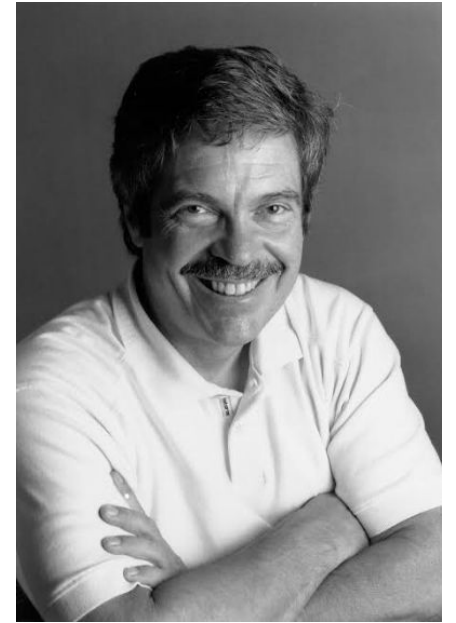


**“The best way to predict the future is to create it.”**



Alan Kay



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(NSPA)



# NEXT GENERATION ROTORCRAFT CAPABILITY

Global Defence Helicopter Conference

Cyril Heckel – Programme Manager

23 October 2024

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## Life Cycle of a Defense System



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# NATO Support & Procurement Agency

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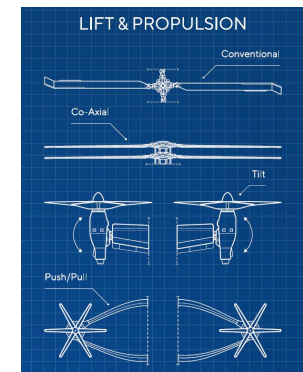
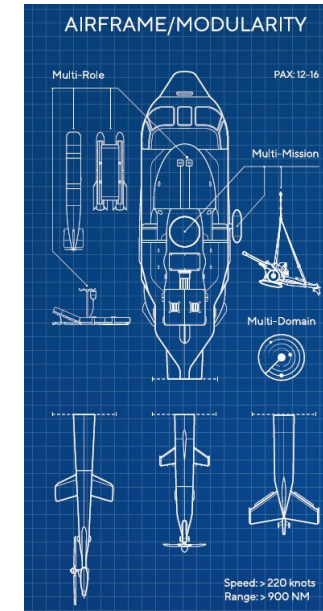
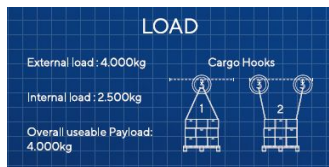
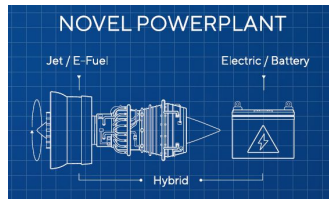
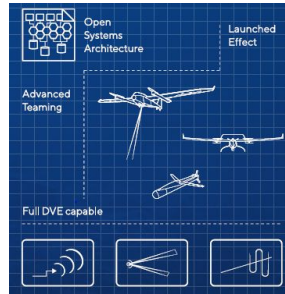
*Be the first choice for acquisition of multinational systems to deliver innovative and sustainable capabilities for the Alliance and nations.*



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# Rotorcraft: what is next



# Next Generation Rotorcraft Capability

- Develop a medium multi-role rotorcraft capability by 2035 - 2040 time period
- Memorandum of Understanding established for Concept Stage
- NSPA (Luxembourg) is the nominated acquisition agent



