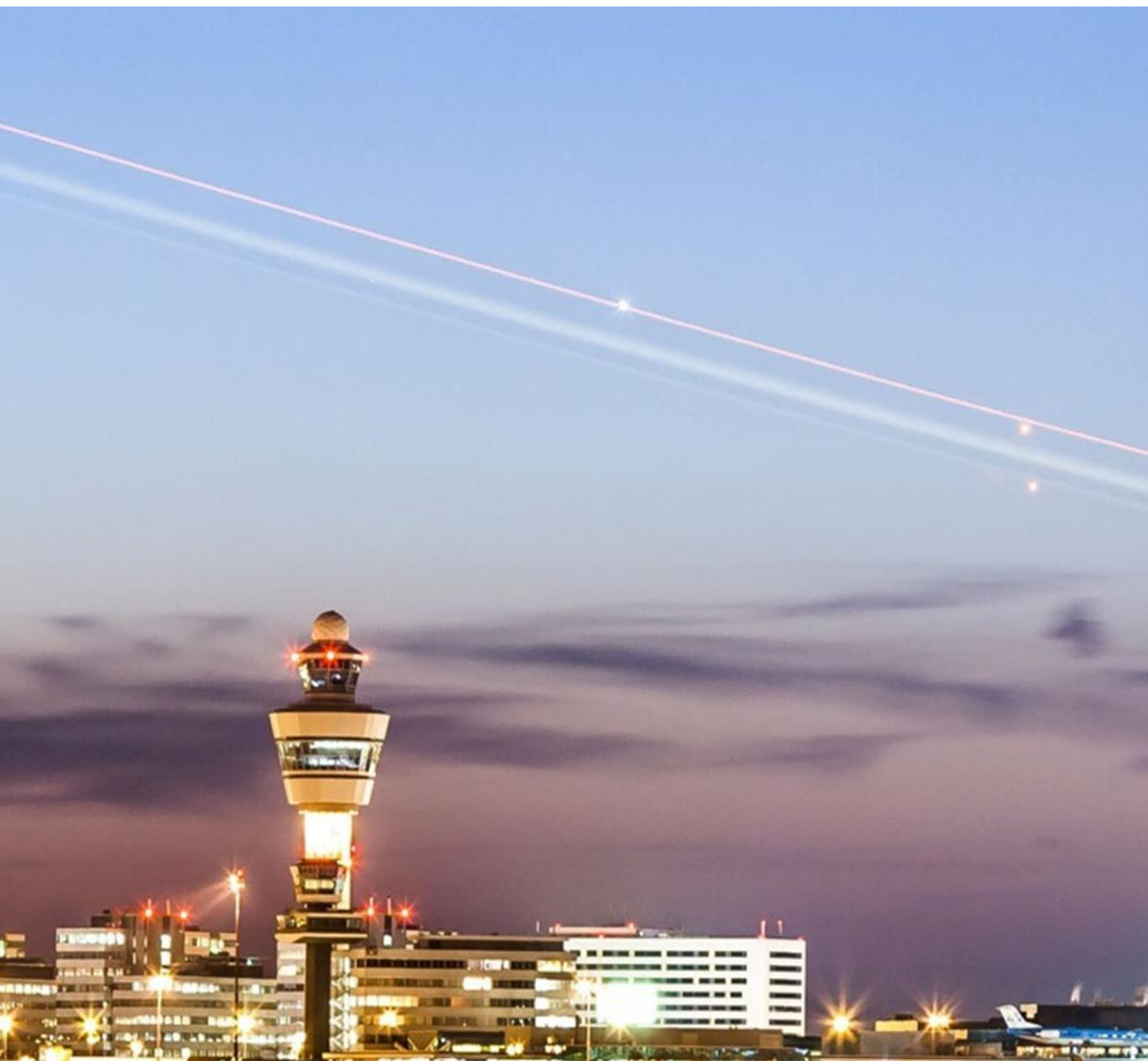


System Requirements Document

UTM Drone Flight Planning Tool



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1. General Introductory

1.1 Specification Structure

The requirements are divided into the following sections:

- Functional Requirements; this section describes the additional functional and technical requirements in support of application of features by different user(s)(-groups) and on various locations.
- Non-functional requirements; this section describes the technical requirements not directly related to functions and/or use cases and those that apply indirectly to the new system (e.g. safety and quality, documentation, training, etc.).

1.2 Requirement Format

Each feature and requirement of this System Requirements Document is identified by a table with a defined structure. Each feature and requirement has the following format:

Attribute	Explanation
ID	Unique identification of the feature/requirement.*
Description	Textual description of the feature/requirement.
Priority	Priority assigned to the feature/requirement. Each feature/requirement has one of the following priorities: - Knockout – Indicates that the tender must FULLY comply with the content of this requirement. Failing such full compliance (i.e. partial or non-compliance) shall automatically result in the exclusion of the Supplier from this tender procedure. - Essential – Indicates that this requirement is important to Air Traffic Control the Netherlands; in general: the more the tender complies with such requirement, the more points may be awarded.
Rationale	Describes the context to which the feature/requirement applies.
Remarks	Additional explanation about the feature/requirement.

2. Functional Requirements

2.1 Core System

ID	GEN-001
Description	The UTM solution shall support the operational handling of UAS mission plans in designated airspaces (e.g. CTR), including submission, review, approval, clearance, monitoring and closure.
Priority	Knockout
Rationale	Defines the high-level, core operational purpose of the system that is further detailed in the requirements below.
Remarks	

ID	GEN-002
Description	The UTM solution shall support configurable role-based access control (RBAC), that enables authorised (LVNL) administrators to define and manage user groups with differentiated permissions, functionalities, data access rights, and user interface elements according to operational needs.
Priority	Knockout
Rationale	Ensures that each user group can access only the functions and information relevant to its role.
Remarks	

ID	GEN-003
Description	The UTM solution shall provide a consistent and unambiguous operational status model for mission plans (e.g. draft, submitted, under review, reviewed, (pre-)approved, rejected, cleared, active, closed and cancelled).
Priority	Knockout
Rationale	Provides a common understanding of mission status across all interfaces.
Remarks	

ID	GEN-004
Description	The UTM solution shall record and retain an auditable history of all mission plan lifecycle events and administrative actions.
Priority	Knockout
Rationale	Supports traceability, accountability and post-operational review.
Remarks	

ID	GEN-005
Description	The UTM solution shall distinguish between operational data, user data, aeronautical data and system configuration data.
Priority	Knockout
Rationale	Supports clear data governance and maintainability.
Remarks	

ID	GEN-006
Description	The UTM solution should provide at least configurable terminology, field and selection options, labels and information icons where operational terminology differs between user groups.
Priority	Essential
Rationale	Improves usability across different operational communities without changing core functionality.
Remarks	

ID	GEN-007
Description	The UTM solution shall provide access to the required functionalities on commonly used mobile and desktop platforms.
Priority	Knockout
Rationale	Ensures accessibility across commonly used user platforms.
Remarks	

ID	GEN-008
Description	The UTM solution shall allow UAS operators to register and create a user profile.
Priority	Knockout
Rationale	Enables identification and management of individual UAS operators.
Remarks	

2.2 Data Management

ID	DAT-001
Description	The UTM solution shall persistently store and make available all submitted UAS mission plans from an authoritative data source.
Priority	Knockout
Rationale	Mission plans must be available for review, operational display and historical reference.
Remarks	

ID	DAT-002
Description	The UTM solution shall store UAS mission plan(s) and UAS operator information.
Priority	Knockout
Rationale	Ensures mission and operator information is available throughout the operational workflow.
Remarks	

