Lucintel
Insights that Matter

Growth Opportunity in Global UAV Market

Lucintel Brief

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Executive Summary

- **UAS (Unmanned Aircraft Systems) are an emerging sector of the aerospace industry with great opportunity and market demand that can be leveraged to high profitability in the near future.**
  - UAS market includes all unmanned vehicles such as UAVs, blimps and zeppelins
  - Unmanned Aerial Vehicles (UAVs) are the most predominant segment of the UAS market
- **Global UAV market spending was $7.5 billion in 2013 and expected to reach $11.3 billion in 2020 with a CAGR of 5.7% from 2014 to 2020**
- **Defense spending is growing more towards unmanned aircraft rather than manned aircraft.**
  - Increase in home land security system and war against terrorism around the world are the key drivers of growth in the UAV industry
  - There will be significant growth in UCAVs driven by low cost and its capability in undertaking high threat task.
- **USA contribute approx. 70% of global UAV market. European countries depicted mixed growth in UAV market due to defense budgetary constraints. Asian countries growth is driven by increasing defense expenditure from emerging economies such as India, China and Middle East countries**
- **Increase in awareness, mission capabilities of UAVs and increase use of composites are driving innovations and new applications**
- **Half of the expenditures on UAV are dedicated for research and development**

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UAS includes all Unmanned Vehicles such as UAVs, Blimps and Zeppelins

UAVs

- Unmanned Aerial Vehicles (UAVs) are remotely piloted or self-piloted aircraft that can carry cameras, sensors, communications equipment or other payloads
- UAVs are smaller than manned aircraft and therefore more easily and more cost-effectively stored and transported
- UAVs make significant contributions to the fighting capability of operational war forces

Blimps

- Blimp (technically called a “pressure airship”) is a powered, steerable, lighter-than-air vehicle
- Blimps are simply shaped balloons with fins and an engine and has no rigid internal structure; if a blimp deflates, it loses its shape
- Blimps are best known today for their role as advertising, promotional vehicles and primary military use is for anti-submarine and reconnaissance roles

Zeppelins

- Zeppelins are rigid or semi-rigid airship
- Zeppelins have rigid metal skeleton, making them suitable for longer trips in a wider variety of weather conditions (which also makes them expensive)
- Zeppelins were used for passenger transport as well as for military purposes; after World War I, zeppelins were extensively used as bombers and scouts

Major Applications of UAS (Unmanned Aircraft Systems)

	Applications	UAV	Blimps	Zeppelins
Civil	Natural Disasters	◔	◑	◑
	Humanitarian Relief	◑	○	○
Commercial	Environment	◔	◑	◑
	Weather & Strom tracking	◔	◕	◑
	Advertisement	○	◕	◑
Military/Security	Defense	◕	◑	◔
Science	Wireless Communications	◕	◑	◑
	Precision Agriculture	◔	◔	◔
	Cargo Transport	◔	◑	◑

● High ◕ Medium to High ◑ Medium ◔ Low ○ Least

Key Insight

UAVs: Challenging in dangerous environment and expensive relative to blimps

Blimps: Low-tech and relatively low cost component

Zeppelins: Equipped with powerful engines and capable to lift heavier loads

Relative threat of Blimps/Zeppelins to Established UAV Applications

Segments	Applications	Strength of UAV	Strength of Blimps/Zeppelins	Conclusion for market potential of Blimps/Zeppelins
Civil	Natural Disasters/ Humanitarian Relief	• Data captured from disasters or crises area	• Sky lifters support combat operations	Practice of Blimps/ Zeppelins are high
Commercial	Environment/ Weather & Storm tracking	• Outstanding for sensitive area such as hurricane • Used for precise data collection	• Excellent for constant access of data • Low operating cost	Usage of UAVs is positive but market share of Blimps/Zeppelins is high
	Advertisement	• UAVs are not used for advertisement activities	• Highly active • Low cost advertisement & promotions	Blimps/Zeppelins capture entire advertising market
Military/ Security	Defense	• Reconnaissance & surveillance • Missile capabilities	• Low operating cost • Keep eye on wide areas for very long periods of time	UAVs capture very large share relative to Blimps/Zeppelins
Science	Wireless Communications	• Outstanding for sensitive areas	• Excellent for constant access for high-speed data and voice communications • Low operating cost	Usage of Blimps/ Zeppelins is positive but market share of UAV's is high
	Precision Agriculture/ Cargo Transport	• Used for precise data collection	• Higher cargo capacity • Capable to lift heavier loads	Adoption of Blimps/ Zeppelins is optimistic

UAVs are divided by Class Categories on the basis of Range or Endurance or both

UAV Classes	UAV-Close Range (UAV-CR)	UAV-Short Range (UAV-SR)	UAV-Endurance (UAV-E)
			
