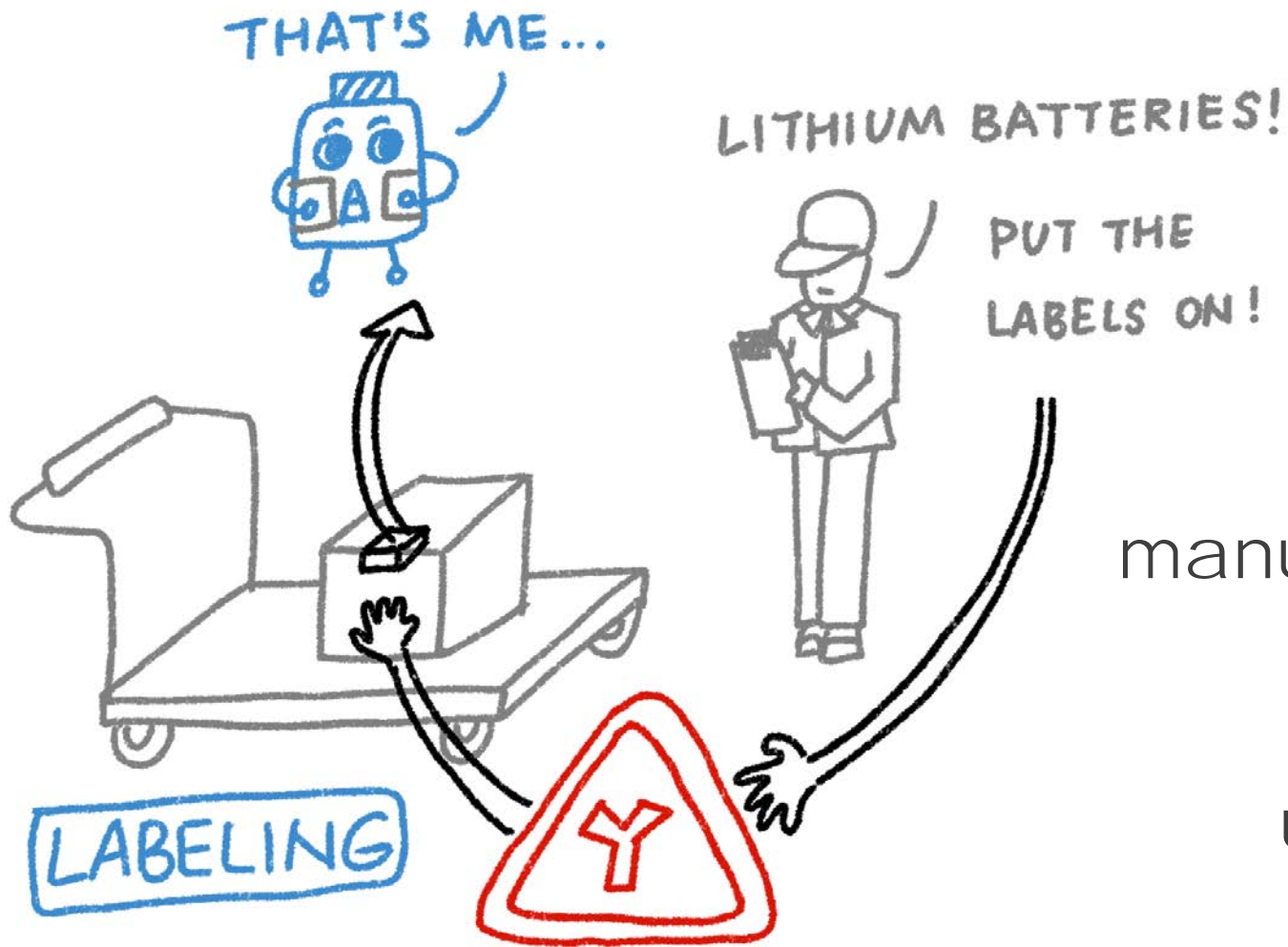


packing

Chapter 5, Annex 18
the Convention on
International Civil Aviation
"Safe Transport of Dangerous Goods By Air"

Unit Load Device/ULD

optimal spacing
contingent on types/sizes
anti-emergency measures



labeling

risk declaration

based on
manufacturers' declaration

potentially deploying
unmanned assessment
labeling / stamping



transportation period

AIRLINE



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Storage and Sorting

Controlled warehouse

- specialized infrastructure
- fast & easy access to rescue
- on-going monitoring



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Storage and Sorting

Routine Package Checks

- before loading -> boarding pass
- after arriving -> potential removal
- instant & safe offload of
damaged packages



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Airline

Handling / Uploads + Offloads

Exclusive Equipment, Documents and Shipment

- special ULD
- Notification to Captain (NOTOC)
- priority loading



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pre-event period

RISK ASSESSMENT & SAFE CONTROL



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Risk Assessment & Safe Control

Risk assessment and management is a significant part of **SMS**.