ID	DAT-003
Description	The UTM solution shall store the current status and status history of each mission plan.
Priority	Knockout
Rationale	Enables tracking of the mission plan throughout the workflow.
Remarks	

ID	DAT-004
Description	The UTM solution shall store decision information related to approval, rejection, clearance, cancellation and closure of mission plans.
Priority	Knockout
Rationale	Ensures that operational decisions remain traceable.
Remarks	

ID	DAT-005
Description	The UTM solution shall store contact information of the UAS operator, remote pilots and observer associated with a mission plan.
Priority	Knockout
Rationale	Operational users must be able to contact the responsible UAS operator and associates when required.
Remarks	

ID	DAT-006
Description	The UTM solution shall prevent unauthorised modification of submitted and approved mission data and shall restrict modification to authorised users in accordance with configured permissions.
Priority	Knockout
Rationale	Protects the integrity of operationally relevant information.
Remarks	

ID	DAT-007
Description	The UTM solution shall retain historical mission plan data for a configurable retention period in a dashboard with export functionality.
Priority	Knockout
Rationale	Supports operational review, reporting, (safety) incident analysis and compliance with retention policies.
Remarks	

ID	DAT-008
Description	The UTM solution should allow UAS operators to maintain reusable profiles for UAS, pilots and observers.
Priority	Essential
Rationale	Reduces administrative effort for recurring users.
Remarks	

ID	DAT-009
Description	The UTM solution shall enable authorised system administrators to create, modify, and delete airspace zones, including their geometric representation and associated operational attributes.
Priority	Knockout
Rationale	This capability enables LVNL to maintain accurate, current, and complete airspace information within the UTM solution, e.g. when original sources by memberstate and/or competent authorities (like the European AIS Database (EAD) and ED-318) contain inaccuracies or are incomplete and need ad-hoc amendment.
Remarks	

2.3 Operator mission filing

ID	OPS-001
Description	The UTM solution shall allow registered UAS operators to create and submit UAS mission plans.
Priority	Knockout
Rationale	Mission filing by UAS operators is the starting point of the operational workflow.
Remarks	

ID	OPS-002
Description	The UTM solution shall allow UAS operators to define the planned geographical mission area or route visually.
Priority	Knockout
Rationale	The operational area must be defined for review and display of requirements and processes and procedures and automatic workflows
Remarks	

ID	OPS-003
Description	The UTM solution should allow UAS operators to set a route buffer (contingency volume).
Priority	Essential
Rationale	Supports definition of contingency volumes around planned UAS routes.
Remarks	

ID	OPS-004
Description	The UTM solution shall require UAS operators to complete all administrator-defined mandatory fields before a mission plan can be submitted.
Priority	Knockout
Rationale	Ensures that submitted mission plans contain the minimum required information.
Remarks	

ID	OPS-005
Description	The UTM solution shall allow UAS operators to save draft mission plans.
Priority	Knockout
Rationale	Ensures that UAS operators can save incomplete mission plans, a flexible and user friendly mission plan filing and preparation process.
Remarks	

ID	OPS-006
Description	The UTM solution shall clearly indicate which mandatory fields are incomplete or invalid before submission.
Priority	Knockout
Rationale	Helps operators correct incomplete mission plans before submitting them.
Remarks	

ID	OPS-007
Description	The UTM solution shall allow UAS operators to view their own mission plans in all stages.
Priority	Knockout
Rationale	Operators need insight into their current and historical mission plans.
Remarks	Also refer to DAT-007

ID	OPS-008
Description	The UTM solution shall provide UAS operators with the current status of each submitted mission plan.
Priority	Knockout
Rationale	Operators must understand where their mission plan submission is in the workflow.
Remarks	

ID	OPS-009
Description	The UTM solution shall notify the UAS operator when the status of a submitted mission plan changes.
Priority	Knockout
Rationale	Operators must be informed of decisions or operational changes.
Remarks	

ID	OPS-010
Description	The UTM solution shall change the status of an approved mission plan to a state requiring re-submission or re-review whenever an authorised user modifies operationally relevant information within the mission plan.
Priority	Knockout
Rationale	Prevents unreviewed changes to approved operations.
Remarks	

ID	OPS-011
Description	The UTM solution shall allow modification of specific fields within a submitted mission plan by authorised users in to be defined workflow stages.
Priority	Knockout
Rationale	To enable controlled modifications to a submitted flight plan without requiring the mission plan to be cancelled and an entirely new flight plan to be created.
Remarks	

ID	OPS-012
Description	The UTM solution should provide an option to the UAS operator to duplicate an existing mission plan.
Priority	Essential
Rationale	Allowing UAS operators to duplicate existing mission plans improves the efficiency and usability of the mission planning process by reducing repetitive data entry and can minimise the risk of manual input errors. This capability supports recurring or similar operations by enabling operators to reuse previously submitted mission plans and adapt them for new dates, times, locations, or operational parameters.
Remarks	

ID	OPS-013
Description	The UTM solution should provide an option to the UAS operator to create (parts of) pre-completed mission plan templates, to be saved for later use.
Priority	Essential
Rationale	Supports more efficient planning for the operator of standard/frequent UAS missions. Allowing UAS operators to create (parts of) pre-completed mission plan templates improves the efficiency and usability of the mission planning process of standard and/or frequent recurring UAS missions by reducing repetitive data entry.
Remarks	

ID	OPS-014
Description	The UTM solution shall inform and require agreement (e.g. by means of a checkbox) of UAS operators of their responsibilities and compliance with the applicable regulations.
Priority	Knockout
Rationale	Ensures that operators understand their operational responsibilities and the service limitations.
Remarks	

ID	OPS-015
Description	The UTM solution should allow UAS operators, pilots and observers to receive a reminder before the approved mission time window starts and closes with a configurable message.
Priority	Essential
Rationale	Makes UAS operators aware they have to contact TWR before and after execution of their mission, and thereby supports timely contacting TWR and mission closure.
Remarks	

ID	OPS-016
Description	The UTM solution shall provide unregistered users, access to general information on UAS applicable airspace restrictions, local rules, and NOTAM information through an interactive map, without requiring user registration or the submission of a mission plan.
Priority	Knockout
Rationale	Supports safety awareness for the general public who need to check where UAS flying is not allowed and is allowed, including what conditions need to be met.
Remarks	

2.4 Approval workflow

ID	OHD-001
Description	The UTM solution shall allow authorised users to view submitted mission plans awaiting review.
Priority	Knockout
Rationale	Supports the operational review process.
Remarks	

ID	OHD-002
Description	The UTM solution shall provide authorised users with the mission information required for UAS mission assessment, including UAS operator and observer contact information, mission area, time window, altitude, and applicable aeronautical constraints, for each submitted mission plan.
Priority	Knockout
Rationale	Reviewers need the relevant information to make an informed decision.
Remarks	

ID	OHD-003
Description	The UTM solution shall allow authorised users to approve, reject or request modification of a submitted mission plan.
Priority	Knockout
Rationale	These are the core decisions in the approval workflow.
Remarks	

ID	OHD-004
Description	The UTM solution shall allow authorised users to create and modify UAS mission plans.
Priority	Knockout
Rationale	In some situations, authorised users may need to amend a submitted UAS mission plan following coordination with the UAS operator. Allowing proposed changes to be made directly within the UTM solution is more efficient than rejecting the mission plan and requiring the operator to revise, resubmit, and undergo another review cycle. This improves coordination, reduces administrative workload, and minimises the risk of misunderstandings or unintended mission plan modifications.
Remarks	

