



Sami Marjoniemi

SITUATIONAL AWARENESS SYSTEM: PURPOSE AND BENEFITS

TELESTE



TABLE OF CONTENTS

1	Situational awareness system: Getting the big picture	1
2	System components	4
3	Implementation challenges	5
4	System integrations	6
5	Tools for informed decisions	7
6	Decision points for choosing a situational awareness system	8

This paper introduces the scope and basic elements of a situational awareness system, and some of the most common challenges and key decision points related to system implementation. Our target is to help you evaluate the benefits and usability of the system for your operational environment and needs.

SITUATIONAL AWARENESS SYSTEM: GETTING THE BIG PICTURE

When talking about situational awareness systems, we are typically interested in critical safety and security situations and managing them. Such events affect the total safety and security situation within a city, region or country and engage multiple stakeholders and security authorities. A situational awareness system enables comprehensive understanding of the situations, improves responsiveness and communication, and provides tools for informed decision-making on eventual actions.

1. Overall understanding of the security environment

The big picture is what matters the most for high-end safety and security purposes, and utilising a situational awareness system is one of the most effective ways to achieve it. The system provides authorities and security centres with up-to-date information about different safety and security situations in a wider area such as a city, a specific region, and/or an entire country to increase understanding of the complete safety and security situation in the environment.

Utilising the system allows users to:

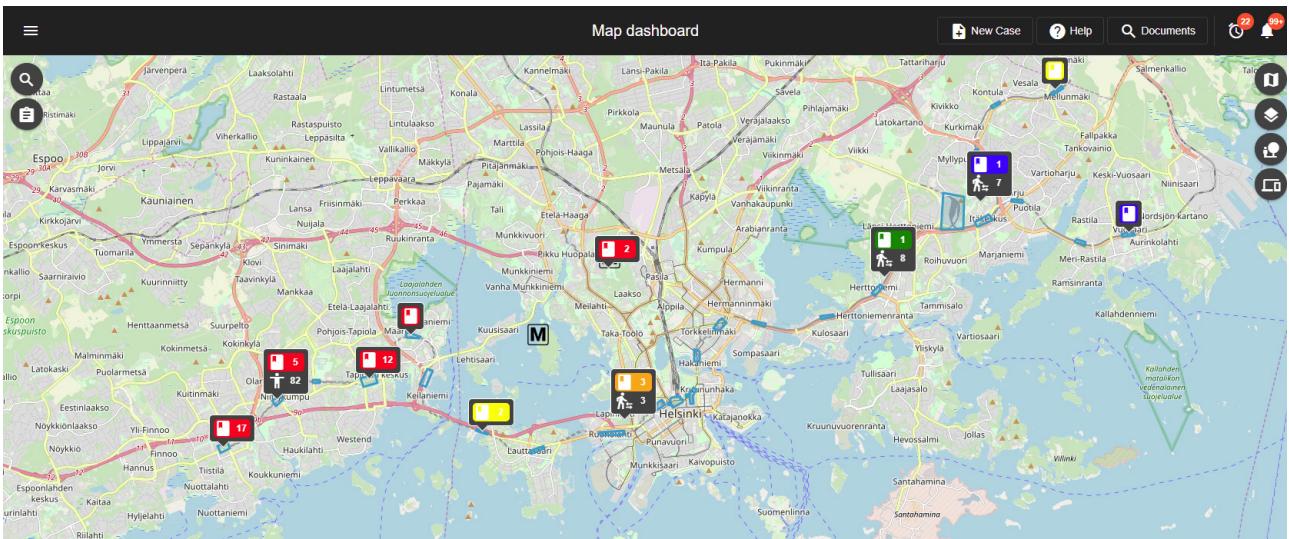
- **Understand** if something really extraordinary is happening or going to happen
- **Guide** current resources to the right place(s) as fast as possible
- **Alert** authorities needed to take part in handling situations at hand

A situational awareness system collects information from multiple security and safety systems and human observations, filters the relevant information from non-relevant, and presents information relevant to a particular organisation or user in a common user interface.

Typical end-users include authorities and organisations such as the border guard, military, rescue services, airports, and mass transit including rail, underground and road authorities.

