TECHNICAL REPORT

ISO/TR 23629-1

First edition
2020-04

UAS traffic management (UTM) —

Part 1:
Survey results on UTM

Reference number
ISO/TR 23629-1:2020(E)

ISO copyright office
CP 401 • Ch. de Blandonnet 8
CH-1214 Vernier, Geneva
Phone: +41 22 749 01 11
Fax: +41 22 749 09 47
Email: copyright@iso.org
Website: www.iso.org

Published in Switzerland

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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

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For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT) see www.iso.org/iso/foreword.html.

This document was prepared by Technical Committee ISO/TC 20, *Aircraft and space vehicles*, Subcommittee SC 16, *Unmanned aircraft systems*.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

UAS traffic management (UTM) —

Part 1:
Survey results on UTM

1 Scope

This document provides results of a survey on UTM which indicates aggregated data from survey respondents. It does not cover detailed analysis of regions and organizations.

UTM is expected to reveal hundreds of commercial applications already in place, as well as social systems as their background conditions. The results can be used to analyze benefits and gaps for possible future standardization topics in consultation with authorities such as ICAO.

2 Normative references

There are no normative references in this document.

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

— ISO Online browsing platform: available at https://www.iso.org/obp

— IEC Electropedia: available at http://www.electropedia.org/

3.1
detect and avoid
DAA
capability to see, sense or detect conflicting traffic or other hazards and take the appropriate action to comply with the applicable rules of flight

Note 1 to entry: The definition is adapted from Reference [2].

3.2
unmanned aircraft system
UAS
aircraft and its associated elements which are operated remotely or autonomously

[SOURCE: ISO 21384-4:—, 3.79]

4 UTM survey

4.1 General

This survey is composed of part 1 and part 2. The survey period is March 3, 2019 to March 22, 2019. ISO/TC 20/SC 16 conducted a survey to gather information about UAS traffic management around the world. Part 1 is a survey of selection type. Part 2 is a follow-up survey of part 1 for the respondents to provide free responses. During the survey period, 107 people responded to part 1, 16 people responded to part 2. In part 1 and part 2, it's not required to provide responses to all items.

4.2 UTM survey items

4.2.1 UTM survey part 1

This subclause describes the UTM survey part 1 that focused on the interest on UTM.

Q1. What is your level of interest or involvement in the development of UAS traffic management (UTM) systems?

a. I am developing or helping to develop a UTM system, or will be directly impacted by a UTM system in the future. → Q2

b. I am interested in UTM systems and would like to receive periodic updates on the work of ISO group on UTM. → Q5

Q2. Which of the following are you?

a. UTM system developer

b. UAS (unmanned aircraft systems) operator

c. UAS service supplier (provider)

d. Air navigation service provider

e. Data service provider

f. UAS manufacturer

g. ATM (air traffic management)-related

h. Others ( )

Q3. What are the key applications of a UTM system for you?

a. Delivery

b. Construction

c. Measurement or surveying

d. Inspections of infrastructure

e. Aerial photography

f. Surveillance and security

g. Agriculture

h. Urban air mobility

i. All of the above

j. Others ( )

Q4. What do you expect for standardization on UTM?

a. Safety and quality requirements

b. General functional requirements

c. Requirements for specific use cases

d. UTM architecture

e. Data structure, identification and control

f. Interface between ATM and UTM

g. All of the above

h. Others ( )

i. None

Q5. Please provide your contact information (all fields required):

First name:

Last (family) name:

Company/Organization:

Email address:

4.2.2 UTM survey part 2

This subclause describes the UTM survey part 2 items.

1. What are the key applications of an unmanned traffic management (UTM) system?
2. What are the key capabilities that you would like to see a UTM deliver?
3. What are the key safety considerations which must be addressed within a UTM?
4. Please provide a list of stakeholders that you believe would need to be involved in the development of the international standard.
5. What is the status of regulations around UTM in your country (roadmap related to UTM, necessary regulation development)?
6. Who are potential actors in the implementation of a UTM in your country/area/region (who ordered the core system, the budget) ?
7. What are the requirements for implementation (necessary standards to assist the implementation, quality assurance)?
8. What are the comparative advantages and features of the above UTM ecosystem?
9. Are there any technical challenges or regulatory issues preventing the establishment of the UTM ecosystem?

4.3 UTM survey results

4.3.1 UTM survey part 1

UTM survey part 1 consists of 5 items and received answers from 107 people. The results show the number of responses and the voting rate. The rate is rounded to the nearest whole number.

Table 1 shows the result of Question 1 that 75 % of the survey respondents are involved in UTM development.

Table 1 — Survey part 1 result 1

Q.1	What is your level of interest or involvement in the development of UTM?	Number	Rate
a.	I am devoloping or helping to develop UTM systems, or will be directly impacted by UTM systems in the future.	80	75 %
b.	I am interested in UTM systems and would like to receive periodic updates on the work of ISO group on UTM.	27	25 %

Table 2 shows the result of Question 2. Question 2 examines the role of the respondent and allows multiple answers. The most voted answer is UTM system developer. The next voted answer is UAS service supplier (provider). In this document, a UAS service supplier is a person who provides services using UAS, e.g., aerial photography, infrastructure inspection, logistics services. From this result, it becomes clear that there are many UTM developers and UTM users. Other answers include aviation authority, airports, regulator, cybersecurity design, etc.