ID	OHD-005
Description	The UTM solution should allow authorised users to add a decision comment to an approval, rejection or modification request.
Priority	Essential
Rationale	Provides context to the operator and supports traceability.
Remarks	

ID	OHD-006
Description	The UTM solution shall allow authorised users to submit or forward a mission plan to relevant users where required.
Priority	Knockout
Rationale	Connects the approval process to the clearance process.
Remarks	

ID	OHD-007
Description	The UTM solution shall be able to generate a digital and printable output of mission plans.
Priority	Knockout
Rationale	Supports operational use of the UAS mission plan by TWR where a formal approval output is required. The printable output (e.g. a PDF) will be used in the transition from paper to digitally accessible UAS mission plans, and also forms the back-up for when the digital access to UAS mission plans fails.
Remarks	

ID	OHD-008
Description	The UTM solution shall allow authorised users to filter and sort mission plans (e.g. date, time period, airspaces, geographical areas).
Priority	Knockout
Rationale	Supports efficient operational review and planning.
Remarks	

ID	OHD-009
Description	The UTM solution shall warn authorised users when required mission information is incomplete before forwarding a mission plan to another user.
Priority	Knockout
Rationale	Maintains awareness of missing information supporting operational flexibility.
Remarks	

ID	OHD-010
Description	The UTM solution should clearly identify and present all proposed changes by LVNL in a submitted UAS mission plan that allows the UAS operator to identify each change, and should require explicit approval of these changes by the UAS operator before the modified mission plan takes effect.
Priority	Essential
Rationale	To maintain operator awareness and accountability, all proposed changes should be clearly identified and presented to the UAS operator for review and approval before becoming effective.
Remarks	

ID	OHD-011
Description	The UTM solution should clearly indicate changes made after (re)submission by the UAS operator in the UAS mission plan to relevant users.
Priority	Essential
Rationale	This aids the operational user to quickly grasp what items have been changed and should be reviewed. This saves time and effort in reviewing all details again.
Remarks	

ID	OHD-012
Description	The UTM solution shall have system administrator configurable TWR portal and TWR user profiles for mission plan review and approval.
Priority	Knockout
Rationale	Every TWR needs a dedicated UTM portal access, configured to their specific needs, showing only information relevant to that specific TWR unit. Allow TWR staff to review, and then approve, reject or request adjustment of UAS mission plans directly through the UTM solution, reducing the need of coordination between OHD-TWR, as TWR send the message to all stakeholders directly.
Remarks	

ID	OHD-013
Description	The UTM solution TWR portal should allow TWR staff to add and make ad-hoc change to UAS mission plans.
Priority	Essential
Rationale	Enables TWR staff to directly incorporate operationally required changes into UAS mission plans, e.g. outside of OHD opening hours
Remarks	

ID	OHD-014
Description	The UTM solution shall allow for automated and manual review, and manual approval/rejection of a UAS mission plan submission (where required) by approved users.
Priority	Knockout
Rationale	Supports efficient mission review while retaining human decision-making where required.
Remarks	

2.5 Map layers & data

ID	MAP-001
Description	The UTM solution shall use authoritative aeronautical and geographical data sources for displayed airspace (EAD and NOTAM), aerodrome, restriction and mission reference information.
Priority	Knockout
Rationale	Ensures that users rely on trusted operational information.
Remarks	

ID	MAP-002
Description	The UTM solution shall display relevant airspace structures, including controlled airspace, prohibited areas, restricted areas and danger areas.
Priority	Knockout
Rationale	Provides users with essential airspace context.
Remarks	

ID	MAP-003
Description	The UTM solution shall display relevant local UAS restrictions and no-drone zones based on published files by the memberstate and/or competent authority (e.g. ED-318 JSON file).
Priority	Knockout
Rationale	Supports operator awareness of applicable local restrictions.
Remarks	

ID	MAP-004
Description	The UTM solution shall make relevant NOTAM information available both on the map and in a textual list.
Priority	Knockout
Rationale	Supports both spatial and textual review of NOTAM information.
Remarks	

ID	MAP-005
Description	The UTM solution should allow NOTAM information to be (dynamically) filtered by area, time and mission plan.
Priority	Essential
Rationale	Supports awareness of temporary or dynamic operational constraints.
Remarks	

ID	MAP-006
Description	The UTM solution shall display the UAS mission area on an interactive map.
Priority	Knockout
Rationale	Spatial display is required for operational interpretation of mission plans.
Remarks	

ID	MAP-007
Description	The UTM solution shall update aeronautical and geographical data within a defined update cycle agreed with the data source owner.
Priority	Knockout
Rationale	Prevents users from unknowingly relying on unsuitable and/or out of date data.
Remarks	

ID	MAP-008
Description	The UTM solution shall clearly indicate when displayed aeronautical or geographical data is outdated, unavailable or degraded.
Priority	Knockout
Rationale	Prevents users from unknowingly relying on outdated or degraded information.
Remarks	

ID	MAP-009
Description	The UTM solution shall allow authorised administrators to manage the availability of map layers per user group (e.g. TWR-user: heliports/platforms, low flying areas, etc.).
Priority	Knockout
Rationale	Ensures each user group sees information that is relevant to them. E.g. TWR wants to see approach lines and grid, where this information is irrelevant or secret and therefore should not be shown to UAS operators. And UAS operators want to see UAS restricted or no-drone zones, where this information is irrelevant to TWR and thus should not be shown to TWR.
Remarks	

ID	MAP-010
Description	The UTM solution should allow authorised administrators to configure detailed visual styling of map layers for specific user groups (e.g. line colour, line opacity, line thickness, infill colour, infill opacity, etc.).
Priority	Essential
Rationale	Useful for readability optimisation, but not essential to the core workflow.
Remarks	

ID	MAP-011
Description	The UTM solution shall provide users with selectable map layers, including at minimum a road map, aerial or satellite imagery, and terrain elevation information that is sufficiently current, accurate and detailed to support safe and effective UAS mission planning and flight preparation.
Priority	Knockout
Rationale	Provides geographical context required for effective UAS mission planning and preparation.
Remarks	

ID	MAP-012
Description	The UTM solution shall store and display the operator-declared maximum mission altitude AGL.
Priority	Knockout
Rationale	The operator-declared altitude is required for review and operational display.
Remarks	

ID	MAP-013
Description	The UTM solution shall calculate or derive the maximum mission altitude AMSL where reliable terrain elevation data is available.
Priority	Essential
Rationale	Provides operational users with an altitude reference aligned with aviation use by means of automated max. UAS height in feet AMSL calculation (e.g. by GND elevation determination within UAS mission flight area based on Actueel Hoogtebestand Nederland data [m], adding filed max. UAS height [m/ft], and converting to feet AMSL).
Remarks	

ID	MAP-014
Description	The UTM solution shall store both maximum altitude AGL and maximum altitude AMSL where both values are available.
Priority	Knockout
Rationale	Ensures consistent altitude references across interfaces.
Remarks	

ID	MAP-015
Description	The UTM solution shall display altitude values in a way that clearly identifies the reference used, including AGL or AMSL.
Priority	Knockout
Rationale	Prevents misunderstanding between different altitude references.
Remarks	

2.6 System administration

ID	ADM-001
Description	The UTM solution shall allow authorised system administrators to manage user roles and access rights.
Priority	Knockout
Rationale	Required to maintain role-based access.
Remarks	

ID	ADM-002
Description	The UTM solution shall allow authorised system administrators to configure input field formatting rules (e.g. data type, character length, date format, and mandatory fields).
Priority	Knockout
Rationale	Supports local and operational information requirements. Configurable field formatting and validation rules support automated data quality checks, reducing the likelihood of incomplete, incorrectly formatted, or invalid mission plan submissions.
Remarks	