Range	Approx. 50 Km	200 KM	More than 200 KM
Endurance	30 min–2 hours	8 to 10 hours	Minimum 24 hours
Weight	2–10 lbs	<10,000 lbs	<2,29,000 lbs
Speed	-	<300 mph	<454 mph
Altitude	<1000 ft	<50,000 ft	<65000 ft
Pay load	-	<3800 lb	<1,900lb
Cost	$500–$1500	<8,000,000	<$123,000,000

UAV class categories are selected to achieve the required flexibility and capability of organized task

UAVs are divided on the basis of Different Type

UAVs	Description	Example
Mini UAVs	Small UAV launched by person	 AeroVironment RQ-11 raven
Tactical UAVs	UAV used for reconnaissance with endurance of several hours and operating radius of 200 km or less	US Shadow  French Sperwer 
MALE UAVs	Medium Altitude/Long Endurance UAV with endurance of about 24 hours and long range capability used for operational reconnaissance.	 Predator  Eagle
HALE UAVs	High Altitude/Long Endurance UAV with endurance of a day or more and long range capability used for strategic reconnaissance	Global Hawk 
UCAVs	Uninhabited Combat Air Vehicle, High performance UAV designed primarily for ground attack.	 X-47B

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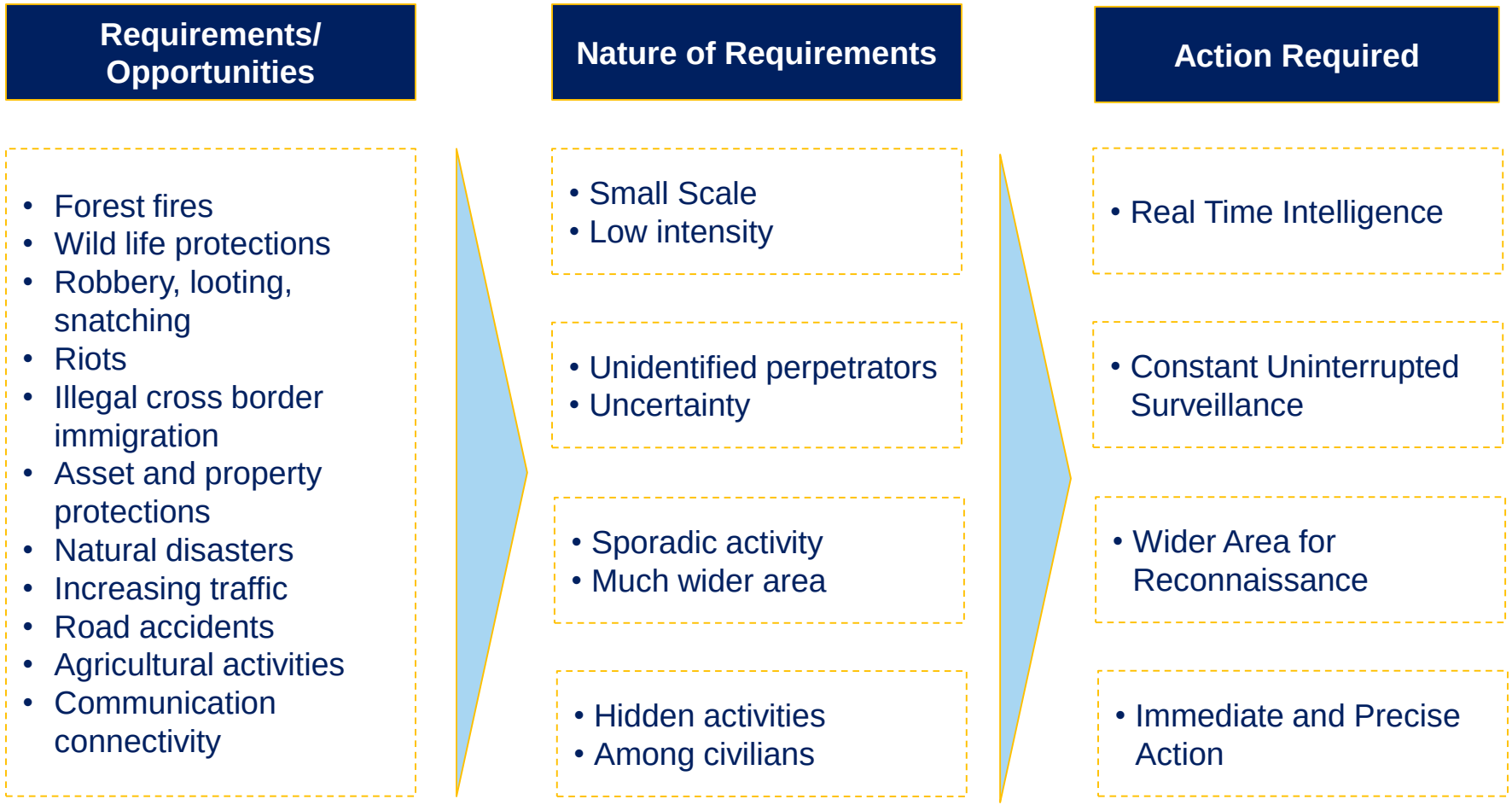
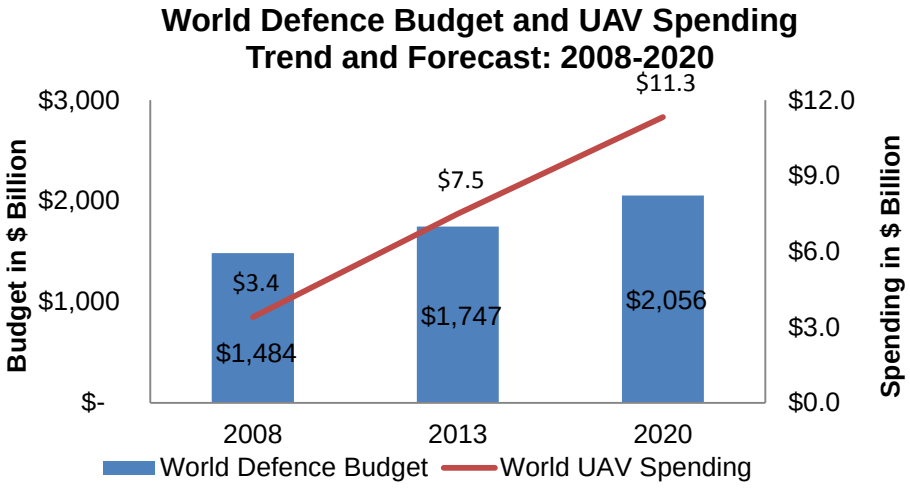
Opportunities in Civil and Commercial UAV Market