SMS: safety management system



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Frequency of Occurrence (or Likelihood)	Consequences (Severity of Accident)				
	Incidental (1)	Minor (2)	Serious (3)	Major (4)	Catastrophic (5)
Frequent (5)	M	H	VH	VH	VH
Occasional (4)	M	M	H	VH	VH
Seldom (3)	L	M	H	H	VH
Remote (2)	L	L	M	H	H
Unlikely (1)	L	L	M	M	H

HIGH RISK

LOW RISK



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Prospective Solutions



RECOMMENDATIONS

- standardized labs
- SMART ULDs



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Technological Recommendation



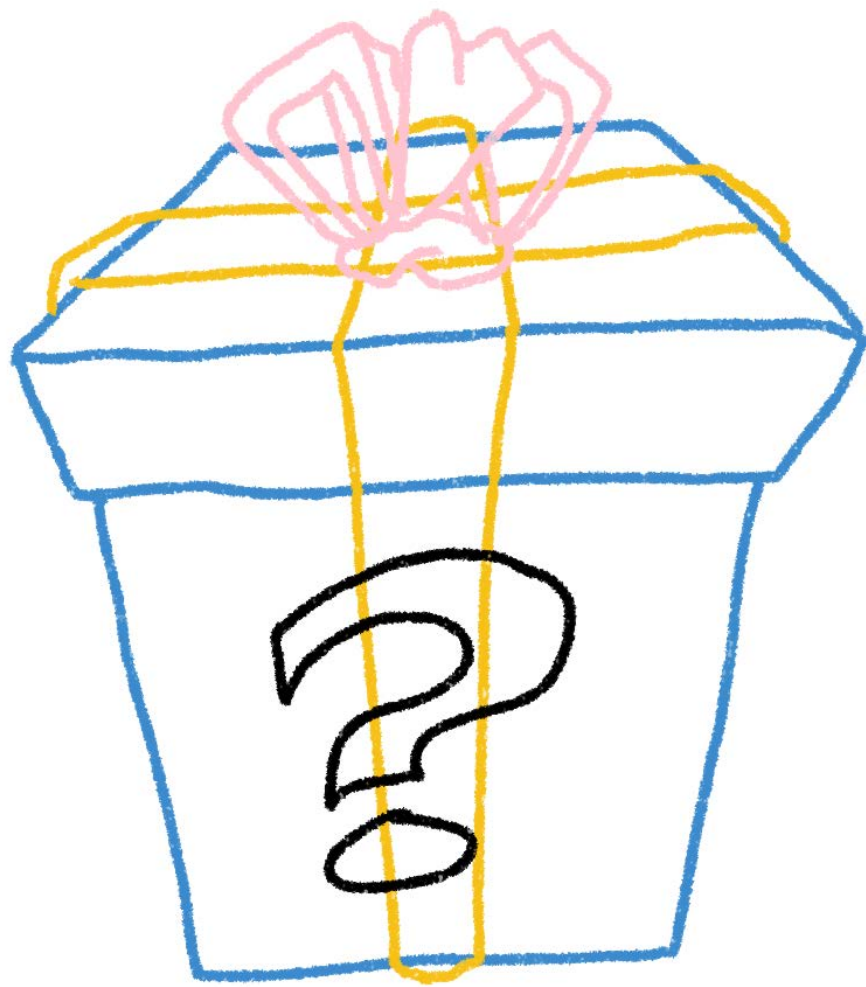
standardized laboratories

- testing lithium battery samples
- bound by UN 38.3

to **prevent unsafe** lithium battery cargos on board



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SMART ULD



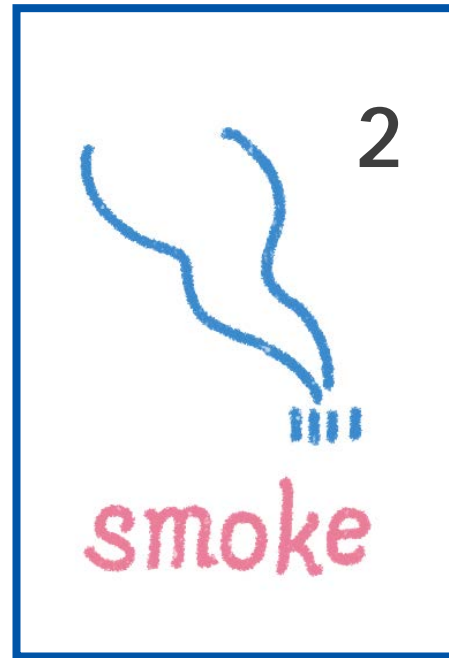
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SMART ULD – risk control

how a lithium battery explosion develops



SMART
ULDs



previous
methods



nip it in the buds!

