

Integration of Unmanned Aircraft Systems (UAS) into Operations Conducted by New England Departments of Transportation

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Research Objectives

The objective of this research is to provide guidance to New England state DOTs regarding effective practices for integrating UAS technology into daily operations.

Methodology

In order to achieve the aforementioned objectives, the planned research approach is:

- Gather and analyze state of the practice data on industry and New England state DOT insights through a literature review and targeted interviews.
- Gather market data on UAS hardware/software components and related support systems.
- Conduct case studies on optimal combinations of UAS technology and transportation operations applications.
- Define New England state DOT processes for airspace authorization/waivers.
- Develop procedures for selected applications of UAS technology.
- Issue findings and recommendations.

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Figure 1. Bridge inspection using a multicopter UAS.



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Figure 2. Multicopter UAS for measuring final quantities.

Suitable Applications

An initial scan of existing literature and targeted interviews uncovered several popular transportation-related applications including traffic monitoring, structural inspection, construction inspection, surveying and mapping, environmental assessment, emergency and incident response, and public outreach and engagement. Using available information, the efficacy of each application was analyzed using certain criteria shown in Table 1. It appears that the use of UAS improves upon traditional methods for each application, some more significantly than others. However, further analysis is required to validate these findings.

Table 1. Initial analysis on the efficacy of using UAS compared with traditional methods of performing each application.

| Criteria | Traffic Monitoring | Structural Inspection | Construction Inspection | Surveying and Mapping | Environmental Assessment | Emergency and Incident Response | Public Outreach and Engagement |
|---|--------------------|-----------------------|-------------------------|-----------------------|--------------------------|---------------------------------|--------------------------------|
| Effectiveness in achieving objectives | High | High | High | Medium | Medium | High | High |
| Efficiency in performing required tasks | Low | Medium | Medium | Medium | Medium | Medium | Medium |
| Safety improvements | Medium | High | Medium | High | High | High | Low |
| Cost/Labor Savings | Medium | Medium | Medium | Medium | Medium | Medium | Medium |

Next Steps

Upcoming tasks include identifying current technologies and support systems necessary for specific transportation applications through a targeted market analysis and industry outreach. The research team will then address challenges associated with integrating UAS technologies and complying with federal regulations and rules through case studies at each New England state DOT. These tasks will inform the development of procedures and guidelines for deploying UAS technology in priority areas. The final report will include specific implementation plans for integrating UAS technology at the New England state DOTs.