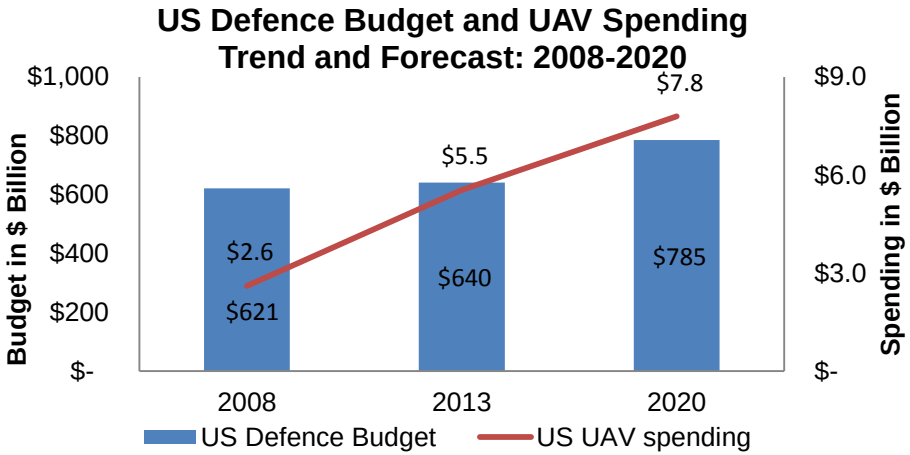


Opportunities in Defense UAV Market

Traditional Wars	New War Challenges	Action Required
• Large Scale • War at main points only	• Small Scale • Low intensity	• Real Time Intelligence
• Centralized • Formal attack	• Decentralization • No formal declaration of attack	• Constant Uninterrupted Surveillance
• Defined territory of war • Limited war field	• Undefined territory • Larger territory of activities	• Wider Area for Reconnaissance
• Away from civilians • Declared war	• Among civilians • Espionage & other hidden activities	• Immediate and Precise Action

