** **

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**Situational Awareness - Human Behaviour**

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## I. Description

Put simply, situational awareness (SA) means appreciating all you need to know about what is going on when the full scope of your task - flying, controlling or maintaining an aircraft - is taken into account. More specifically and in the context of complex operational environments, SA is concerned with the person's knowledge of particular task-related events and phenomena. For example, for a fighter pilot SA means knowing about the threats and intentions of enemy forces as well as the status of his/her own aircraft. For an air traffic controller, SA means (at least partly) knowing about current aircraft positions and flight plans and predicting future states so as to detect possible conflicts. Therefore, in operational terms, SA means having an understanding of the current state and dynamics of a system and being able to anticipate future change and developments.

A general definition of SA is that it is the perception of the elements in the environment within a volume of time and space, the comprehension of their meaning and the projection of their status in the near future[[1]](http://www.skybrary.aero/index.php/Situational_Awareness?utm_source=SKYbrary&utm_campaign=2ae67428aa-427_Situational_Vector_08_08_2016&utm_medium=email&utm_term=0_e405169b04-2ae67428aa-276577709#cite_note-1)

This basic definition has been extended by Dominguez et al. (1994)[[2]](http://www.skybrary.aero/index.php/Situational_Awareness?utm_source=SKYbrary&utm_campaign=2ae67428aa-427_Situational_Vector_08_08_2016&utm_medium=email&utm_term=0_e405169b04-2ae67428aa-276577709#cite_note-2), who state that SA needs to include the following four specific elements:

1. extracting information from the environment;
2. integrating this information with relevant internal knowledge to create a mental picture of the current situation;
3. using this picture to direct further perceptual exploration in a continual perceptual cycle; and
4. anticipating future events.

Taking these four elements into account, SA is defined as the continuous extraction of environmental information, the integration of this information with previous knowledge to form a coherent mental picture, and the use of that picture in directing further perception and anticipating future events.

## II. Significance

For a pilot, situational awareness means having a mental picture of the existing inter-relationship of location, flight conditions, configuration and energy state of your aircraft as well as any other factors that could be about to affect its safety such as proximate terrain, obstructions, airspace reservations and weather systems. The potential consequences of inadequate situational awareness include [CFIT](http://www.skybrary.aero/index.php/CFIT), [loss of control](http://www.skybrary.aero/index.php/Loss_of_Control),[airspace infringement](http://www.skybrary.aero/index.php/Airspace_Infringement), [loss of separation](http://www.skybrary.aero/index.php/Loss_of_Separation), or an encounter with [wake vortex turbulence](http://www.skybrary.aero/index.php/Wake_Vortex_Turbulence), severe air [turbulence](http://www.skybrary.aero/index.php/Turbulence), heavy [icing](http://www.skybrary.aero/index.php/In-Flight_Icing) or unexpectedly strong head winds;

For a Controller, situational awareness means acquiring and maintaining a mental picture of the traffic situation being managed and maintaining an appreciation of the potential for unexpected progressions or changes in this scenario.

## III. Defences

Situational awareness is so important that much of the working environment of both the pilot and the ATCO is designed and used to help maintain it.

* For the ATCO, this includes [communication](http://www.skybrary.aero/index.php/AGC), with aircraft (voice and data link) and with other controllers; and radar, together with associated [safety nets](http://www.skybrary.aero/index.php/Safety_Nets).
* For the pilot, this includes [communication](http://www.skybrary.aero/index.php/AGC) with the controller; monitoring communication between controllers and other aircraft; visual look-out; navigation (incuding use of maps and charts); and aircraft [safety nets](http://www.skybrary.aero/index.php/Safety_Nets), including [TAWS](http://www.skybrary.aero/index.php/TAWS), [ACAS](http://www.skybrary.aero/index.php/ACAS" \o "ACAS)and [GPWS](http://www.skybrary.aero/index.php/GPWS).

## IV. Typical Scenarios

* A pilot is cleared for an approach at night to an airport with which they are not familiar, but decides to fly by [visual reference](http://www.skybrary.aero/index.php/Visual_References) instead of following the vertical profile of the assigned instrument procedure because they can see the runway in the distance; [CFIT](http://www.skybrary.aero/index.php/CFIT) results (e.g. [S76, Peasmarsh East Sussex UK, 2012](http://www.skybrary.aero/index.php/S76,_Peasmarsh_East_Sussex_UK,_2012)).
* The pilot is unaware of the existence of an [airspace reservation](http://www.skybrary.aero/index.php/Controlled_Airspace) and enters it without clearance resulting in [Loss of Separation](http://www.skybrary.aero/index.php/Loss_of_Separation) from another aircraft (e.g. [AT72 / B732, vicinity Queenstown New Zealand, 1999](http://www.skybrary.aero/index.php/AT72_/_B732,_vicinity_Queenstown_New_Zealand,_1999), [B738 / C172, en route, near Falsterbo Sweden, 2014](http://www.skybrary.aero/index.php/B738_/_C172,_en_route,_near_Falsterbo_Sweden,_2014)).
* The pilot copies a clearance incorrectly but fails to read it back; the [read-back](http://www.skybrary.aero/index.php/Read-back_or_Hear-back)omission is overlooked by the ATCO and the aircraft climbs to a level to which it has not been cleared creating a [level bust](http://www.skybrary.aero/index.php/Level_Bust) (e.g. [C525 / B773, vicinity London City UK, 2009](http://www.skybrary.aero/index.php/C525_/_B773,_vicinity_London_City_UK,_2009)).
* The ATCO forgets the presence of an aircraft on approach and clears another aircraft to enter the active runway in its path resulting in a [Runway Incursion](http://www.skybrary.aero/index.php/Runway_Incursion) (e.g.[B738 / 744, Los Angeles USA, 2004](http://www.skybrary.aero/index.php/B738_/_744,_Los_Angeles_USA,_2004), [B738/B734, Johannesburg South Africa, 2010](http://www.skybrary.aero/index.php/B738/B734,_Johannesburg_South_Africa,_2010)).
* The ATCO issues a clearance to an aircraft flying in [IMC](http://www.skybrary.aero/index.php/IMC) which results in it entering a [cumulonimbus](http://www.skybrary.aero/index.php/Cumulonimbus) cloud, where severe [icing](http://www.skybrary.aero/index.php/Icing) and [turbulence](http://www.skybrary.aero/index.php/Turbulence) are encountered.
* The ATCO clears an aircraft to a level where it will be in conflict with a second locally-based aircraft; the aircraft is unaware of the error because communications with the locally-based aircraft are being conducted in the local [language](http://www.skybrary.aero/index.php/Language) whereas other aircraft communications are being carried out in English (e.g. [GLEX/F2TH, vicinity Ibiza Spain, 2012](http://www.skybrary.aero/index.php/GLEX/F2TH,_vicinity_Ibiza_Spain,_2012)).

## V. Contributory Factors

* [Interruptions and distractions](http://www.skybrary.aero/index.php/Interruption_or_Distraction);
* Use of the local [language](http://www.skybrary.aero/index.php/Language) on a frequency used by pilots who are not familiar with it;
* [Pilot](http://www.skybrary.aero/index.php/Pilot_Workload) or [ATCO](http://www.skybrary.aero/index.php/ATCO_Workload) workload;
* Poor [radio discipline](http://www.skybrary.aero/index.php/Radio_discipline).

## VI. Solutions

* Strengthening the defences and reducing the impact of the contributory factors listed above.