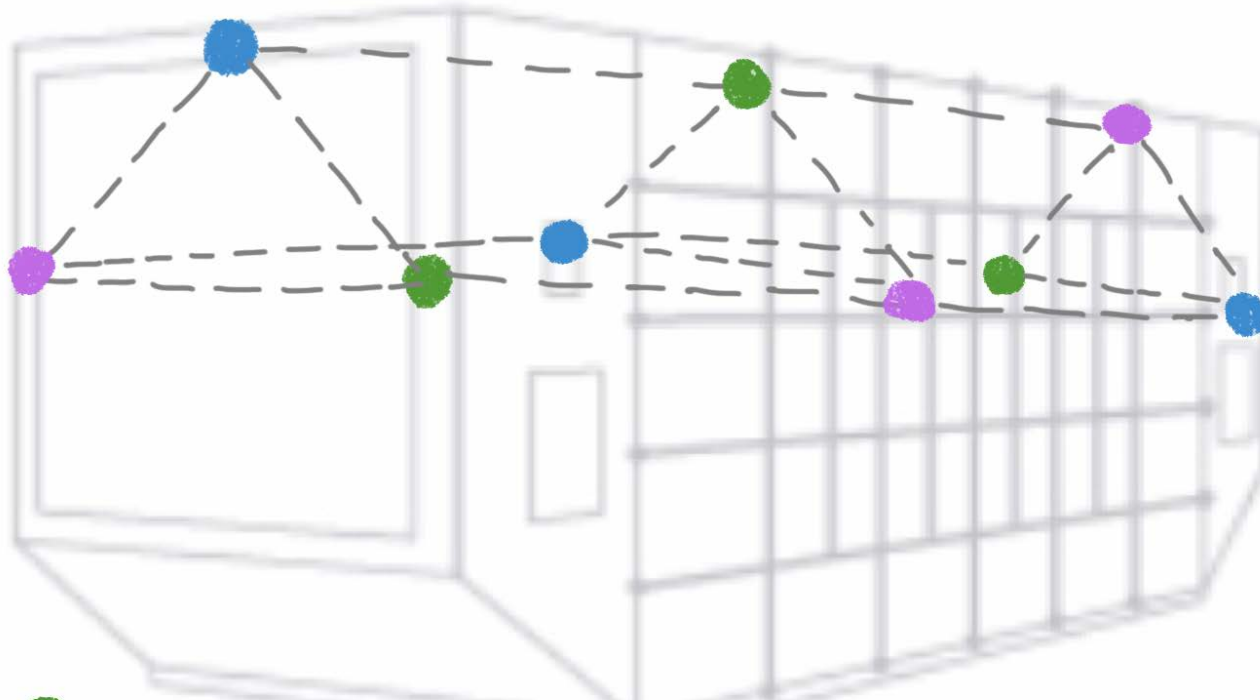




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SMART ULD – risk control

within ULD: **HEAT** detectors



● sensor_type1 ● sensor_type2 ● sensor_type3



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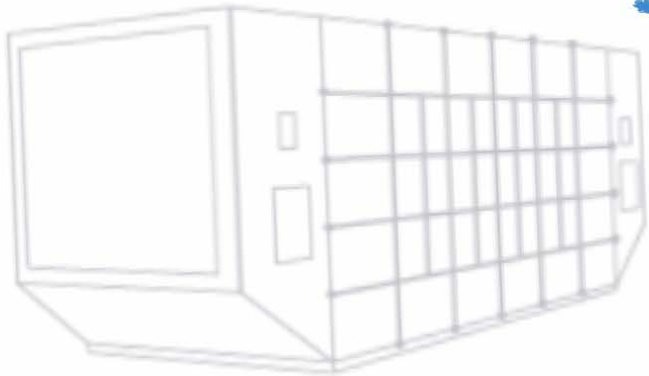


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SMART ULD – risk control

signal transition: from ULD to pilots

cargo compartment



signal / cable



cockpit



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SMART ULD – risk control

specific features

- triple redundancy
- thermal mapping
- actuation(suppression)
- interface



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SUMMARY

- [Redacted]
- [Redacted]
- [Redacted]
- [Redacted]

CONCLUSION



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Conclusion

Lithium Batteries as Cargo on Passenger Aircrafts

FEASIBLE

- easy implementation **efficient**
- low cost **economic**
- easy to maintain **sustainable**
- highly effective **safe**



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Crew Members on WG2A
thank you for your attention