Defense Budget & UAV Spending Trend and Forecast

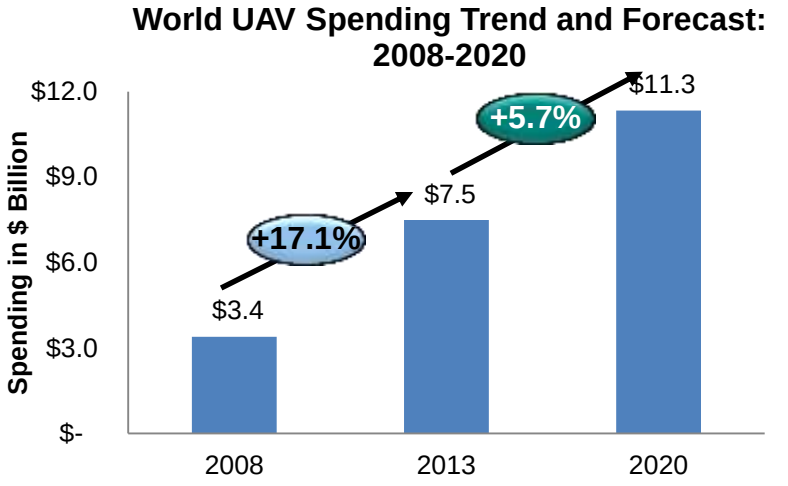


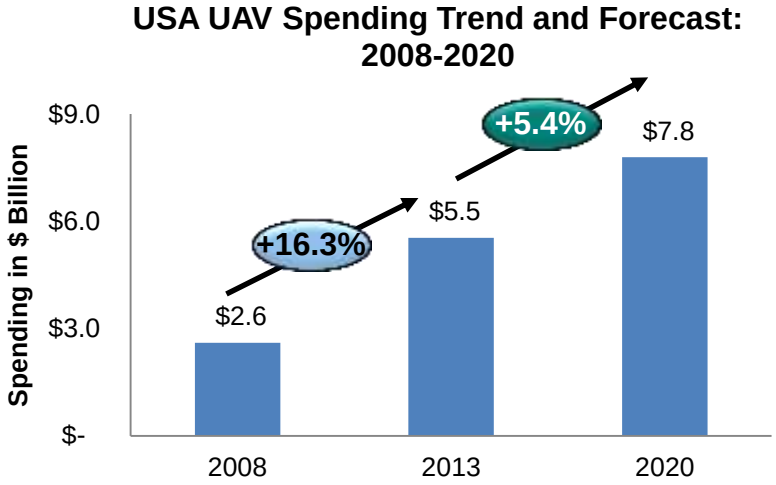


Key Insight

- Global defense budget was $1,747 billion in 2013 and expected to reach $2,056 billion in 2020
  - Global UAV expenditure comprises very small portion of global defense budget, which is approximately 0.4% of the entire defense budget across the globe
  - This portion of UAV expenditure expected to rise in the coming future, implying that UAVs will get a significant attention in defense market
- Global UAV market spending was $7.5 billion in 2013 and expected to reach $11.3 billion in 2020 with a CAGR of 5.7% from 2014 to 2020
  - Approximately half of the expenditure of UAV market spend on procurement of UAV and another half spend for Research and Development activities

UAV Market Trend and Forecast





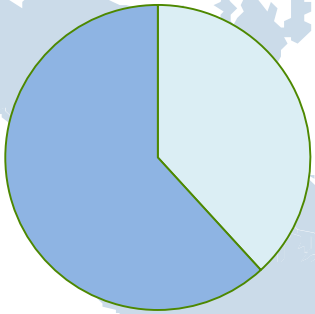
Key Insight

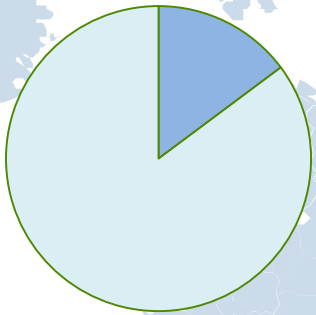
- Spending for UAVs tends to come primarily from defense budgets
  - UAV spending across the globe has received increase attention after the terrorist attack on World Trade Centre in 2001
  - USA Department of Defense increased its funding for UAV programs significantly after the attack
- UAV market spending in the USA was $5.5 billion in 2013 and expected to reach $7.8 billion in 2020 with a CAGR of 5.4% from 2014 to 2020
  - USA share in 2013 in the UAV market is 74%, whereas the USA share in total worldwide defense spending is about 37% in 2013
  - USA armed forces have witness more success with strategic endurance UAVs than with tactical short-range UAV

UAV Procurement Market by Region: Global average annual growth rate of UAV market has been projected at 5.7% through 2020

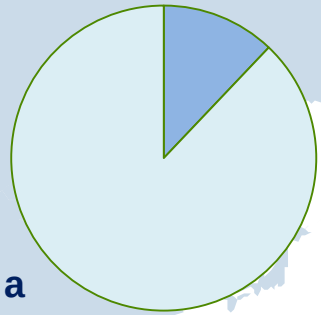
Europe UAV Market: Replace their existing aging tactical UAV with new ones