**NGRC Participating Nations**



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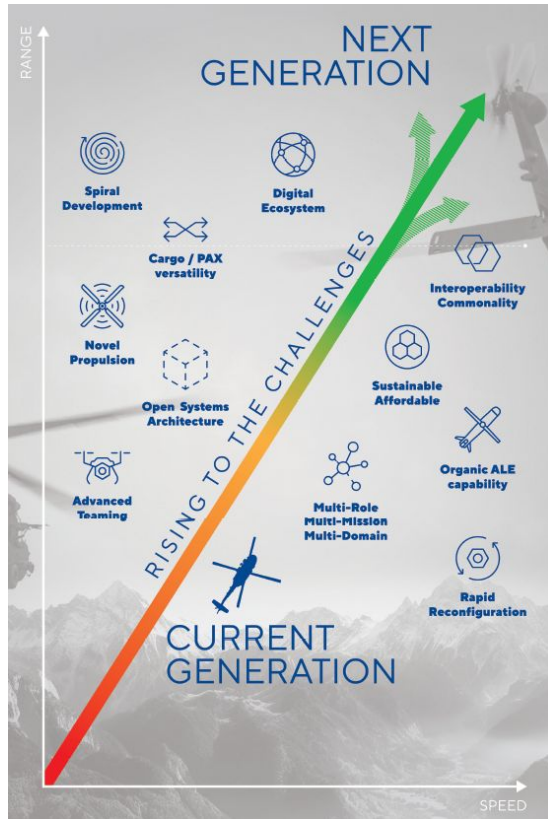
# NGRC Attributes

NGRC Attributes

Core Platform Enablers

Mission & Operational

Integrated Logistic Support



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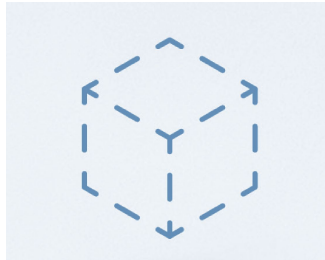
# NGRC Attributes

NGRC Attributes

**Core Platform Enablers**

Mission & Operational

Integrated Logistic Support



Open System Architecture



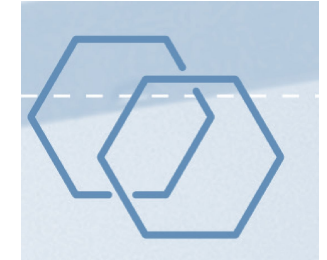
Multi Role  
Multi Mission  
Multi Domain



Rapid reconfiguration



Novel Powerplant



Interoperability  
Commonality



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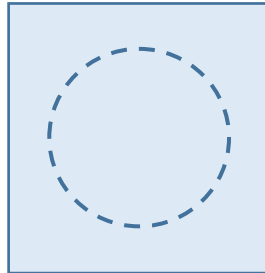
# NGRC Attributes

NGRC Attributes

Core Platform Enablers

**Mission & Operational**

Integrated Logistic Support



Optionally Uncrewed



Transport 12-16 troops



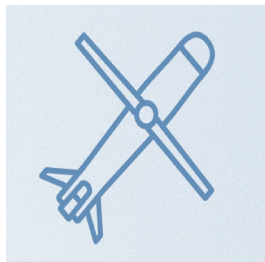
Range > 900nM



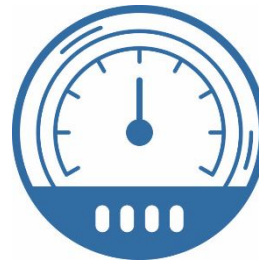
Max Take-off Gross weight 10-17T



Advanced Teaming



ALE Capability



Cruise Speed target >220kts  
(no less than 180kts)