2. Consistent, real-time information for all stakeholders

A situational awareness system connects together multiple stakeholders with different functions and responsibilities. The key point is to understand that they all need real-time information about safety and security situations.



Example of Situational Awareness system map view

It is also important to notice that **information needs differ between organisations and stakeholders, and even between individual end-users**, as they are all mainly interested in **information affecting their own work and activities**. Most of the stakeholders do not have direct access to information from native systems and they don't even want it simply because of the overwhelming amount of data produced.

To address the different information needs, a situational awareness system:

- Processes and filters the received data automatically
- Shows the overall, real-time safety and security situation to the stakeholders that need it
- Shows the real-time progress and actions taken to handle critical cases that affect multiple stakeholders (what, when, who)
- Provides a structured way to handle critical cases and manage information

In other words, a situational awareness system provides different stakeholders real-time information in a structured format that ensures a uniform, relevant and user-specific snapshot of situations and leads to informed decision-making on eventual actions.

3. Effective situational response in the required time

Security failures and abnormal situations often occur unexpectedly – but some of them can still be predicted to happen someday. When it comes to predictable situations, **it is possible to improve preparedness to be ready to act in the required time**, and some actions can be defined beforehand also for complete surprises.

A situational awareness system supports predicting future events by helping identify security and safety threats. Usually this is achieved utilising pre-set rules

that are created within the system to enhance operations. For example, by linking several low-priority cases together based on available information the system can alert that a bigger threat exists.

While some threats can be considered obvious, the system plays a crucial role in recognising additional threats related to the original security threat by using pre-defined rules, guidelines and measures. Especially, a rule generator to create new incidents based on combined sensor, incident and case information is a very powerful tool in recognising additional security threats.

The system also collects and stores information about serious incidents that can be used later for specific case reports and statistics, and to link the reports to other cases to provide a wider understanding of each situation.

Identifying security threats is the key to being prepared as it forms the basis of all consequent actions. In addition, a situational awareness system can be used to **plan for resources** for repeated situations such as public holidays, visits of heads of state, and major sporting events. The system makes it easy to check the number of cases reported on previous occasions and review the collected statistics to assess whether resources in use were sufficient to handle them and whether they should be increased.

One of the finest features of a situational awareness system is that it can be used to **train for the most critical and exceptional situations in advance** to ensure an effective level of preparedness in the future.

Trainings can be made more realistic by utilising simulators to launch additional security threats while practising for a specific incident. For example, the

A situational awareness system is a highly powerful tool for public security under normal circumstances, and its relevance grows tremendously during crises and disturbances. The system saves time and allows more efficient use and control of resources in handling abnormal and emergency situations.

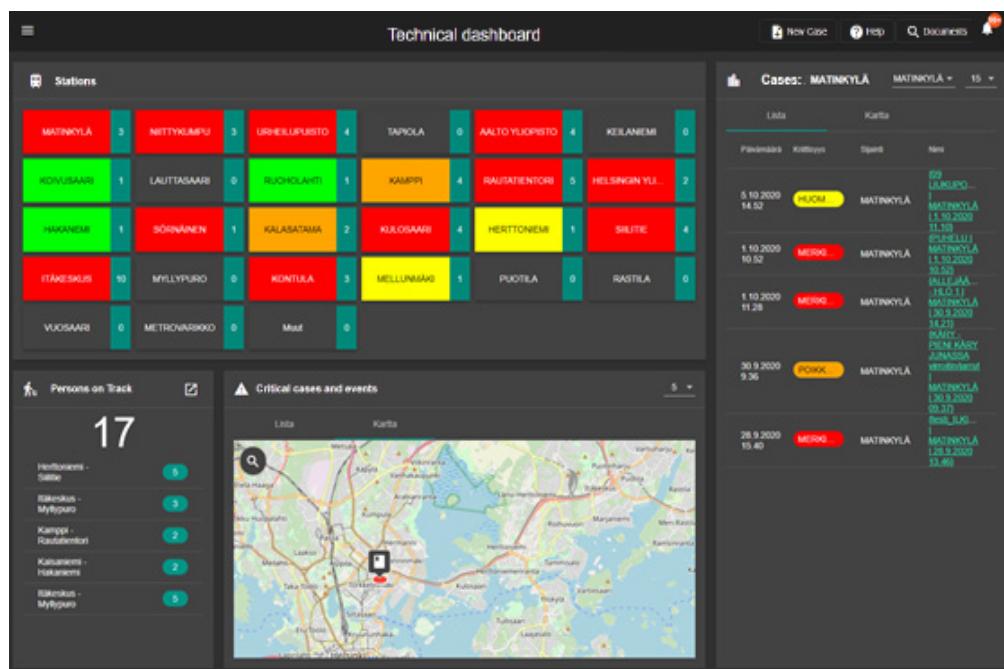
original threat might be caused by a passenger train that has caught fire in a tunnel. In addition to that, a second level threat might arise from having power still on the tracks even though the lights are otherwise off in the tunnel.

