

Future trends/ Concerns

- Positive and negative effects of local, state, and federal regulations on use of unmanned systems
- More issues will arise with maintaining traffic management as the number of unmanned vehicles in use increases
- Drone-in-a-box (like scooters in a city) will increase drone-as-a-service use in industry (i.e., security industry)
- Emergence of artificial intelligence and increases in autonomy of drones will allow for on-demand mobility and delivery (i.e., self-driving cars and taxis, delivery of food and packages, etc.)
- Sensor advancements will increase capabilities and/or situational awareness
- BVLOS will enable UAS industry expansion and impact roles/responsibilities in UAS occupations
- With increased autonomy of systems, we run the risk of issues arising from humans not paying as close attention.
- Manufacturers are working on hybrid transportation mode or “pop up” vehicles (i.e. AirBus, Audi, and Porsche)
- Advancements in the industry will lead to additional legal implications and liability concerns with unmanned systems use
- Infrastructure necessary to implement BVLOS, extended capabilities, etc. needs to be in place first; the lack of broadband in many areas (especially rural) will limit expansion of UAS industry
- Need to develop test sites in VA for underwater unmanned vehicles

Definitions of Acronyms

AI	Artificial Intelligence	PPE	Personal Protective Equipment
AR	Augmented Reality	PPK	Post-Processed Kinematic
ATV	All-Terrain Vehicle	RF	Radio Frequency
BVLOS	Beyond Visual Line of Sight	RTK	Real-Time Kinematic
CAD	Computer-Aided Design	SD	Secure Digital
CAN	Controller Area Network	SPI	Serial Peripheral Interface
CTD	Conductivity Temperature Depth	SQL	Structured Query Language
ESC	Electronic Speed Controllers	SWAP	Size Weight and Power
FOD	Foreign Object and Debris	UAS	Unmanned Aircraft System
FPV	First-Person View	SUAS	Small Unmanned Aircraft System
GIS	Geographical Information System		
GNSS	Global Navigation Satellite System		
GPS	Global Position Satellite		
IMU	Inertial Measurement Unit		
IP	Ingress Protection		
ITAR	International Traffic in Arms Regulations		
I2C	Inter-Integrated Circuit		
LAANC	Low Altitude Authorization and Notification Capability		
LED	Light-Emitting Diode		
LIDAR	Light Detection and Ranging		
NDVI	Normalized Difference Vegetation Index		
OSHA	Occupational Safety and Health Administration		
PDB	Power Distribution Boards		