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# NGRC Attributes

NGRC Attributes

Core Platform Enablers

Mission & Operational

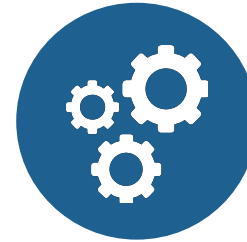
**Integrated  
Logistic Support**



Availability  
Reliability



Fly away cost  
Cost per hour



Integrated  
monitoring



Ship Deployability  
for 6-9 month

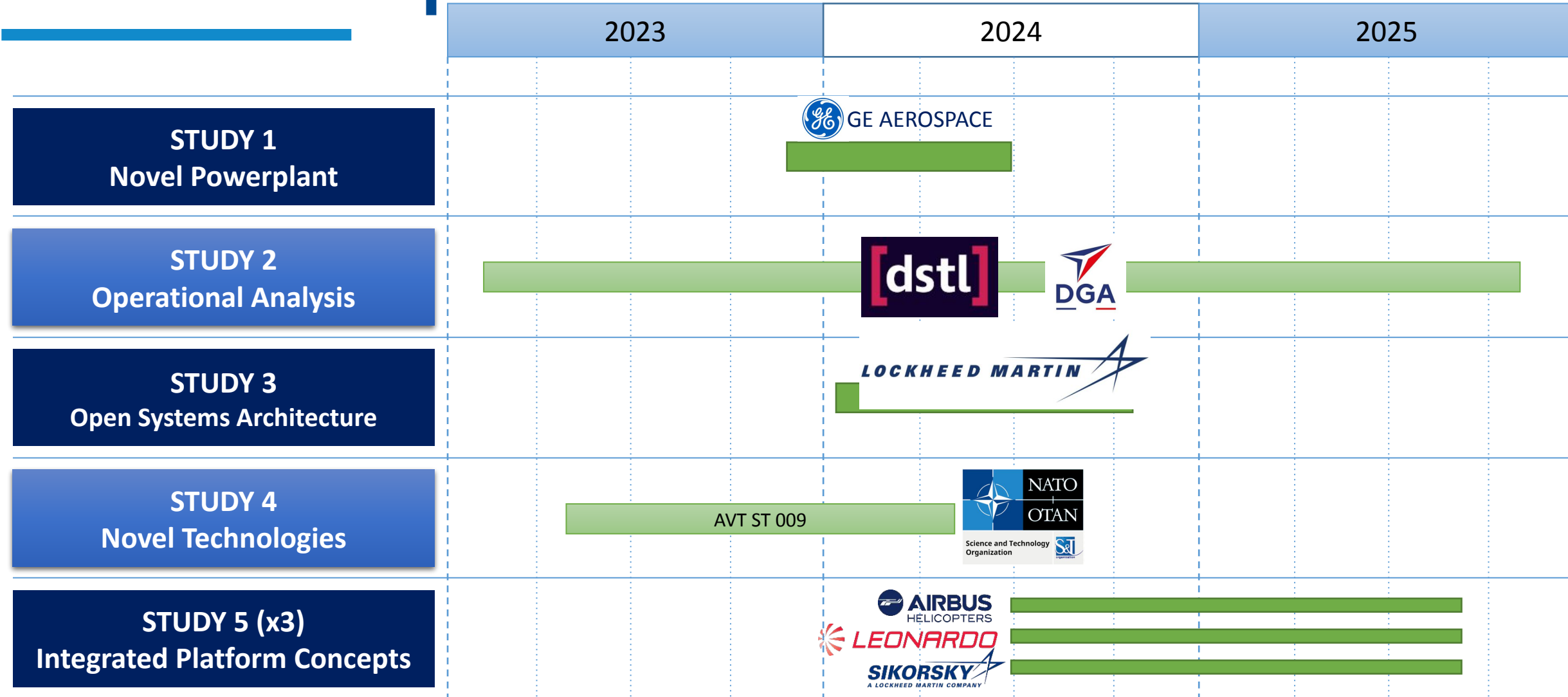


Ground based  
planning station



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# NGRC Concept Studies



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## CONCEPT STUDY #1 NOVEL POWERPLANT

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# Concept Study #1 – Quantitative Analysis

- Determine aircraft & propulsion system sizing to meet the NGRC mission requirements at different max cruise speeds (180, 200, 220 kias)
- Compare performance & cost for each aircraft configuration/propulsion combination

## Aircraft configurations:



Advanced Single Main Rotor



Compound, Co-axial Main Rotor



Compound Lift & Thrust



Twin Tilt-rotor

## Powerplant configurations:



Gas Turbine  
(in-service tech)



Hybrid Electric



Gas Turbine  
(next gen 2025 tech)



Hybrid Hydrogen  
fuel cell



Gas Turbine  
(next gen+ 2035 tech)







Hydrogen  
combustion





# Concept Study #1 – Quantitative Analysis

Aircraft Configuration	Flight Speed (kias)	Engine Type					
		In-service GT	GT 2025	GT 2035	Hybrid Electric	Hybrid Fuel Cell	H2 Combustion
 Compound L&T SMR	180	A1	A2	A3	A4	A5	A6
	200	B1	B2	B3	B4	B5	B6
	220	C1	C2	C3	C4	C5	C6
 Advanced SMR	180	D1	D2	D3	D4	D5	D6
	200	E1*	E2*	E3*	E4*	E5*	E6*
	220	F1*	F2*	F3*	F4*	F5*	F6*
 Compound T CMR	180	G1	G2	G3	G4	G5	G6
	200	H1	H2	H3	H4	H5	H6
	220	I1	I2	I3	I4	I5	I6
 Twin Tilt Rotor	180	J1	J2	J3	J4	J5	J6
	200	K1	K2	K3	K4	K5	K6
	220	L1	L2	L3	L4	L5	L6