ID	ADM-003
Description	The UTM solution shall allow authorised system administrators to manage mission filing form configuration.
Priority	Knockout
Rationale	Enables controlled adaptation of the filing process.
Remarks	

ID	ADM-004
Description	The UTM solution shall allow authorised system administrators to manage user groups and relevant workflow settings.
Priority	Knockout
Rationale	Supports controlled operational configuration.
Remarks	

ID	ADM-005
Description	The UTM solution shall allow authorised system administrators to configure notification rules for mission status changes.
Priority	Knockout
Rationale	Ensures relevant users are informed of relevant workflow events.
Remarks	

ID	ADM-006
Description	The UTM solution shall allow authorised system administrators to configure backend automations based on mission status, location, user group or airspace area.
Priority	Knockout
Rationale	This requirement enables the UTM solution to support configurable, context-specific automation of operational workflows, notifications, and information distribution. By allowing authorised system administrators to define automation rules based on mission status, geographic location, user group, or airspace area, the system can reduce manual workload, improve process efficiency, ensure timely stakeholder involvement, and support local operational procedures without requiring software modifications.
Remarks	

2.7 Reporting & history

ID	REP-001
Description	The UTM solution shall allow authorised users to retrieve historical mission plans.
Priority	Knockout
Rationale	Supports operational review and reporting.
Remarks	

ID	REP-002
Description	The UTM solution shall allow authorised users to filter historical mission plans (e.g. by time period, airspaces, and geographical areas).
Priority	Knockout
Rationale	Enables practical use of historical mission data.
Remarks	

ID	REP-003
Description	The UTM solution shall provide export functionality for selected mission plan data.
Priority	Knockout
Rationale	Supports analysis and reporting outside the system.
Remarks	Refer to NFS_GN_LOGTRAC_14

ID	REP-004
Description	The UTM solution shall allow authorised users to configure a retention period for archived mission plans.
Priority	Knockout
Rationale	A retention period shall be defined and enforced for historical (personal) data to ensure compliance with the applicable regulation (e.g. GDPR storage limitation principle).
Remarks	

2.8 Notifications

ID	NTF-001
Description	The UTM solution shall support notifications for mission plan statuses and action requests.
Priority	Knockout
Rationale	Ensures relevant users are informed of important workflow events.
Remarks	

ID	NTF-002
Description	The UTM solution should support additional notification channels, such as email, SMS or push notification, where configured.
Priority	Essential
Rationale	Provides flexibility without making all channels mandatory.
Remarks	

ID	NTF-003
Description	The UTM solution shall provide a log of operationally relevant notifications generated by the system.
Priority	Knockout
Rationale	Supports traceability of communication.
Remarks	

2.9 User Interface

ID	UI-001
Description	The UTM solution shall provide user interfaces that are tailored to the operational tasks and information needs of each user group.
Priority	Knockout
Rationale	Ensures that each interface supports the actual work of the intended user group.
Remarks	

ID	UI-002
Description	The UTM solution shall display and visualise UAS mission status, mission information (e.g. mission area) and quantitative values (e.g. time and altitude) using consistent terminology, labels, colours, icons, units of measure and formatting conventions across all applicable user interfaces.
Priority	Knockout
Rationale	Prevents inconsistent interpretation of operational information between users.
Remarks	

ID	UI-003
Description	The UTM solution shall clearly distinguish between mission plan states (e.g. draft, submitted, under review, approved, rejected, cleared, active, closed and cancelled).
Priority	Knockout
Rationale	Supports quick recognition of the operational state of each mission.
Remarks	

ID	UI-004
Description	The UTM solution should be able to distinguish between missions in a mission overview based on configurable rules.
Priority	Essential
Rationale	To enable operational staff to quickly identify the operator category of a UAS mission and apply the appropriate priorities, capacities, workflows, and operational procedures associated with that category. E.g. state operators (a.o. Police, Defence, Fire brigade, Customs, Directorate-General for Public Works and Water Management) have priority, higher capacity per CTR, different submission workflow and can submit ad-hoc UAS missions.
Remarks	

ID	UI-005
Description	The UTM solution shall be accessible for users (e.g. ISO9241, ISO24505-2:2025, EN 301 549 and W3C WCAG Accessibility Criteria).
Priority	Knockout
Rationale	Ensures that all information, status indicators, warnings, and alerts are perceivable and distinguishable by users, including users with colour vision deficiencies. E.g. the UTM solution shall not rely on colour as the sole means of conveying information and shall provide redundant visual coding, such as text, icons, shapes, and/or patterns.
Remarks	

ID	UI-006
Description	The UTM solution shall clearly indicate the availability, timeliness, and integrity status of displayed operational data (e.g. live, delayed, unavailable, or degraded).
Priority	Knockout
Rationale	Users must understand whether the displayed information can be relied upon operationally. This requirement implies that updates of plans, zones, and other relevant data during a disconnection from a client to the UTM system are automatically processed as soon as the connection of the UTM system is restored.
Remarks	

ID	UI-007
Description	The UTM solution shall clearly indicate the status of system connectivity and backend service availability of supporting services that affect system functionality or data provision.
Priority	Knockout
Rationale	Prevents users from relying on stale or unavailable system information.
Remarks	

ID	UI-008
Description	The UTM solution shall provide responsive interfaces suitable for the intended device types of each user group (e.g. dynamic scaling, and mouse, keyboard and touch interfacing).
Priority	Knockout
Rationale	Ensures usability on mobile, tablet, desktop and operational display environments (e.g. at the CWP's at TWR) for all user groups.
Remarks	

ID	UI-009
Description	The UTM solution shall support effective operation in both (bright) daytime and (dark) night-time ambient lighting conditions, without adversely affecting the visual adaptation of the user.
Priority	Knockout
Rationale	Users will use the UTM solution in a wide range of ambient lighting conditions, from bright daylight to low-light and night-time environments. The UTM solution should maintain usability and readability under these varying conditions (bright and dark surroundings), reducing glare and preserve visual adaption to darkness during nighttime operations.
Remarks	

ID	UI-010
Description	The UTM solution shall provide clear error, warning and confirmation messages for operationally relevant user actions.
Priority	Knockout
Rationale	Reduces the risk of unintended actions and supports correct system use.
Remarks	

ID	UI-011
Description	The UTM solution should provide the option to send error reports to authorised users for system improvement.
Priority	Essential
Rationale	Allows users to - ideally understand the source of the error - inform the UTM system provider and LVNL of errors. The UTM system provider and LVNL can use the error reports to improve the UTM system.
Remarks	

ID	UI-012
Description	The UTM solution shall display time (UTC and Local Time) information using a consistent time reference across all operational interfaces.
Priority	Knockout
Rationale	Prevents ambiguity in the interpretation of operational times.
Remarks	

ID	UI-013
Description	The UTM solution shall clearly indicate when user action is required to progress a mission plan to the next workflow step.
Priority	Knockout
Rationale	Supports efficient handling of mission plans.
Remarks	

2.10 Functional – Training

ID	TR-001
Description	The UTM solution should support training and exercise activities in a manner that prevents any adverse impact on operational UTM data, services, users and system performance.
Priority	Essential
Rationale	To enable training and exercise activities without introducing risks to operational UTM services, data integrity, or safety. This can be done by means of technical or physical separation, e.g. sandboxing, simulation, virtualisation, a separate training environment and/or PPT (Part Task Trainer).
Remarks	