Utilising the system's training environment helps in:

- Indication of the relevant information that is not visible to all necessary stakeholders
 - Identification of possible missing measures/ procedures and communication breakdowns
 - Measurement of individual response times and resources needed to handle each situation

And thus, the system helps improve handling of the real situations properly and as fast as possible.

Training tools do not solve all challenges related to the handling of complex events, but they help rehearse for them in a more realistic way. They point out bottlenecks, improve response times, help bring new personnel on board and ensure efficient and correct operations even in extreme circumstances.



Example of a situational awareness system technical dashboard

Comparison of situational awareness and other operational systems: Normal day-to-day actions such as observing opening doors are tasks for ‘native’ operational systems such as access control, PSIM or a building management system, and they normally affect only one operator and/or organisation at a time. Incidents handled by a situational awareness system have the capacity to affect the overall safety and security situation and multiple operators within a wider area, and the system provides both predictive and reactive tools to handle them.

	Affecting only a single operator	Affecting many operators within one organization	Affecting many operators and organizations	Predictive / reactive
Situational Awareness System	NO*	YES	YES	BOTH
Building Management System	YES	YES**	NO	REACTIVE
PSIM	YES	YES**	NO	REACTIVE
Individual native systems	YES	YES**	NO	REACTIVE

* = Exceptions exist

**= Yes, but only for limited systems/audiences

SYSTEM COMPONENTS

A situational awareness system consists of several elements that need to be fitted seamlessly together for reliable system operation. The most fluent way to acquire it is to choose a ready-made system package with all the needed software, hardware, network components, customer-specific integrations, user interfaces and tailoring.

A recommended option to implement a successful situational awareness system is to purchase **a central situational awareness system** as a package including **situational awareness SW installed in suitable HW** sized according to your needs, and **a core network** with all needed network protections and components.

Integration modules are needed to ensure reliable, real-time transfer of data between the situational awareness system and other operational systems. Fusing the observed data from the other systems, the situational awareness system maintains up-to-date information about the environment and creates relevant data of safety and security situations.

User interfaces should be clear and user-friendly, and they should come with the possibility for customisation to ensure effective real-time visualisation of the overall security and safety situation as well as handling of critical cases in organisation-specific security environments. In addition, user interfaces need to be available for normal PCs either as a web-based UI or application, and as mobile application for tablets and smartphones.

Tailoring of the situational awareness system to particular safety and security environments is always needed for the best possible operative outcome. It is, however, important to note that the system should still be based on a standard software that is optimised to the specific needs. Optimisation should be done by:

- Tailoring UI views for specific operational needs
- Providing suitable integrations and setting rules to create automatic cases based on integrated alarm/sensor information
- Setting up the needed specific information including maps with locations of interesting areas/devices/moving patrols, case templates and guidelines, and measurement and report templates
- Providing user manuals and relevant training for users of the system

In addition, implementing a separate **training system** with simulators is highly recommended as it allows flexible training without the risk of compromising the real information from an operational or legal point of view.

For a successful system implementation, choosing an experienced system provider really helps. The right partner can recognise time-consuming and critical parts of the project and suggest solutions to handle them appropriately. The support of an experienced and professional team also guarantees that your system will meet your real needs.