\*200 and 220 kias cases did not converge for the Advanced SMR



# Concept Study #1 - Qualitative Analysis

	Technical Requirements											Integrated Logistics and Support			Score
Weight	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
Gas Turbine	2.7	2.0	2.8	2.1	3.0	2.8	3.0	3.0	3.0	2.0	3.0	2.8	3.0	2.7	
Hybrid Electric	2.0	2.5	2.8	1.5	2.5	2.2	1.8	2.0	2.5	2.0	1.9	2.0	2.0	2.1	
H2 Fuel Cell Hybrid	1.7	2.0	2.3	2.1	2.3	2.2	1.0	1.0	1.0	2.0	1.8	1.7	1.6	1.7	
H2 Combustion	1.7	2.0	2.0	2.1	1.8	1.8	1.0	2.0	1.0	2.0	1.7	2.0	2.0	1.8	

Industrial Development Strategies  
 Civilian Aviation v. Military Aviation  
 Operational Capability  
 Operating Environment  
 Mission Readiness  
 Platform Protection / Vulnerability  
 Interoperability / Commonality  
 Technology Readiness Level (TRL)  
 Certification / Airworthiness  
 Environmental legislation  
 Supply and logistics  
 Through-life support  
 RAMST

Technical & supportability considerations

Impacts (Results)



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# Concept Study #1 – Key findings



GT next gen 2025 tech - likely best option

- Life Cycle Cost perspective
- Meet minimum capability requirements



GT next gen +2035 tech – Further investigation

- Life Cycle Cost further analysis (Development cost)
- Capability improvement



Electric Hybrid – Further investigation

- Increased Life Cycle Cost (Development costs)

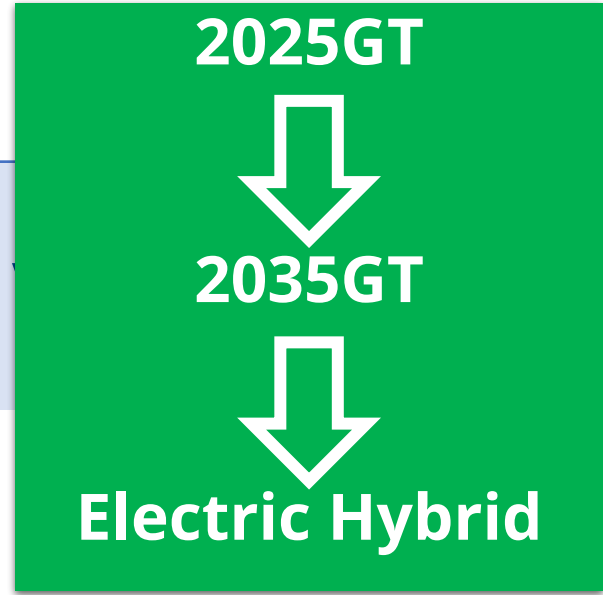


Hydrogen – not viable

- Doesn't meet NGRC Attributes



Platform development should consider provisions for Spiral Upgrade





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## CONCEPT STUDY #3 OPEN SYSTEM ARCHITECTURES

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# Concept Study #3 – Objectives

Identify & demonstrate OSA concepts that

- support the NGRC Attributes and
- form a cohesive OSA approach across the entire system

Identify enterprise and business enablers of OSA and Digital Engineering including any potential barriers to adoption





# Concept Study #3 – Aims & Outcomes

A  
I  
M

Identify, analyse and compare OSA concepts



← potentially fulfil NGRC capability requirement / full recognition of the NGRC Attributes →



Solution agnostic

Comparative analysis

O  
U  
T  
C  
O  
M  
E

Provide NSPA with knowledge and understanding of relevant OSAs and their enabling digital ecosystems to help inform assessment of future integrated platform concepts □ Study #5



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## CONCEPT STUDY #5 INTEGRATED PLATFORM CONCEPTS

---



# Concept Study #5

A  
I  
M

Each Contractor to recommend  
up to 2 Integrated Platform Concepts



Potentially fulfil NGRC  
capability requirement:  
- Attributes  
- CONOPS



O  
U  
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E

Preferred Concept to support:

- Drafting of the initial set of NGRC Requirements
- Initiation of Concept Design activities



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## WHAT NEXT?