NA UAV Market: U.S accounts for more than 70% of UAV market

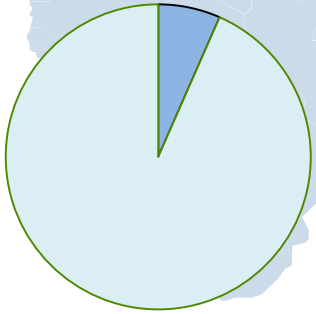




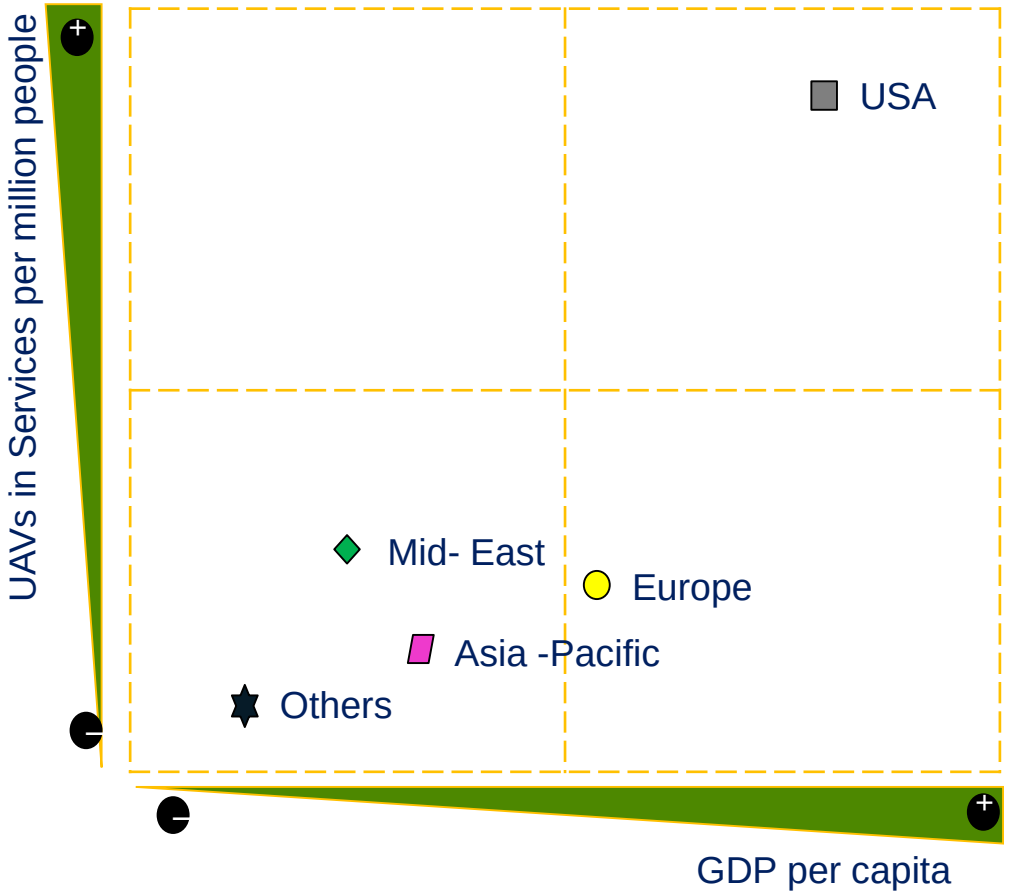
APAC UAV Market: Major UAV manufacturers are concentrated in APAC region



ROW UAV Market: Use of UAV's is experiencing a decline in under developed regions



Developing Countries have Significant Potential in UAVs



Key Insight

- USA is in the forefront of developing and deploying reconnaissance and strike UAVs
  - Accounted for more than 70% in RDT&E spending & procurement
- France and Germany have set the pace for UAV deployment in Europe
- In Mid- East region Israel was the pioneer for many of the current tactical UAV efforts and major player in UAV sales to armed forces around the globe
- Asia-Pacific region has great potential in the coming years
  - Asian countries have increased actives in UAV development

Relative Market Attractiveness of UAVs in Different Regions

Segments		USA	Europe	Mid East	Asia Pacific	Others
Civil	Natural Disasters/ Humanitarian Relief	◑	◔	◔	◔	◔
Commercial	Environment/ Weather & Strom tracking	◑	◔	◔	◔	◔
	Advertisement	○	○	○	○	○
Military/ Security	Defense	●	◕	◕	◕	◑
Science	Wireless Communications	●	◕	◕	◕	◑
	Precision Agriculture/ Cargo Transport	◔	◔	○	○	○

● High ◕ Medium to High ◑ Medium ◔ Low ○ Least

Relative Market Attractiveness of UAS (Unmanned Ariel Systems)