IMPLEMENTATION CHALLENGES

A situational awareness system is a complicated structure, targeted to fit the needs and requirements of your operational environment. Hitting a home run with its implementation is not an easy task but taking note of a few common stumbling blocks will greatly improve your chances of a successful outcome.

1. How can you keep the project on schedule and get the system up and running in the expected time?

When it comes to project schedule, the best way to minimise the risk of delays is to base your solution on a standard software with a ready-made system package including most of the needed features. Instead of building the solution from scratch, **turn the focus on tailoring the system to your specific operational needs.**

2. How should you assess network access requirements and solve multi-organisation needs?

Network access challenges are especially related to the handling of classified security information in multi-organisation environments. In addition to ensuring sufficient network capacity, the biggest challenge can be simplified to one sentence: **How can you provide the necessary information to all stakeholders, but still protect the network and the information that is stored and handled within the system?** How can you share enough information and at the same time avoid sharing it with persons or organisations not entitled to it?

There are many case-specific details here, but common mitigations include minimising the amount of transferred information, using demilitarised zones, defining different

levels of access rights to limit access to information, utilising data encryption/decryption technologies, and avoiding active directory solutions in multi-organisation environments to have a single responsible stakeholder for users able to access the system. It is also important to keep an eye on the applicable regulations, network threats and IP policies as what was acceptable at the beginning of the project might not be valid a bit later.

3. How can you separate real operational needs from nice-to-have requests?

In the project planning phase, you can place countless expectations on the new system but, to ensure reliable system delivery within the agreed time, **it is important to understand the real operational reason behind each feature request.**

In many cases, there are several different ways to fulfil specific situational awareness needs. Before asking for your own particular feature request to be implemented, it pays off to evaluate if the same need can already be fulfilled with existing features or by tailoring them. And even if new a feature needs to be implemented it is always wise to evaluate different ways to find the best solution and also to use the standard software as a base. It is wise to turn to a system provider with wide experience about other similar cases and projects, and capability to recognise your real operational needs and find solutions to them.

The best way to proceed in system integrations is to keep them simple and integrate only the needed systems and information. Although it is easy to get overwhelmed by the latest technologies, it is wise to concentrate on the essential and avoid integrating nice-to-have systems or features with little additional benefit.

SYSTEM INTEGRATIONS

Integration modules are needed in every situational awareness system to link it with other operational systems, receive information from them and, in certain cases, also to pass information to them. Integrated systems may include sensor and map systems, communication systems as well as visual verification systems.

Sensor system integrations

Sensor systems feed a situational awareness system observed information from different sensors such as motion, fire and smoke detection, weather and other physical sensors. They are integrated to the situational awareness system so that:

- Individual or combined sensor information can be used to launch cases/alarms in the situational awareness system.
- Critical cases can be recognised as early as possible as combining information from several sources provides a more comprehensive overview of the environment. For example, individual alarms from different sensors may have a low priority as such, but when the information is combined, they may indicate a critical case: A single motion sensor alarm in the country border might just be triggered by an animal or one person whereas multiple sensor alarms from different locations may indicate a far more serious situation.
- Additional sensor information affecting the security situation can be checked easily. For example, in case of a tunnel fire, information about the wind direction may have a significant effect on rescue operations.

Sensor system integrations are often unidirectional as the actual task is usually handled in the native system and only the information needs to be passed to the situational awareness system. Implementing deeper, bi-directional integrations is also possible, but you should carefully consider their additional value to operations.

Unidirectional integrations are much more simple and easier to maintain in the long run and there might also be restrictions related to laws and regulations for the use of bi-directional integrations. This is the case, for example, when the use of 3rd party applications would restrict or complicate the use of the situational awareness system due to legal requirements.

