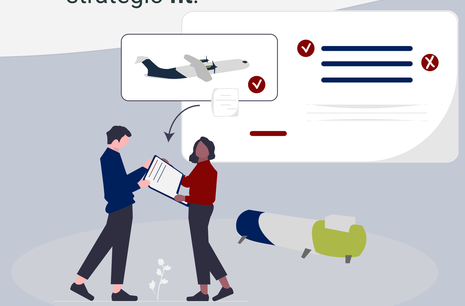
ENABLING HYDROGEN PROPULSION EQUIPMENT DEVELOPMENT THROUGH EMPOWERING ZEROe LH_2 ENGINEERS TO CONFIDENTLY ENGAGE SUPPLIERS

The mindset of internal stakeholders needs shifting to enable ZEROe LH_2 engineers to confidently engage suppliers. This requires changes in communication and internal processes to come to an environment in which the engineers are confident they can develop systems and components with requirements and specifications that meet the required safety standards. (Project) managers have the responsibility to guide this mindset shift by mediating the interactions between the engineers, the internal stakeholders (e.g. procurement), and the suppliers.

CONTEXT

Supplier landscape	No combined H_2 and aviation capabilities	A few first movers showing commitment	Growing supplier pool including legacy Tier 1s		Mature supplier pool with first-movers having an advantage over laggards	
Value proposition	Funded fundamental H_2 technology R&D	H_2 technology for aircraft capability development	Maturing of the market for H_2 equipment for aircraft	Fixed number of equipment orders	High volume procurement	High volume repeat orders
Technology readiness			TRL 3/4	TRL 6		Entry Into Service (EIS)

	PRESENT	HORIZON 1 2025	HORIZON 2 2027	HORIZON 3 2030	FUTURE VISION
MINDSET		**BE HUMBLE**	**BUILD MOMENTUM**	**LEVERAGE KNOWLEDGE**	**CONFIDENT SUPPLIER ENGAGEMENTS**
		Acknowledge that there is a knowledge and expertise deficit. Focus on **learning** as part of the TRL3 efforts. Be as **transparent** about your architectural considerations as you can. Start **building relationships**. **Avoid conflicts** at all costs to avoid scaring potential partners at the start. Break away from strict **contract dominant engagements**, you will not get the perfect price and delivery anyway in this phase.	Focus on building your suppliers' confidence in the project. Be **transparent** about your system and component design choices. Inspire their commitment through showcasing **prototypes** and mock-ups. Re-assure suppliers on the **fixed decisions** and highlight existing uncertainties. Only select suppliers with organisational and strategic **fit**.	Leverage the knowledge gained and momentum created to **confidently share** desired specifications with a large supplier pool. Harness the power of the **legacy development process** in this phase to solicit competitive offers from suppliers. Include first-mover suppliers to reward early commitment.	**Confidently lead component and system development for hydrogen powered aircraft.** Be *the* authority when it comes to green hydrogen powered aircraft development
		Learn from your supplier's expertise	 *Work around mock-ups as boundary objects*	*Use the legacy processes once knowledge and momentum has been created.*	
SUPPORT		***SUPPORT LEARNING***	***CONVERT LEARNINGS INTO CERTAINTY***	***POWER PERFORMANCE***	
		*Enable the engineers to rapidly learn by encouraging early **intensive interactions** with (potential) suppliers. Send them on visits, have them test and **validate very early prototypes** with suppliers. **Compensate suppliers** for their efforts. Keep the technical explorations as **open** as possible, shielding the engineers from **unnecessary contractual discussion** and supporting them in **simplifying specifications**. Repeatedly ask yourself the question 'How can I make my engineers learn as much and as quickly as possible?'*	*By now, the engineers will have gathered many learnings and experiences. Support them to convert these learnings into **decisions** that give the suppliers **certainty**. Only select suppliers that have an **aligned strategic interest** in the future of the project. Support suppliers by being transparent about **system interfaces**. Ask yourself the question 'How can we reduce the technical uncertainties as much as possible?'*	*Your engineers will now have acquired **sufficient expertise** in hydrogen systems for aircraft. (Potential) suppliers will clearly know what Airbus' intentions are and will be able to assess the risks of engagement. Use legacy processes to develop safe and high-performance equipment from a **competitive supplier pool**. Ask yourself the question 'How can we get the best performing equipment for the best offer?'*	**Lead hydrogen technology development for aircraft** enabled by a rich and robust supplier pool. Engineers will have acquired renewed confidence in aircraft system development combined with hydrogen system expertise. This is where Airbus' aircraft development heritage will bring the **edge over competition**.

Engineers **struggle to define** requirements and specifications while adhering to existing RFTI & RFP processes. Engineers are **overly cautious** in writing requirements & specifications to mitigate **unknown safety risks**. A strong **heritage** in legacy aircraft development processes is causing this caution, even in early prototype development. This results in **over-dimensioned equipment**. The legacy development processes are unfit for R&T developments in ZEROe.

Suppliers are hesitant to engage in **uncertain developments** and struggle signing purchase contracts when the requirements are not clear.

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