ID	TR-002
Description	The UTM solution should enable all user groups to train under conditions representative of operational use, including up-to-date user interface functionality, visual design, and airspace data.
Priority	Essential
Rationale	To ensure that all operational and administrative user groups can acquire, maintain, and demonstrate the competencies required to perform their role-specific tasks and responsibilities. Ensures that training remains relevant and representative of operational use, allowing users to develop and maintain knowledge and skills that can be directly applied in the live environment. E.g. by means of equivalent user interface functions, workflows, and user role-specific views as available in the operational environment.
Remarks	

ID	TR-003
Description	The UTM solution should enable authorised training personnel to create, modify, save, adjust, publish, reuse, execute and reset representative training scenarios (including simulated UAS mission plans and NOTAMs) to support training and exercise activities.
Priority	Essential
Rationale	To enable training personnel to develop and maintain (improve, adjust) realistic and repeatable training exercises for all operational and administrative user groups. Enables trainees to practice mission planning and mission management tasks, and train on interpretation and handling of UAS mission plans and airspace restrictions, using representative data (UAS mission plans of both state operators and civil operators and NOTAMs).
Remarks	

ID	TR-004
Description	The UTM should enable users to perform self-directed learning and training activities in assigned roles by training staff, including creation, modification, deletion and processing UAS mission plans, without requiring instructor intervention.
Priority	Essential
Rationale	To facilitate independent familiarisation and skill development, personnel should be able to safely explore UTM functionality, workflows, and mission planning processes, e.g. by following UAS operator, FSC/OHD and TWR workflows. This supports flexible learning, increases user proficiency, and reduces reliance on instructor-led training for routine system familiarisation.
Remarks	

ID	TR-005
Description	The UTM solution should provide users with predefined training scenarios containing representative UAS mission plans and NOTAMs, and should allow users to access and use these scenarios without first creating or entering training data themselves.
Priority	Essential
Rationale	To enable trainees to quickly explore and understand system functionality without first creating training data (i.e. UAS mission plans and NOTAMs) themselves.
Remarks	

ID	TR-006
Description	The UTM solution should allow multiple users acting in different operational roles to participate simultaneously in a shared training scenario, enabling role-based interaction and collaboration.
Priority	Essential
Rationale	This allows for realistic collaboration, coordination and counterplay during a shared training exercise between users in different operational roles.
Remarks	

ID	TR-007
Description	The UTM solution should provide a training environment in which users can access and train with planned changes to the user interface and/or airspace data prior to operational deployment.
Priority	Essential
Rationale	Allows LVNL to validate planned changes, and prepare and familiarise users to the changes before operational deployment, improving operational readiness and reducing the risk of transition-related errors.
Remarks	

2.11 Miscellaneous

ID	MISC-001
Description	The suppliers shall provide manuals regarding the use of the UTM solution for the different user groups.
Priority	Knockout
Rationale	Different user groups require appropriate documentation to effectively learn, operate, and troubleshoot the UTM solution.
Remarks	



ID	MISC-002
Description	The UTM solution shall support Dutch and English language.
Priority	Knockout
Rationale	Dutch and English speakers should be able to use the UTM solution.
Remarks	

ID	MISC-003
Description	The UTM solution should be able to check the operational authorisation and/or exemptions of the UAS-operator against the national database.
Priority	Essential
Rationale	UAS operators who want to fly in (parts of the) CTRs need Operational Authorisation (OA) and/or exemptions of ILT. This is now manually checked, but ideally should be automated.
Remarks	

3. Non-Functional System Requirements

3.1 General Design

ID	NFS_GN_GENDES_10
Description	The UTM solution must be scalable to cater for 50% growth of users within 1 year
Priority	Knockout
Rationale	The system must be able to handle the load that is expected for the coming year. In its design, the UTM solution must be able to facilitate growth of that number (scalability).
Remarks	The current number of users is estimated to be 300 certified users

ID	NFS_GN_GENDES_15
Description	The UTM solution shall be designed so that future integration with a Common Information Service and/or any Supplementary Data Services can be supported without fundamental redesign of the system architecture.
Priority	Knockout
Rationale	
Remarks	

3.2 Network and Architecture

ID	NFS_GN_NA_95
Description	The UTM solution shall at least use IPv4 and possibly also IPv6 at OSI layer-3 (the Network Layer) for data communication.
Priority	Knockout
Rationale	IP is the industry standard
Remarks	The intention of this requirement is that all (application) network traffic shall be routable at the IP layer. (V)LANs that are stretched beyond the boundaries of a physical building are not supported and not available.

3.3 Reliability

The system's reliability is defined as the probability of a failure occurring due to incorrect system behaviour, such as software errors and/or hardware failure, and not as a result of human operational mistakes.

ID	NFS_GN_REL_10
Description	Failure of a hardware component of the UTM solution shall not lead to the loss of service at end user positions.
Priority	Knockout
Rationale	The UTM solution may not have a single point of failure, unless the hardware component in failure is at the end user position.
Remarks	

ID	NFS_GN_REL_20
Description	In case of a single hardware error, the system shall preserve the information shown on its displays and related information, including written information and attention triggers.
Priority	Knockout
Rationale	No loss of information at a single Hardware error
Remarks	This does not include failure of end-users devices and/or data connectivity.

3.4 Availability

The availability of the system is expressed in terms of ‘mean time between failures’ as specified in this paragraph. A system failure refers to any breakdown or disruption that prevents a process from being executed fully in accordance with the requirements outlined in this document.

ID	NFS_GN_AVAIL_10
Description	The unplanned non-availability of the services of the UTM solution must be lower than 0,1%.
Priority	Knockout
Rationale	The term “service” is used to denote the complete chain of hardware and software provisions to elaborate the appropriate functionality and connectivity within the UTM solution and its connected systems, including the inability of the user to enter data at an end user position.
Remarks	Assumption: MTTR is 4 hours (Mean Time to Repair)

ID	NFS_GN_AVAIL_25
Description	Failures in any (sub)system of the UTM solution shall not result in loss of data.
Priority	Knockout
Rationale	The data in the system may not be compromised by any (sub)system failure.
Remarks	

ID	NFS_GN_AVAIL_30
Description	The GUI must be able to operate offline with a given mission plan. The relevant information for that plan must retained. This does not include failure of end-users devices and/or data connections.
Priority	Knockout
Rationale	The data in the system may not be compromised by any (sub)system failure.
Remarks	

ID	NFS_GN_AVAIL_40
Description	The web application must clearly show when it is not working in online mode.
Priority	Knockout
Rationale	Awareness for the user that he/she is working off-line.
Remarks	

3.5 Data integrity

ID	NFS_GN_DATINT_01
Description	The UTM solution shall protect the integrity of the data across all interfaces. Data will be accurate.
Priority	Knockout
Rationale	Accurate means that data elements need to contain the correct value and must be available/presented at the needed moment at the needed place (e.g. end user position, log file, etc.).
Remarks	

ID	NFS_GN_DATINT_02
Description	The UTM solution shall provide protection to maintain the integrity of data during concurrent access.
Priority	Knockout
Rationale	The same data can be modified from different places, the system shall ensure that this data will be consistent.
Remarks	

ID	NFS_GN_DATINT_03
Description	Active data stored in the UTM solution shall be consistent at any time when displayed at any end user position.
Priority	Knockout
Rationale	Since the same data can be modified from different places, the system will ensure that the user will be presented with correct, accurate and consistent data.
Remarks	

ID	NFS_GN_DATINT_11
Description	In case of an UTM solution existing of a combination of on-premise and cloud services, this shall not lead to difference in any information being presented to the end users.
Priority	Knockout
Rationale	Information presented to operators should be consistent. Differences in presentations of information to operators is not allowed. This can be all kind of information: flight plan, NOTAM, airspace (also as visualized on maps), meteorologic, etc.
Remarks	A risk of a database in a cloud solution combined with a database on premise may cause desynchronization, e.g. caused by latency. Multiple databases are therefore not encouraged.