Parameters	UAV	Blimps	Zeppelins
Range	◕	◔	◑
Endurance	◑	◕	◕
Weight	◕	◔	◑
Speed	●	◔	◔
Altitude	◕	◑	◑
Pay load	◔	◔	◑
Cost	◔	◕	◕
Overall market attractiveness	◕	◔	◑

● High ◕ Medium to High ◑ Medium ◔ Low to Medium ○ Low

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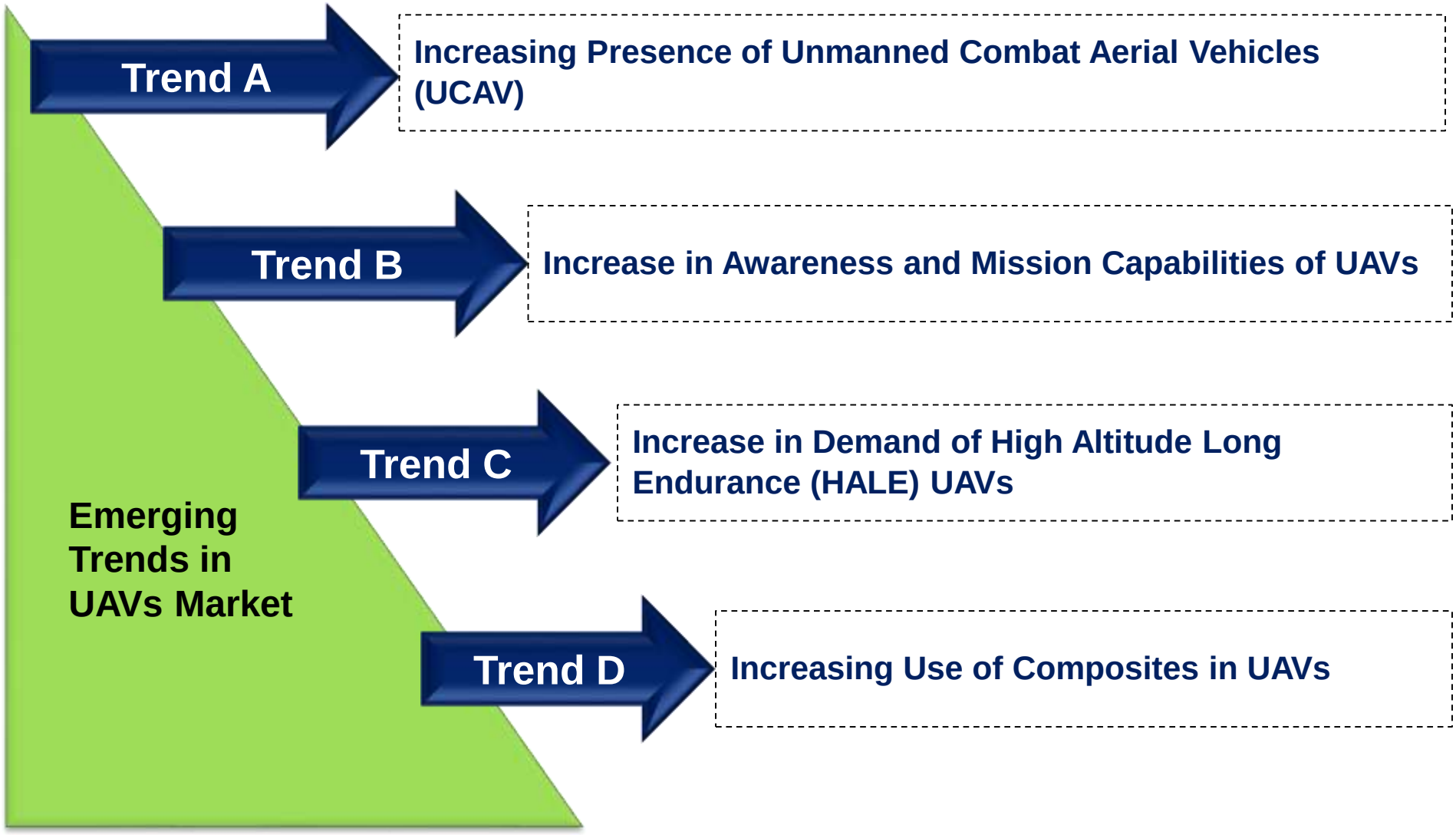
Emerging Trends in UAV Market



Trend A: Increasing Presence of Unmanned Combat Aerial Vehicles (UCAV)