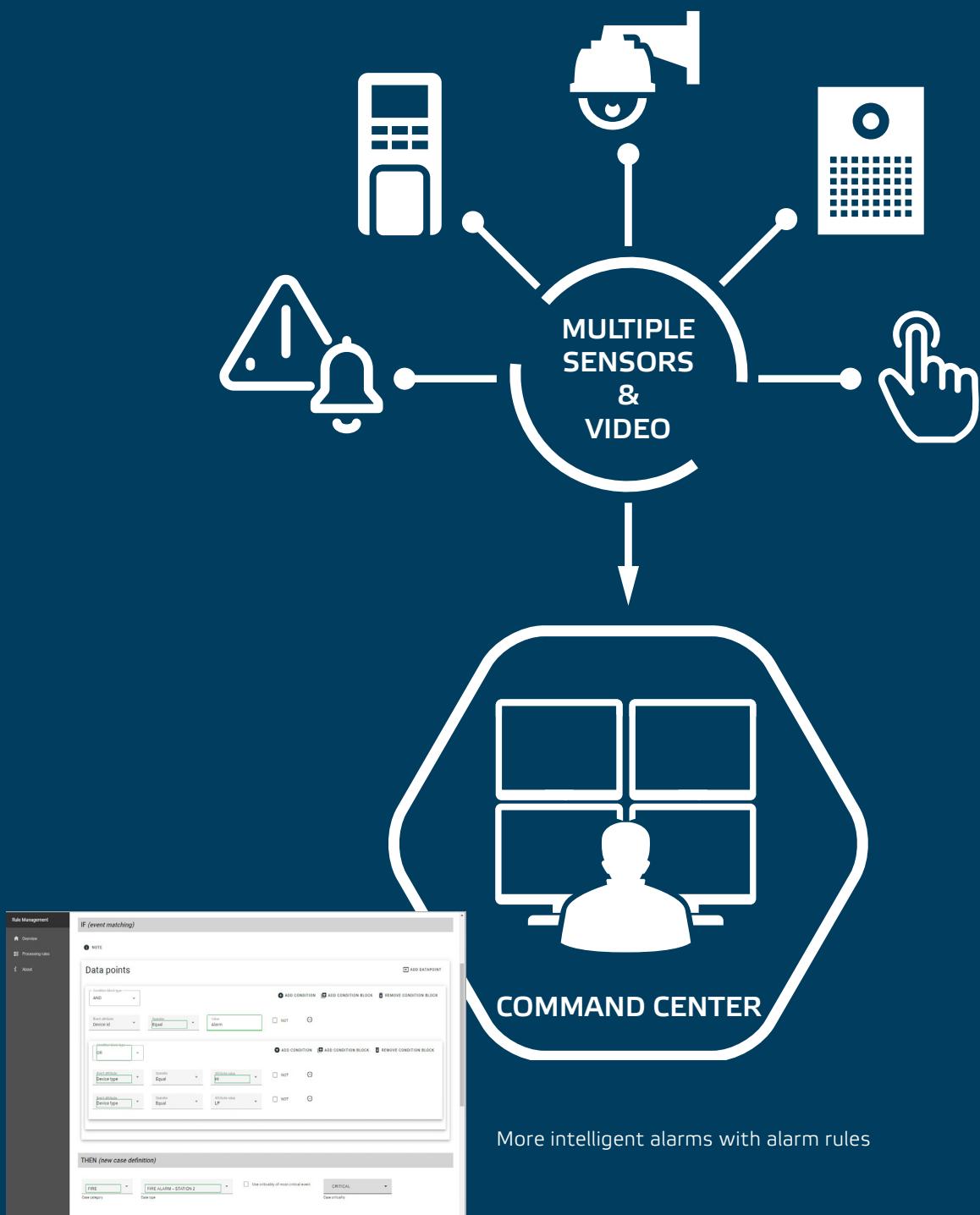
Other system integrations

Map systems may also require integration to a situational awareness system. While standard map systems, e.g. OpenStreetOffline maps serve many purposes well, organisations sometimes have their own map systems, which need to be integrated or integration is required for separately licensed map systems such as Google and ESRI. In these cases, the integration process is well standardised and it is more about licensing and allowing network connections than actual system development.

Communication system integration can mean integrations to email/SMS servers as well as to different actual communication systems, such as dedicated phone networks.

Visual verification is mostly about implementing integration to video surveillance systems. Usually these integrations are considered essential as visual verification of a current or passed situation is highly beneficial in any critical incident. It is important to note that there are many legal and technical aspects affecting how video information can be provided outside of the original organisation operating the video surveillance system.