3.6 Performance – response times

The performance requirements can be broken down into the following parts:

- System-System response time:
System-System messages are messages received from connected systems and saved into the UTM storage or messages sent from the UTM internal storage to connected systems.

The System-System response time is measured:
 - a) From data being send from a connected system to the UTM solution and the completion of the UTM solution processing this data.
 - b) From the sending of data coming from the UTM solution to the delivery of this data to the interface of the connected system.
- System-User response time:
System-User messages are messages sent from the UTM solution to an output device at the end user position.
The response time is measured between the initiation of an action and the time the corresponding information is available to be used on an output device at the end user position.
- User-System-User initial response time:
The maximum response time measured between a user action at an end user position and a first initial system response visible (on the end user position monitor) for the user (e.g.. “Processing request”, “Printing ...”, etc.), with exception from displaying the user action on the end user position’s monitor (e.g. when the user is typing text).
- User-System-User resulting response time:
The maximum response time measured between a user action and the delivery of these result to an output device at another end user position. The User-System-User initial response time is included in the response time of this action.

ID	NFS_GN_PERF_02
Description	User-system-user response shall not exceed 1 sec. in 90% of the cases. This performance shall be visible in the dashboard.
Priority	Knockout
Rationale	
Remarks	

ID	NFS_GN_PERF_03
Description	The system shall support concurrent operations without performance degradation.
Priority	Knockout
Rationale	
Remarks	

3.7 End user client platform

ID	NFS_GN_USER_01
Description	The application software shall be able to perform its function to the end-user using a HTML5 interface without the need of client-side browser plugins.
Priority	Knockout
Rationale	Standardization; flexibility in the connection of standardized applications to the LVNL infrastructure and equipment
Remarks	

ID	NFS_GN_USER_02
Description	The application must support and cater for various screen sizes and resolutions.
Priority	Knockout
Rationale	Various phone sizes, tablets as well as full size screens.
Remarks	

ID	NFS_GN_USER_03
Description	There shall be a separate ADMIN account for user management and optional system settings in the UTM system.
Priority	Knockout
Rationale	
Remarks	

3.8 Monitoring & Control

ID	NFS_GN_M&C_01
Description	System (processes and system interfaces) and services shall be monitored by LVNL monitoring & control- (M&C-) tooling.
Priority	Knockout
Rationale	
Remarks	

ID	NFS_GN_M&C_02
Description	The status of monitored services and equipment shall continuously be provided to the LVNL M&C service.
Priority	Knockout
Rationale	The status of the equipment and services shall be fully up-to-date (real time) for 1st and potentially 2nd level support staff.
Remarks	

ID	NFS_GN_M&C_03
Description	It shall be visible to the user at an end user position, whenever a service at an end user position (of the services which are available at the end user position) is no longer available to the user.
Priority	Knockout
Rationale	The user must be made aware of the unavailability of a service in order to take adequate action if necessary.
Remarks	

3.9 Technical interfacing

ID	NFS_GN_TINT_GEN_10
Description	A (temporary) interruption of any TCP/IP connection shall not result in a permanent loss of data at any of the system-to-system interfaces.
Priority	Knockout
Rationale	No messages may get lost.
Remarks	

ID	NFS_GN_TINT_GEN_20
Description	A software or hardware crash shall not result in a permanent loss of data.
Priority	Knockout
Rationale	No messages may get lost.
Remarks	

ID	NFS_GN_TINT_GEN_30
Description	The UTM solution shall have a capability to send e-mail traffic via SMTP. The E-mail/SMTP solution shall be realized in close cooperation with LVNL.
Priority	Knockout
Rationale	No messages may get lost.
Remarks	

ID	NFS_GN_TINT_GEN_50
Description	The supplier shall be responsible that the UTM system will be using the most up-to-date eEAD data.
Priority	Knockout
Rationale	
Remarks	

ID	NFS_GN_TINT_GEN_60
Description	The supplier shall be responsible that the UTM system will be using the most up-to-date ED-318 JSON file published by the authority.
Priority	Knockout
Rationale	
Remarks	

ID	NFS_GN_TINT_GEN_65
Description	The UTM solution shall provide a secure API for authorised external systems where external data exchange is part of the operational concept (e.g. submitting a mission plan from UAS fleet management tooling)
Priority	Knockout
Rationale	Enables controlled integration without bypassing system governance.
Remarks	

ID	NFS_GN_TINT_GEN_70
Description	The UTM solution shall document its external APIs, including authentication, authorisation, data models, message flows and error handling.
Priority	Knockout
Rationale	Required for safe and maintainable integration.
Remarks	

ID	NFS_GN_TINT_GEN_80
Description	The UTM solution shall enforce role-based access control for API users.
Priority	Knockout
Rationale	
Remarks	

ID	NFS_GN_TINT_GEN_90
Description	The UTM solution shall validate incoming API data before it is accepted into the operational workflow.
Priority	Knockout
Rationale	
Remarks	

3.10 Logging and tracing

This section addresses system logging and traceability.

The definition of *the log* (the noun) can be best described as one or more lists of elements, where each element contains evidence, produced by a component of the system, that an action or operation has been completed, or that an event has taken place. This evidence is composed of a time stamp stating the moment this evidence was produced, together with text that describes the action or the event, and its state. Consequently we define *to log* (the verb) as the action to add an element to *the log*.

The definition of *the trace* (the noun) is one or more lists of elements, where each element contains evidence, produced by a component of the system, that an action or operation has come

to a conclusion, or to a specific (internal) state. This evidence is composed of a time stamp stating the moment this evidence was produced, together with some text that describes the conclusion or state. Consequently we define *to trace* (the verb) as the action to add an element to *the trace*.

We expect that the UTM solution, comprising all kinds of software processes working together, has capabilities to produce and store this log and trace information, together with capabilities to configure the (individual) settings related to log and trace.

ID	NFS_GN_LOGTRAC_01
Description	The UTM solution shall provide Logging functionality.
Priority	Knockout
Rationale	To have basic information for troubleshooting
Remarks	

ID	NFS_GN_LOGTRAC_02
Description	The UTM solution shall provide Recording functionality.
Priority	Knockout
Rationale	To have detailed information for investigation.
Remarks	

ID	NFS_GN_LOGTRAC_03
Description	The UTM solution shall provide Tracing functionality.
Priority	Knockout
Rationale	To have detailed information for investigation
Remarks	

ID	NFS_GN_LOGTRAC_10
Description	The UTM solution shall maintain log data from the current date over a period of at least 31 days and therefore the UTM solution shall be dimensioned in such a way that the system is able to keep (immediate access) log files for a period of at least 31 (thirty-one) days.
Priority	Knockout
Rationale	For adequate maintenance and security monitoring it must be possible to study the system behaviour back in time.
Remarks	