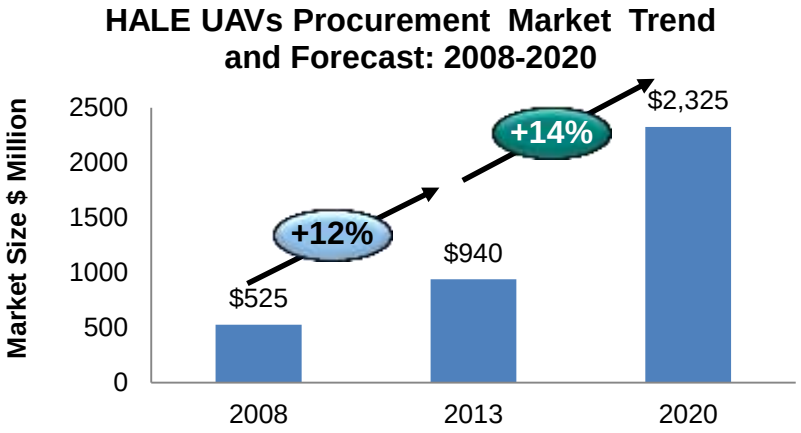
UCAV is a new segment and have a long way to go for further development. It is anticipated that fully developed product in UCAV's will take another decade

Major UCAV and their Players

Boeing X-45	Northrop Grumman X-47B	BAE Systems Taranis	Alenia Aeronautica Sky-X	Dassault Aviation Neuron
				
First Flight- 2002 Number built- 2 Endurance- 7 hr Payload- 4,500 lb MTOW- 36,000 lb	First Flight- 2011 Number built- 2 Endurance- 9 hr Payload- 4,500 lb MTOW- 46,000 lb	First Flight- 2013 EIS- After 2030 Endurance- 8 hrs Payload- MTOW- 18,000 lb	First Flight- 2005 Number built- 1 Endurance- 2 hrs Payload- 450 lbs MTOW- 3,196 lb	First Flight- 2012 Under Research Endurance- 1 hr Payload- 13,300 lb MTOW- 14,330 lb

- UCAVs is expected to replace manned fighters and provide more persistence but lesser sensor capabilities than manned fighters
- Global UCAVs expected to reach $3.2 billion in 2020

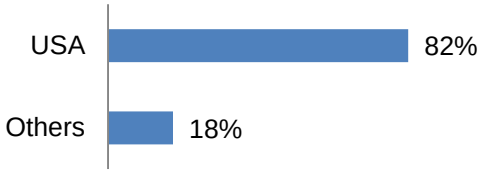
Trend B: Increase in demand of High Altitude Long Endurance (HALE) UAVs



Global Hawk

Global Hawk is the most advanced system which can loiter for more than 36 hours at the altitude of 60,000 feet or above

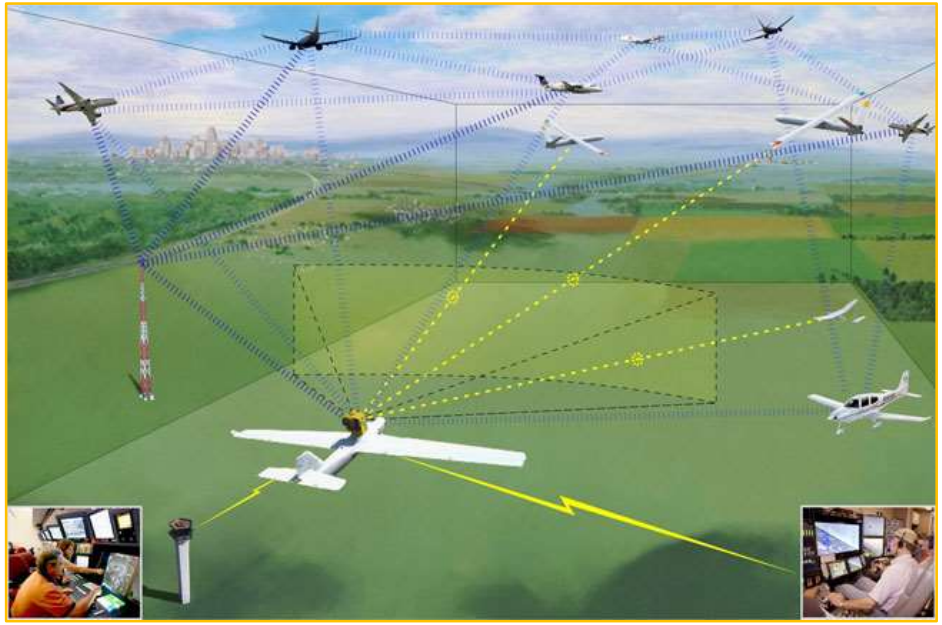
USA is highest HALE UAVs producing region with the contribution of 82%



