

IAF SYMPOSIUM ON INTEGRATED APPLICATIONS (B5)  
Integrated Applications End-to-End Solutions (2)

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## DOWNSTREAM APPLICATIONS OF SPACE FOR SAFETY AND SECURITY

**Abstract**

The European Space Agency's Business Applications Space Solutions (BASS) programme supports the study, development and demonstration of space-enabled commercially sustainable services. Specifically, the use of satellite communications, earth observation, and navigation in market verticals including maritime, energy, agriculture, finance, infrastructure, and beyond. Recent events have shone a spotlight on national and international vulnerabilities with respect to safety and security, whether in relation to geo-political tensions, environmental threats, cybersecurity events or public health crises. Through activities run under ESA's BASS programme, space-enabled services have shown to support the prevention, mitigation, detection, response and/or recovery from such events. In doing so offsetting emerging threats to physical infrastructure, cyberspace, the environment, and public health. Examples of such services include structural integrity monitoring systems using GNSS (Global Navigation Satellite System) receivers complemented by a suite of sensors to detect impending structural failures of bridges in Italy. GNSS has been used to guide drones to deliver personal protective equipment and CV-19 test samples in Scotland throughout the pandemic, and to provide the positioning information for predictive analytics on the traffic conditions of U.K. roads such that highway managers can mitigate or pre-empt impending accidents. Machine learning algorithms applied to satellite imagery allowed ecological consultants to identify whale populations that otherwise would not have been detected and in doing so acknowledge and preserve their habitats. Satellite communications provided connectivity to smart cameras to alert of potential poachers in conservation parks preventing attacks on the animals therein, and it connected remote weather stations to report on hazardous weather conditions along railways for improved infrastructure management. All of these resulting in novel services and the exploitation of space technology to improve public safety and security. As new challenges emerge in the global landscape, new solutions and services will be necessary to effectively respond. ESA's BASS programme enables companies to study, develop and demonstrate such solutions to pave the way to a safer and more secure world for us all.