ID	NFS_GN_LOGTRAC_11
Description	The UTM solution shall record the events and information in the log file and shall provide an option to record additional information regarding the processing of the FPL-route. The UTM solution shall log at least the following events, but not limited to, in (a) log file(s) to allow support personnel to trace the source of errors and to create legal records: - reception of messages; - transmission of messages; - user commands; - configuration changes; - manipulations on data stores (add, modify, remove, etc.); - syntax errors on incoming messages; - connection errors; - transmission errors; - the status of processes, e.g. started/terminated; - exceeding a certain level of a system resources (disk/memory space, CPU utilization, message buffer space, etc.); - unsuccessful logins to any (hardware) component of the system; - abnormal situations which have influence to normal operation of the system.
Priority	Knockout
Rationale	Logged events are very helpful for cause analysis in case of system anomalies.
Remarks	

ID	NFS_GN_LOGTRAC_12
Description	The log as described in the previous requirement, NFS_GN_LOGTRAC_11, shall retain its contents during: - (series of) a stop and start of the operating system; - (series of) a stop and start of the application(s).
Priority	Knockout
Rationale	Log files must always be available for consulting in case of a system anomaly.
Remarks	

ID	NFS_GN_LOGTRAC_13
Description	Every event of the log as described in the requirement, NFS_GN_LOGTRAC_11, shall include a timestamp (date/time (hh:mm:ss,ms)) in UTC.
Priority	Knockout
Rationale	In case of cause analysis identical timestamps between systems are essential.
Remarks	

ID	NFS_GN_LOGTRAC_14
Description	The UTM solution should provide logging files in a human readable format (preferably XML, .txt or .csv formats) for offline processing.
Priority	Essential
Rationale	The output as specified by this requirement is in a standard format suitable as input for other analyses and reporting tools that run outside the Production environment.
Remarks	

ID	NFS_GN_LOGTRAC_15
Description	The UTM solution should provide the ability to change the logging level (e.g. DEBUG, INFO, WARNING, ERROR, etc.) of each logging event as indicated in NFS_GN_LOGTRAC_11.
Priority	Essential
Rationale	In case of system anomalies it might be necessary to have more in depth logging available for cause analysis.
Remarks	

ID	NFS_GN_LOGTRAC_16
Description	The Supplier should describe in detail the capabilities of the proposed system in the area of logging and tracing.
Priority	Essential
Rationale	In order to understand the Supplier's solution in the area of logging and tracing.
Remarks	

3.11 Backup and restore

The definition of *the backup* (the noun) is the archive (as in a copy) of elements as listed in requirement NFS_GN_LOGTRAC_11 so it may be used to restore the system data after a data loss event. Consequently, we define *to back up* (the verb) as the action to copy elements to the archive.

ID	NFS_GN_BCK_01
Description	The UTM solution shall have provisions (software and hardware) to automatically back up completely all its data (configuration, adaptation, logging, etc.) to external media (preferably to a redundant network share). These backup features shall be configured in such a way that all those data will be backed-up periodically. (1) The periodicity of the backup might be runtime, hourly or daily. (2) The Supplier is requested to describe the backup capabilities in requirement NFS_GN_BCK_03.
Priority	Knockout
Rationale	Since the system contains large amounts of data, log files, adaptation and configuration settings, we require to store this information in a safe place for the situation we have to cope with disaster recovery.
Remarks	

ID	NFS_GN_BCK_02
Description	Back up operations shall be able to execute during normal system operation; this implies that users do not need to log off or suspend their work, and that there is no impact on the quality of service to the users other than a minimal increment of response times.
Priority	Knockout
Rationale	In order to give operational users the highest quality of service and to reach the highest possible operational availability.
Remarks	

ID	NFS_GN_BCK_03
Description	The Supplier should describe in detail the capabilities of the proposed system in the area of backup and restore.
Priority	Essential
Rationale	In order to understand the Supplier's solution in the area of backup and restore.
Remarks	

3.12 Cloud & Security

ID	NFS_GN_CLOUD_10
Description	The service shall be provided as a SaaS (Software as a Service).
Priority	Knockout
Rationale	
Remarks	

ID	NFS_GN_CLOUD_SEC_11
Description	The external non-LVNL users shall communicate with the UTM solution via cloud based web-proxies (WAF - web application firewall) being part of the UTM SaaS.
Priority	Knockout
Rationale	
Remarks	

ID	NFS_GN_CLOUD_SEC_20
Description	The service security shall comply to NEN/ISO 27001 or provable similar certification regulation
Priority	Knockout
Rationale	
Remarks	

ID	NFS_GN_CLOUD_SEC_21
Description	The supplier shall permit access to execute security audits by the customer
Priority	Knockout
Rationale	
Remarks	CIS Controls in accordance to NEN/ISO 27002 can serve as a guidance for security audits

ID	NFS_GN_CLOUD_SEC_22
Description	The supplier shall be able to provide: (1) certification, with scope definition and declaration of applicability; (2) reports of periodic external checks like audits, pen-tests, TPM's.
Priority	Knockout
Rationale	
Remarks	Example of test- and audit report format: ISAE3xxx SOC type II

ID	NFS_GN_CLOUD_SEC-31
Description	The Supplier shall provide information how they fulfil their security responsibilities regarding the delivery of a cloud service. This includes, but is not limited to, information on how the underlying cloud services are securely configured, how they are securely operated, managed and governed. This also include information on how they will alert on security incidents and information on the security incident response and disaster recovery of the different cloud solution components.
Priority	Knock-out
Rationale	To get confident about the maturity of the security aspects of the cloud solution.
Remarks	

ID	NFS_GN_CLOUD_SEC-32
Description	The Supplier shall store and process data in the EU only.
Priority	Knockout
Rationale	To be able to determine which legal jurisdiction(s) the data could be subject to and to be confident that none of the legal jurisdictions under which the data is subject prevents meeting LVNL and Defense security goals in all but exceptional circumstances.
Remarks	

ID	NFS_GN_CLOUD_SEC-33
Description	The Suppliers cloud provider shall be certified according a established and appropriate standard. For this purpose, the supplier shall provide information on the security controls around their (or their suppliers') data centers. Appropriate standards include CSA CCM v3.0.1, ISAE 3402, ISO/IEC 27001. The applicability of certification shall extend to physical security, data security, service administration, vulnerability management, protective monitoring, incident management, configuration and change management, personnel management, supply chain security, user management, audit and logging.
Priority	Knockout
Rationale	To be confident that the security measures employed by the provider are sufficient to control physical, information and cyber risks to an acceptable level.
Remarks	

ID	NFS_GN_CLOUD_SEC-35
Description	All data used by the service shall not be accessible or potentially be influenced by other cloud customers ('tenants'/'subscriptions'/'organization') of the underlying cloud service by, as a minimum, operate the service on its own user identity service, at the level at which the underlying cloud service is managed and/or billed.
Priority	Knockout
Rationale	To ensure correct behaviour in the absence of an attack, and to protect against 'movement' or influence between 'tenants'.
Remarks	

ID	NFS_GN_CLOUD_SEC-40
Description	The service shall encrypt all data at rest by default, including any metadata derived from that data, and logs. All storage services shall use full disk encryption of stored data. This encryption shall use per-customer or per-object keys, depending on the design. Keys shall be managed by the Supplier or the cloud provider. The keys shall only be accessible to by specified compute services or privileged users. The encryption algorithm shall be a symmetric encryption algorithm chosen from NIST-SP-800-131A in a mode of operation chosen from NIST-SP-800-38, that provides both confidentiality and integrity.
Priority	Knockout
Rationale	Data shall be protected from unauthorized access by parties with physical access to the service infrastructure.
Remarks	

ID	NFS_GN_CLOUD_SEC-41
Description	All accesses to the cloud service shall be authenticated. As a minimum with a username, password and Multi Factor Authentication (MFA).
Priority	Knockout
Rationale	To be confident to control who can access the service.
Remarks	