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# Next Generation Rotorcraft Capability

- MoU Amendment 1



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# Next Generation Rotorcraft Capability

- MoU Amendment 2
- Concept Design activities

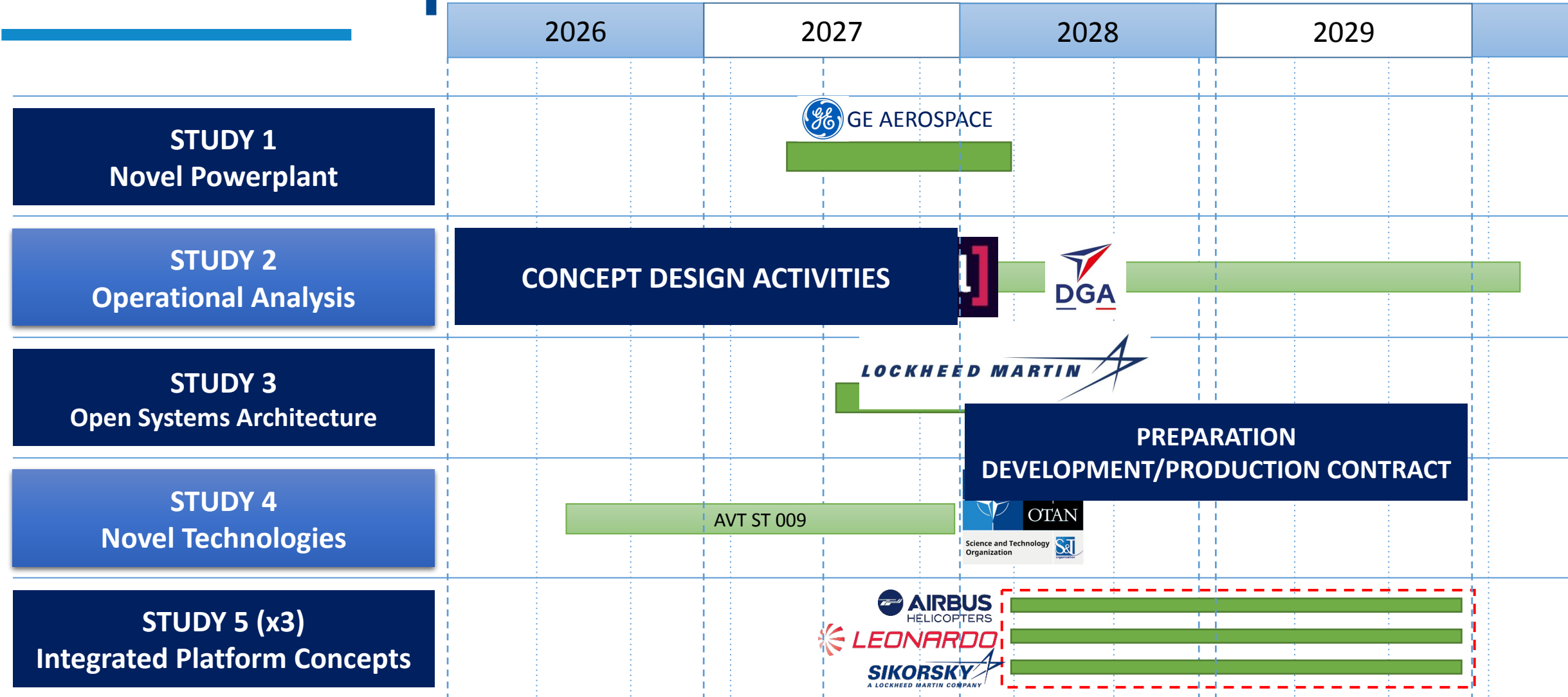


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# NGRC Concept Studies



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# QUESTIONS

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