Table 2 — Survey part 1 result 2

Q.2	Which of the following are you?	Number	Rate
a.	UTM system developer	29	27 %
b.	UAS operator	20	18 %
c.	UAS service supplier (provider)	26	24 %
d.	Air navigation service provider	5	5 %
e.	Data service provider	13	12 %
f.	UAS manufacture	7	7 %
g.	ATM (air traffic manegememt)-related	5	5 %
h.	Others (airports, aviation autority, ardupilot development , cybersecurity design, developing standards for UTM, international regulator and so on)	17	16 %

Table 3 shows the result of Question 3. Question 3 examines the key applications of UTM. The results show that the respondents believed that urban air mobility and inspection of infrastructure would be the key application for UTM. In this survey, UTM system and UAS are mixed. This will be reviewed after UTM functions and services are defined in ISO.

Table 3 — Survey part 1 result 3

Q.3	What are the key applications of a UTM system for you?	Number	Rate
a.	Delivery	8	11 %
b.	Construction	0	0 %
c.	Measurement or surveying	5	7 %
d.	Inspections of infrastructure	13	17 %
e.	Aerial photography	2	3 %
f.	Surveillance and security	8	11 %
g.	Agriculture	1	1 %
h.	Urban air mobility	14	18 %
i.	All of the above	11	14 %
j.	Others (detection and tracking, UAS training ,UTM-ATM integration traffic monitoring and incident response, fire protection and so on)	14	18 %

Table 4 shows the result of Question 4. Question 4 examines what to expect for UTM standardization. The most voted answer is safety and quality requirements. The next voted answer is interface between ATM and UTM. From this result, it becomes clear that safety and quality requirements are most expected and data linkage with ATM is important.

Table 4 — Survey part 1 result 4

Q.4	What do you expect for standarization on UTM?	Number	Rate
a.	Safety and quality requirements	22	28 %
b.	General functional requirements	10	13 %
c.	Requirements for specific use cases	3	4 %
d.	UTM architecture	9	11 %
e.	Data structure, identification and control	10	13 %
f.	Interface between ATM and UTM	15	19 %
g.	All of the above	5	6 %
h.	Others (interface, cybersecurity, data exchange format and so on)	5	6 %
i.	None	0	0 %

Table 5 shows Question 5. This survey result is private according to the policy.

Table 5 — Survey part 1 result 5

Q.5	Please provide your contact information (all fields required):
First name:	
Last (family) name:	
Company/Organazation:	
Email address:	

4.3.2 UTM survey part 2

UTM survey part 2 consists of 9 items. Survey results are described below. The result of Question 4 is undisclosed in accordance with the survey policy.

Table 6 shows the result of Question 1. Question 1 examines the key applications of the UTM system.

Table 6 — Survey part 2 result 1

Q.1	What are the key applications of an unmanned traffic management (UTM) system?
— Separation of RPA, situational awareness of active RPAS operations, situational awareness of developing RPAS operating environment (e.g. weather). — Commercial, recreational, governmental. — Regional traffic management of unmanned BVLOS operations in VLL over rural, sub-urban and urban areas. — Cooperative separation, intent sharing, manage by exception, digital exchanges and not overloading air traffic control system. — Enable deconflicting of airspace between manned & unmanned aircraft. Allow UAS to use the same airspace safely. Help enable BVLOS operations. — Tracking - to create a visibility on drone operations, interoperability with ATM. — Support all operations of manned and unmanned aircraft flying below 3000 ft AGL, whether in VLOS over rural areas or in BVLOS along ATS routes dedicated to UAS, carrying cargo or passengers over urban areas and covering all the traffic management phases (i.e. from flight plan submission to invoicing) as well as registration. If connected to the CAA it may also support processing and delivery of regulatory approvals. If connected to police it may also support national security. — Tracking movement of drones; having detect and avoid geo-fenced areas to alert users, file flight plans and provide supplemental data services via supplemental data service providers--communication dead zones, no fly areas, weather, etc. — UAS location and flight path deconfliction. — Enabling complex UAS operations, specifically BVLOS which is not overly restricted to a specific environment. For instance, BVLOS ops over people at night. The actual mission of the UAS is not particularly relevant to the UTM system. — Enable safe operation of UAS-- by all operators-- in the airspace. This should not be limited to a specific set of operations (survey, photography, package delivery, etc.), but should support all (reasonable) use-cases. — The efficient and effective service provision. — Survey, photos, video mapping, archaelogism. — Ability to notify, communication between key stakeholders. The flight corridor which will eventually allow UAV's to operate safely in. The ATM interface with others. — UTM should be looked at as complimentary in every aspect similar to that of ATM systems and the application should not be restrictive or exclusive. Everything from delivery to surveys to recreational use. — Provision of services for UAS either at low altitude or in coordination with ATC for any comercial application.	