TOOLS FOR INFORMED DECISIONS



DECISION POINTS FOR CHOOSING A SITUATIONAL AWARENESS SYSTEM

Choosing the right situational awareness system is a far-reaching decision with a long life-cycle. Before making the final choice, it is worth asking yourself the five basic questions highlighted below.

1. Does the system fit to the actual needs?

Focus on the key needs you have and make certain that they can be fulfilled with the chosen solution. Do not try to address all potential needs and nice-to-have features.

For most of the time, the goal of your system should be to create a comprehensive overview of the security and safety situation within your operational environment. The system provides you and all necessary stakeholders with real-time information to help solve critical situations fast. Its other important features include the opportunity to train for critical situations, report critical incidents, and plan the future use of resources with the help of the information extracted from the system.

2. How do the costs of the system compare to the expected benefits?

Choosing a situational awareness system based on your essential needs will bring you many benefits, alongside a number of additional features. Before making up your mind about those, you should always perform a cost-benefit analysis.

One of the most typical mistakes is to go too deep in 3rd party system integrations. Often, the benefits received are very small compared to the implementation costs, especially when taking into account that the integrations need to be maintained and maybe even

re-established after 3rd party system upgrades or 3rd party system replacements. It is common that the budget for integrations is available, but there is no budget for their continuous maintenance.

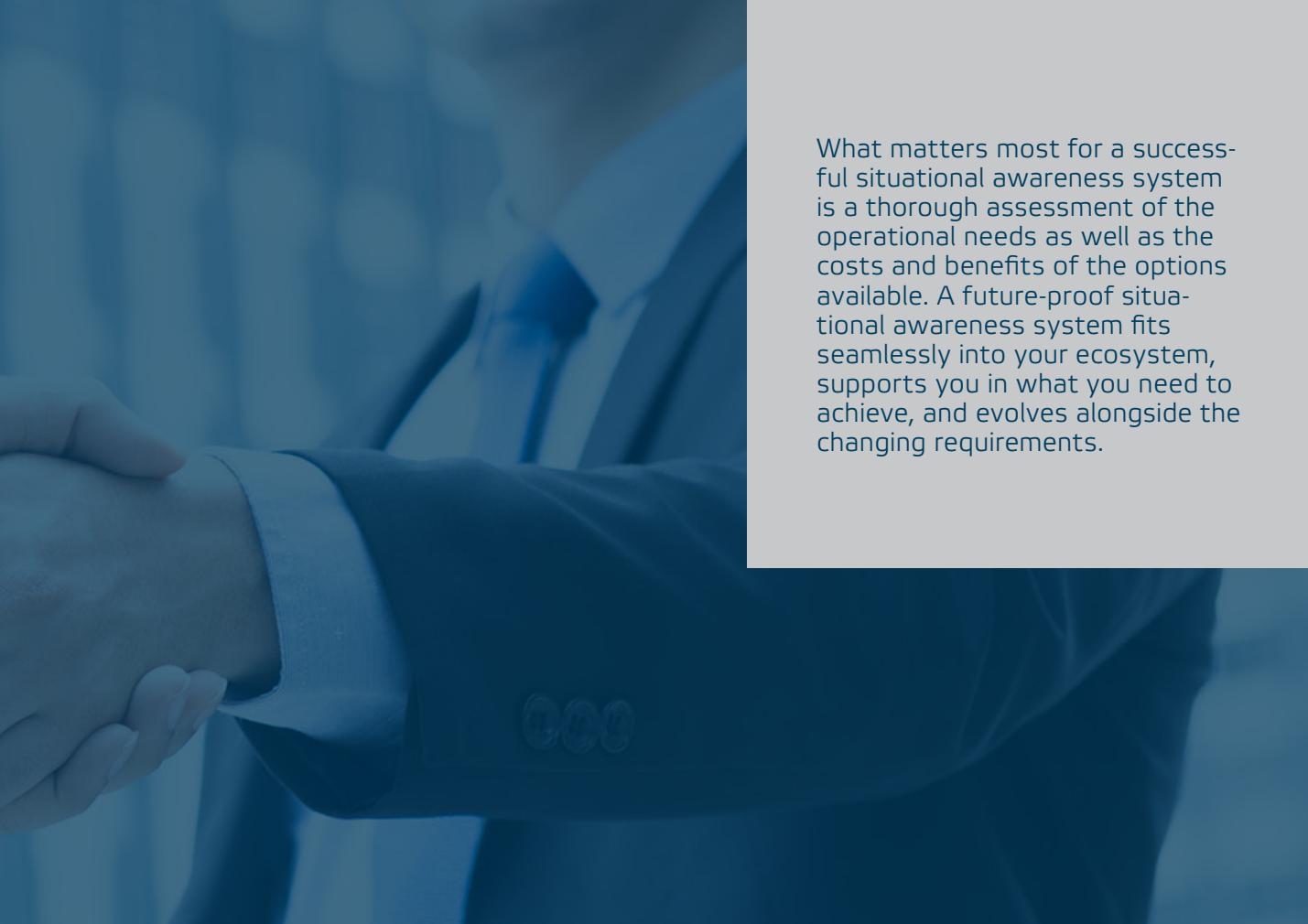
3. How can the risks be minimised?