Key Insight

- Global HALE UAVs is an attractive market with total opportunity of US $940 million in 2013
- Increasing demands for HALE due to high altitude and more endurances
  - Solar powered UAVs have a demonstrated endurance of more than 300 hours
  - Lighter materials and carbon composites are allowing UAVs to operate with longer range and carry more ordinance
- Northrop Grumman, Gulfstream Aerospace and Aerovironment are major manufacturer of HALE UAVs

Trend C: Increase in Awareness and Mission Capabilities of UAVs



UAVs can perform dangerous missions without risking human life

- One unmanned system teamed with other unmanned system and manned system to increases mission capability
- Optionally piloted vehicles and lighter than air vehicles emerge to bridge the gap between manned and unmanned capabilities
- UAVs can be a smart and cost-effective complement to traditional manned aircraft

Increase in awareness of novel use of UAVs

- UAVs used for civil and science purpose such as natural disasters, humanitarian relief, environment, weather and storm tracking
  - Data captured from disasters or crises areas
  - Outstanding for sensitive areas such as hurricanes
  - Used for precise data collection

Trend D: Increasing Use of Composites in UAVs

Use of light weight advanced composite materials reduces the weight of aircraft which helped in increasing the loitering time (endurance hours) and increasing the payload of aircrafts and also lowered the cost of structural parts of UAVs.

Advantages	Disadvantages
• Low weight • Excellent corrosion resistance • High resistance to fatigue • Ability to orient reinforcement in the direction of maximum stiffness and strength • Reduced number of assemblies and fasteners	• Higher cost· • Relative lack of established design criteria • Poor energy absorption and resulting impact damage in hard landings· • Need for lightening strike protection • Expensive and complicated inspection procedures needed.

- Earlier prototype version of ScanEagle was largely made of aluminum and composites but the current versions are made of light weight carbon composites.
- Northrop Grumman X-47 A, which is in research stage, has 45% composites of its structural weight, while it will have approximately 90% composites at the time of full production.
- Global Hawk which has 65% composites of its structural weight is likely to have 25% more composites by the year 2015.

Growth Strategies for Global UAVs Market

1. Technological advancement and improve mission capabilities

- *Technological advancement such as increase in payload and endurance limit*
- *Teamed unmanned vehicle with manned system to increases mission capability*

2. Focus on Civil segment of UAVs

- *Demand of Civil UAVs is increasing to check for damage on road and rail bridges, monitor natural disasters such as flooding and spray crops with pinpoint accuracy.*

3. Focus on HALE (High Altitude Long Endurance), UCAV Segment

- *Demand of High Altitude Long Endurance (HALE) UAVs is increasing due to high altitude and more endurances in UAV*
- *Capability of UCAV is more than 10 times higher than that of a UAVs*

Lucintel has Strong Capability in Developing Growth Strategies for Companies

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About Lucintel

Lucintel is a leading global management consulting & market research firm that helps companies in growth financing, M & A, market research and strategic consulting.

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- To provide accurate data, insights, strategy and innovation which empowers companies to make better informed decisions.

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- Team of over 120 analysts / consultants - USA / Europe / India

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- Over 1000 clients from 70 countries – Fortune 500 companies
- 15 years of proven global strategic management consulting & market research experience
- Panelists and key note speakers at leading conferences

Published Market Reports:

- Over 500 published market reports – 65 covering composites industry

Consulting Services:

- Market entry strategy, Opportunity screening, Competitive assessment, Strategic consulting, M & A services, Due diligence, Growth finance

Lucintel Ensures Strategic Insights for the Right Market Entry

"*Lucintel has its finger on the pulse of the market and drives deep Strategic Insight*"

- Andy Schmidt, MacQuarie Partners, Managing Partner

- Lucintel has performed hundreds of consulting projects in the area of M & A, market entry strategy, opportunity screening, competitive benchmarking, value chain analysis, unmet needs analysis and others in a variety of markets for last 14 years.

- Lucintel with its profound business success knowledge, has driven strategic success across the value chain from material suppliers to component makers to OEM's to Investors seeking sustainable winning strategies.

- Access to vital, hard to find insights through detailed primary and secondary research and analysis. Incomparable data accuracy and integrity

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  - No Learning Curve - Deep industry knowledge and insight. Quality, Accuracy & Depth

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Lucintel has published +500 multi-client market reports & conducted hundreds of consulting projects across multiple markets

Market Reports


Aerospace


Transportation


Marine


Construction


Renewable Energy

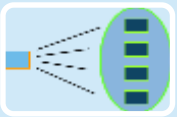

Recreational

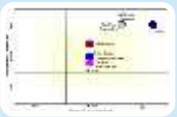

Composite Materials

Consulting


Strategic Growth Consulting

Benchmarking


Opportunity Screening


Partner Search and Evaluation


Due Diligence and M&A


Market Entry Strategy

Thank You