DACUM Research Chart Unmanned Systems Technician

DACUM Panel

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DUTIES		TASKS														
A	Plan unmanned systems mission	A.01	A.02	A.03	A.04	A.05	A.06	A.07	A.08	A.09	A.10	A.11	A.12	A.13	A.14	A.15
		Identify mission requirements (i.e., deliverables, objectives, etc.)	Identify areas of operation	Identify time of operations	Identify unmanned systems to use	Determine permits required for mission	Conduct safety assessment	Develop safety plan	Conduct risk assessment	Develop risk mitigation plan	Determine technical feasibility of mission	Determine operational feasibility of mission	Perform site survey*	Define operational limits	Determine ground support needs	Develop operation budget
		A.16	A.17	A.18	A.19	A.20	A.21	A.22								
		Deconflict mission resources (i.e., personnel, time, airspace, etc.)	Monitor weather conditions*	Obtain required permits	Create mission readiness plan	Create crew management plan	Assemble unmanned vehicle systems*	Report issues to management								
B	Coordinate operational logistics	B.01	B.02	B.03	B.04	B.05	B.06	B.07	B.08	B.09	B.10	B.11	B.12	B.13	B.14	B.15
		Communicate with stakeholders	Schedule site access	Coordinate local security requirements	Schedule personnel	Obtain software	Obtain hardware	Obtain ground support equipment	Obtain vendor quotes	Purchase system components	Obtain ancillary data	Load map data	Create packing list	Ship mission equipment	Secure site-specific resources (i.e., local fishing boat, data plan, etc.)	Secure environment-specific resources (i.e., battery protection, ATV, cold-weather gear, etc.)
		B.16	B.17													
		Facilitate personnel needs (i.e., food, water, shelter, etc.)	Manage travel logistics													
C	Maintain unmanned vehicle systems	C.01	C.02	C.03	C.04	C.05	C.06	C.07	C.08	C.09	C.10	C.11	C.12	C.13	C.14	C.15
		Perform progressive inspections	Research manufacturer specifications	Monitor manufacturer for updates	Perform manufacturer-recommended updates	Check manufacturer warranties	Maintain logbook entries	Verify unmanned vehicle registrations	Dissassemble unmanned vehicle systems*	Repair/replace components*	Calibrate equipment	Test system components	Maintain spare parts	Maintain system diagrams	Maintain vehicle air/sea-worthiness	Verify vehicle performance
D	Maintain unmanned vehicle power systems	D.01	D.02	D.03	D.04	D.05	D.06	D.07	D.08	D.09	D.10	D.11	D.12	D.13	D.14	
		Inspect batteries for damage	Charge batteries	Storage-charge batteries	Store batteries in lipo-safe container	Verify battery capacity	Log cell voltages	Track battery cycles	Dispose of dead batteries	Maintain battery chargers	Mix fuel	Test quality of fuel	Fill fuel containers	Store fuel in controlled environment	Change engine oil	
E	Integrate unmanned vehicle payloads	E.01	E.02	E.03	E.04	E.05	E.06	E.07	E.08	E.09	E.10	E.11	E.12	E.13	E.14	E.15
		Review specs and manuals	Identify interface requirements	Identify SWAP	Document payloads integrated configuration	Configure glider mission & data acquisition commands	Run interference tests*	Identify data storage device	Fabricate wiring harnesses	Test wiring harnesses	Define mounting requirements	Fabricate mounting hardware	Test mounting hardware	Test subcomponents	Benchtest software	Benchtest subsystem
		E.16	E.17	E.18	E.19	E.20	E.21	E.22	E.23	E.24	E.25					
		Benchtest system	Check center of gravity	Ballast glider for target water density	Update weight and balance documentation	Calibrate sensors	Verify IP has been maintained	Verify vibration levels	Perform power-up test	Replace and lube o-rings	Update maintenance records					
F	Perform pre-mission testing	F.01	F.02	F.03	F.04	F.05	F.06	F.07	F.08	F.09	F.10	F.11	F.12			
		Develop pre-mission checklist	Perform ground-to-unit system checks	Verify mission time (i.e., flight time, vehicle endurance, etc.)	Update mission log	Establish mission boundaries (e.g., geofencing)	Determine mission fuel needs	Test navigation systems	Load payload software	Create spare parts list	Troubleshoot issues	Run mission simulation	Perform mission acceptance test (i.e. flight, launch, etc.)			
G	Execute unmanned systems mission	G.01	G.02	G.03	G.04	G.05	G.06	G.07	G.08	G.09	G.10	G.11	G.12	G.13	G.14	G.15
		Run pre-mission checklist	Unpack mission equipment	Check packing list	Set-up field site	Secure mission site	Perform FOD checks	Identify alternate recovery sites	Conduct safety briefing	Conduct mission briefing	Conduct weather briefing	Establish radio communications	Perform mission-specific duties	Launch unmanned vehicle	Recover unmanned vehicle	Conduct post-mission briefing
H	Manage captured data	H.01	H.02	H.03	H.04	H.05	H.06	H.07								
		Retrieve captured data	Back-up captured data*	Index captured data	Verify data quality	Post-process captured data	Validate data satisfies requirements	Maintain physical security of data								
I	Maintain professional knowledge	I.01	I.02	I.03	I.04	I.05	I.06	I.07	I.08	I.09	I.10	I.11	I.12	I.13	I.14	I.15
		Obtain UAS pilot license	Obtain part 107 license (sUAS)	Obtain required certifications	Stay abreast of technological advances	Attend professional development conferences	Review manufacturer literature	Attend trade shows	Participate in community outreach	Participate in industry user groups	Take platform-specific courses	Train colleagues	Participate in safety training	Comply with operations manual	Stay abreast of current regulations	Maintain proficiency

* Denotes task is performed multiple times in various duties