Situational awareness systems are technically complex. It is important to get the system design and scope right from the very beginning to avoid shortcomings that are costly and time consuming to correct at a later stage.

Major risk contributors within situational awareness systems include:

- Meeting the **project schedule**: Time to get the system ready for operational use from an actual decision point is usually underestimated.
- Recognising the **actual needs**: It is important to distinguish wishes and requests from what is really needed in each operational environment.
- Adopting to the **changing environment**: operational needs, an ecosystem approach with included subsystems, network policies especially in multi-organisations, and legislation & regulation changes may all change the content of the project during and after the initial commissioning.

In all of the risks, having the right partner with the right skills and experience really helps. The right partner can



What matters most for a successful situational awareness system is a thorough assessment of the operational needs as well as the costs and benefits of the options available. A future-proof situational awareness system fits seamlessly into your ecosystem, supports you in what you need to achieve, and evolves alongside the changing requirements.

help you to navigate safe and sound in the ever-changing environment and achieve a successful outcome that meets the needs. Be wary of a partner that says yes to all your requests – instead, select one that focuses on finding out what features, functionalities and technologies are truly needed and how they best serve you.

In large-scale situational awareness systems, there will always be surprises. An ideal partner should be able to offer you the support of an experienced and professional team with the ability to provide you with the information necessary for staying up-to-date in every situation. In addition, it should also be emphasised that using ready-made, standard software as a base solution always considerably decrease the risks.

4. How future-proof will the solution be?

Situational awareness systems are designed for multiple years of operation, which means that the system needs to be future-proof. Thinking ahead pays off as it is very common that the life cycle of a situational awareness system is 10–20 years.

The following factors will help future-proof your situational awareness system:

- Harnessing the system with the capability to be expanded to process more data and support additional users

- Basing the system design on modern technologies expected to have a long life cycle
- Selecting a financially stable vendor with the capability to offer you system and software support during the entire lifetime of your situational awareness system

5. Is the chosen supplier and SW vendor trustworthy?

Your situational awareness system provider and system integrator will learn a lot about your operating environment and especially about your security processes and network. It is wise to consider who you can trust.

Obviously, all the information given to your system provider is needed to ensure an optimal solution for you, in commissioning the system, as well as in support activities. Unfortunately, the same information can also be used to find weaknesses in the system and learn, for example, how to by-pass network protection and what are the normal procedures and measures to manage critical security incidents.

Trust, therefore, is among the most important aspects of the building of your system. Choose your system providers carefully and favour ones that have no ties to suspicious parties – whether companies, individuals, countries, or anyone you can't trust.



TELESTE CORPORATION

P.O.Box 323

FI-20101 Turku, Finland

www.teleste.com

P3I_Teleste Situational Awareness System White Paper 2023

Copyright © 2023 Teleste Corporation. All rights reserved. Teleste and the Teleste logo are registered trademarks of Teleste Corporation.

Other product and service marks are the property of their respective owners.

Teleste reserves the right to make changes to any features and specifications of the products without prior notice. Although the information in this document has been reproduced in good faith, the content of this document is provided "as is". Teleste makes no warranties of any kind in relation to the accuracy, reliability or content of this document, except as required by applicable law.