

R&D GAPS & POSSIBLE COLLABORATORS

UAV APPLICATIONS	S&T GAPS and CHALLENGES	R&D AREAS	POSSIBLE COLLABORATORS (ACADEME / NGAs / PRIVATE)
CCA - DISASTER RISK MANAGEMENT (e.g., CLIMATE, GEO-HAZARD, AND ECOLOGICAL RISK ASSESSMENT POST-DISASTER ASSESSMENT, SAR)			
PRE – DISASTER			
LAND USE CHANGE MONITORING	Optics	Optics engineering * Manpower development	Enhance collaborations between universities and other institutions (e.g., Germany and Japan)
WEATHER AND CLIMATE MONITORING 1	Downscaled climate models	Land Use change as an input to downscaled climate models	PAGASA, MO, LGUs, Aboitiz Foundation

<p>CCA - DRRM DATABASE DEVELOPMENT AND MANAGEMENT</p>	<p>Lack of high resolution imaging technologies lightweight enough for UAV use</p>	<p>Development of methodologies for Updated and Large Scale Multi- risk maps and analysis (Spatial and Non- Spatial DRRM Database)</p> <p>UAV Systems Integration</p>	<p>PAGASA, PHIVOLCS, MGB, DENR, NAMRIA, MO, Academe, SMEs, DOH, Industries, NDRRMC, CCC, ASTI, IBM</p>
<p>GEOHAZARD/ ECOSYSTEM MONITORING (for prediction and early warning)</p> <p>2b</p>	<p>Lack of high resolution imaging technologies lightweight enough for UAV use</p>	<p>Multi-spectral camera (hardware)</p> <p>Ground truthing sensor networks</p>	<p>Mining Firms, FARMCs, PHIVOLCS, MGB, DENR, ASTI, NAMRIA, Academe, NDRRMC, Private Stakeholders</p>

POST – DISASTER

<p>DAMAGE ASSESSMENT</p>	<p>Lack of high resolution imaging technologies lightweight enough for UAV use</p>	<p>Multi-spectral camera (hardware) Ground truthing sensor networks</p>	<p>Mining Firms, FARMCs, PHIVOLCS, MGB, DENR, ASTI, NAMRIA, Academe, NDRRMC, PAGASA, OCD, Private Stakeholders, International and Regional Banks, Humanitarian Agencies, Insurance Companies</p>
<p>SEARCH AND RESCUE</p>	<p>Lack of high resolution imaging technologies lightweight enough for UAV use</p>	<p>HR development for Grid Search Analysis of UAV imageries</p>	<p>Emergency Services Groups from other countries, OCD, NDRRMC, AFP, DILG, BFP, PNP, Mountaineering and Outdoor Groups</p>

EMERGENCY COMMUNICATION	Radio Frequency Interference	Radio Frequency Use of TV white space Development of Communications Protocols	Academe, DOTC, ASTI, AFP, NTC, Emergency Services Groups from other countries, OCD, NDRRMC, DILG, BFP, PNP, Mountaineering and Outdoor Groups
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<p>TRANSPORT (e.g., humanitarian supply delivery, services, etc.)</p>	<p>High payload (2-5kg) with long endurance (at least 5 hours)</p> <p>Delivery method</p>	<p>Parachute/Glider Development for with appropriate containers for payload drops</p> <p>Materials Development for the impact resistant containers</p> <p>Target Acquisition</p>	<p>USAID, Global Fund, DILG, DOH, NDRRMC, AFP, DPWH</p>
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AGRICULTURE and ECOSYSTEM MONITORING

<p>WATER SOURCE AND QUALITY SUPPLY MONITORING (e.g., watershed survey and management, irrigation, etc.)</p> <p>2a</p>	<p>Lack of high resolution imaging technologies lightweight enough for UAV use</p>	<p>Multi-spectral camera (hardware)</p> <p>Ground truthing sensor networks</p>	<p>NIA, FMB, DENR, LLDA, DILG, NWRB, NAMRIA, BSWM, MMWSS</p>
<p>RESOURCE MAPPING AND MONITORING</p>	<p>Lack of high resolution imaging technologies lightweight enough for UAV use</p>	<p>Multi-spectral camera (hardware)</p> <p>Ground truthing sensor networks</p>	<p>NAMRIA, DENR, DA, DOST, PCA, Academe, CG Centers, DENR, DOST, PCA, SRC, IRRI, Phil Rice, WWF</p>

<p>PRECISION AGRICULTURE</p> <p>AQUACULTURE MONITORING AND IMPACTS ASSESSMENT</p> <p>4</p>	<p>Alternative Production Systems</p> <p>Imaging Technology</p>	<p>Simulation and Modeling</p> <p>Ground Truthing and Water Surface sensors (e.g., Crop health monitoring, Integrated Pest Management, Abiotic Stress Assessment, Phenotyping)</p>	<p>Academe, CG Centers, DENR, DA, DOST, PCA, SRC, IRRI, Phil Rice, WWF</p>
<p>SOIL MAPPING</p> <p>7</p>	<p>Spectral technique</p>	<p>Multi-spectral camera (hardware)</p> <p>Ground truthing sensor network</p>	<p>BSWM, FMB, DA, DOST, DENR, DA, DOST, PCA, Academe, CG Centers, DENR, DOST, PCA, SRC, IRRI, Phil Rice</p>

URBAN APPLICATIONS

TRAFFIC MANAGEMENT	Balloon Technology Tethered UAV	Helium and other materials for the Balloon UAV Implementation and Systems Integration	MMDA, DOTC, PNP
ROAD CONDITION MONITORING	Imaging Technology	High Resolution camera Image processing techniques	MMDA, DILG, DPWH
BUILDING INSPECTION	LiDAR image technology	Software to do measurements Image processing techniques	UAP, PHIVOLCS, DILG, LGUs, NDRRMC
URBAN PLANNING	LiDAR image technology	Software to do measurements Image processing techniques	UAP, PHIVOLCS, DILG, LGUs, NDRRMC, HLURB

MEDIA APPLICATIONS (i.e., News and entertainment)	Government regulations and policies on UAV use	N/A	LGUs, CAAP, Media Practitioners
MILITARY USE			
INTELLIGENCE SURVEILLANCE AND RECONAISSANCE (ISR) 5	Endurance/ Range Imaging Communication and Data link Data Security and Management	Power plant Cameras and Sensors RF Assignment Encryption and Decryption of Data	Academe, DND-AFP, DOST, Foreign Governments, AFRDC
STRIKE	Payload Stability Endurance and Range Guidance and Control	Materials Aerodynamics Materials Precision automation	Academe, DND-AFP, DOST, Foreign Governments, AFRDC

COMBAT SUPPORT	Payload	Materials	Academe, DND-AFP, DOST, Foreign Governments, AFRDC
HUMANITARIAN ASSISTANCE AND DISASTER RESPONSE 6	Interconnectivity Payload	Communications Materials	Academe, DND-AFP, DOST, Foreign Government, Telcos, NTC, AFRDC
SECURITY PERIMETER MONITORING/ PERSISTENT SURVEILLANCE	Insurance Guidance and Control	Muti-spectral Imaging Technology Electronics Automation	DOST, NTC, Mining Firms, AFRDC