ID	NFS_GN_CLOUD_SEC-42
Description	The Supplier shall contractually agree that the Supplier or any third party service provider has no right to use the data processed or stored within the service for any other purpose than to provide the service. This includes, but is not limited to, to a prohibition to use data for marketing, advertising, and machine learning.
Priority	Knockout
Rationale	To establish ownership and restriction on usage of data
Remarks	

ID	NFS_GN_CLOUD_SEC-43
Description	All data transiting networks shall be protected against tampering and eavesdropping using industry-standard encryption protocols (such as TLS (v1.3)/SSL and IPsec). This includes data flows initiated by the UTM application and those initiated by the underlying cloud platform, including application data, database synchronization, backup remote storage and log aggregation.
Priority	Knockout
Rationale	Data is protected in transit between end user device(s) and the service Data is protected in transit as it flows between internal components within the service Data is protected in transit where exposed to other external services, such as via an API
Remarks	- Encrypt all data in transit by default - Pre-configure data in transit encryption, and default to the latest industry standards. - Uses standardized, well-understood algorithms and protocols (such as TLS v1.3 and IPsec) to protect data - Make it easy to implement data in transit protections in the application

ID	NFS_GN_CLOUD_SEC-44
Description	Log aggregation shall be placed in its own separate workspace.
Priority	Knockout
Rationale	To protect logs for forensic analysis if another part of the system is compromised and to restrict access to other workspaces by a third party SOC service.
Remarks	

ID	NFS_GN_CLOUD_SEC-45
Description	Private customer access to the cloud service shall only provide access to the cloud virtual private network of the service.
Priority	Knockout
Rationale	This prevents an attacker from exfiltrating data from the service by passing it to their tenancy in the shared service, then extracting the data from the service via the internet.
Remarks	

ID	NFS_GN_CLOUD_SEC-46
Description	The service should employ an application-layer network (ALN), such as a service mesh, avoiding network locations like IP addresses.
Priority	Essential
Rationale	ALN provides defense in depth on top of the standard cloud SDN. An ALN may also provide additional security features, such as automatic authentication and encryption of network traffic, improved logging and monitoring of network traffic, and continuous network mapping
Remarks	

ID	NFS_GN_CLOUD_SEC-55
Description	The Supplier should clearly describe the capabilities regarding security monitoring.
Priority	Essential
Rationale	To get insight in the possibilities for monitoring & control for ATC-NL 1 st en 2 nd level support staff in the field of security monitoring.
Remarks	

3.13 Security

ID	NFS_GN_CYBERSEC_01
Description	The Supplier shall detail how the proposed solution meets the objectives in Additional Cybersecurity Annex for Procurement of the UTM solution. These objectives shall be collaboratively developed into binding technical specifications during the design phase.
Priority	Knockout
Rationale	See Annex.
Remarks	

ID	NFS_GN_CYBERSEC_02
Description	The Supplier shall comply with the standard (Cyber) Security Annex for Procurement. The Risk Profile of the UTM solution is determined to be Normal.
Priority	Knockout
Rationale	See Annex: Suppliers play a critical role in LVNL's (primary) business processes and are therefore essential to safeguarding our digital resilience. To maintain continuous control over cyber risks and to ensure secure collaboration, LVNL applies specific terms and requirements relating to cybersecurity.
Remarks	

ID	NFS_GN_CYBERSEC_03
Description	The system shall support network segregation and secure zones according to LVNL standards.
Priority	Knockout
Rationale	Critical infrastructure protection.
Remarks	

ID	NFS_GN_CYBERSEC_04
Description	The system shall support incident detection and response mechanisms.
Priority	Knockout
Rationale	Operational security.
Remarks	

ID	NFS-SEC-010
Description	The system should comply with applicable defence-grade security standards. E.g.: "Beveiligingseisen bij overheidsopdrachten met risico's voor nationale veiligheid (ABRO) Zakendoen met het Rijk Rijksoverheid.nl"
Priority	Essential
Rationale	
Remarks	

3.14 System Environments

ID	NFS_GN_SYSENV_10
Description	Contractor shall deliver instances of the system running in the following types of environments: - Production environment (P); - Acceptance / Test environment (A/T)
Priority	Knockout
Rationale	Instances of the system are needed for educational/testing/development purposes prior to installation in acceptance environment. Once the system runs stable in the A environment, a migration to the P environment is allowed.
Remarks	

ID	NFS_GN_SYSENV_30
Description	In case of on-premise equipment, the A and P environments of UTM shall be equipped with identical type of hardware.
Priority	Knockout
Rationale	In order to increase the maintainability and to reproduce system behaviour between the different environments.
Remarks	

3.15 Test tooling

ID	NFS_GN_TT_10
Description	The -T/-A environments should have provisions to accept live, simulated or recorded live data.
Priority	Essential
Rationale	To test with live, recorded or simulated data in order to test specific aspects the system. Also, to replay known historical scenarios in order to verify the system is still performing as it should, and whether problems are solved.
Remarks	

ID	NFS_GN_TT_20
Description	It should be possible to set/execute the DT environment in a functional time mode, and to set, start and freeze the time.
Priority	Essential
Rationale	To test with system-to-system data and simulated data in order to test specific aspects of the system. Also, to replay known historical scenarios in order to verify the system is still performing as it should, and whether problems are solved.
Remarks	

ID	NFS_GN_TT_40
Description	The Supplier shall make available all tools and test equipment required for FAT, installation and SAT.
Priority	Knockout
Rationale	Based on web application solutions
Remarks	

3.16 ATC-NL Change process and procedures

ID	NFNS_GN_PROCS_01
Description	The Supplier shall apply system changes only when notified to, checked by and permitted by LVNL.
Priority	Knockout
Rationale	To prohibit that unannounced system updates may occur.
Remarks	

ID	NFNS_GN_PROCS_02
Description	LVNL shall be given sufficient opportunity to perform testing activities on the UTM solution to verify that specifications are met, and system behaviour is according to specifications and expectations.
Priority	Knockout
Rationale	To perform test and verification activities to determine if to permit the delivery of the system.
Remarks	

3.17 Safety and Quality Assurance

The UTM solution is assumed to be NOT safety critical for ATC-NL Traffic Management operations.

ID	NFNS_GN_SAFQA_05
Description	The Supplier should ensure there is traceability between System requirements in this SRD and Software requirements.
Priority	Essential
Rationale	Guidance Material to EU Reg. 2017/373: [ED153] section 4.3.15
Remarks	

ID	NFNS_GN_SAFQA_06
Description	In the context of compliance with applicable regulations for system development, the Contractor should deliver and provide assistance to LVNL in support in case of assessment by the Dutch NSA of the delivered software product.
Priority	Essential
Rationale	Regulation
Remarks	

ID	NFNS_GN_SAFQA_07
Description	The system may need to comply with basic regulation [EU2018/1139] annex VIII and underlying regulation 2023/1768 and 2023/1769. In order to ensure compliance, the Supplier should assist LVNL by providing the information required to compose the Statement of Compliance.
Priority	Essential
Rationale	Interoperability regulation
Remarks	

ID	NFNS_GN_SAFQA_08
Description	Handling and storage of personal data will be done according to EU and Dutch privacy regulations (GDPR - General Data Protection Regulation - AVG in Dutch).
Priority	Knockout
Rationale	Privacy regulation
Remarks	

3.18 Maintenance

ID	NFS_GN_MAINT_01
Description	For the purpose of maintenance, system administration and support for the proposed solution, the Supplier shall commit to a Service Level Agreement.
Priority	Knockout
Rationale	Regulation
Remarks	