Currently the European airspace is scattered and does not form a unity at all. This is far from optimal for the safety and efficiency of Air Traffic Management. Hence the question arises: “Why not strive for a unified, single European airspace?” At the moment much research is performed to achieve this goal. This is where the initiatives of the European community and Eurocontrol (the European organization for the safety of air navigation) come in: the Single European Sky (SES). In this article, a broad overview is given of what this initiative is all about and that benefits it has. A focus is given on the technical component of SES dealing with Air Traffic Management.

ONE GOAL, ONE SKY
Air traffic management is a crucial element in achieving the Single European Sky. Currently, the Air Traffic Management (ATM) system is fragmented and inconsistent, decreasing its efficiency and safety. Both civil and military users have much desire to achieve a uniform Air Traffic Management system. This may very well become reality, since the European Commission launched the project to have a Single European Sky (SES) in 2004. This Single European Sky project has several key objectives to meet:
- Restructure European airspace as a function of air traffic flows
- Create additional capacity
- Increase the overall efficiency of the air traffic management system
- Separating regulatory activities from service provision and the possibility of cross-border Air Traffic Management services
- Reorganizing European airspace that is no longer constrained by national borders
- Setting common rules and standards, covering a wide range of issues, such as flight data exchanges and telecommunications

In particular, the last two points clearly indicate that single and universal rules are pursued.

SESAR
The SES project comprises several components, one of which is SESAR. SESAR stands for Single European Sky ATM Research and is the technical component of the SES project. To gain better insight into the usefulness of SESAR, Air Traffic Management will be briefly discussed.

AIR TRAFFIC MANAGEMENT AND ITS DISCIPLINES
ATM is defined as “the process, procedures and resources which come into play to make sure that aircraft are safely guided in the skies and on the ground.” It comprises of three disciplines:
- Airspace Management: deals with defining standard pre-planned routes, which aircraft must follow during their flight.
- Air Traffic Flow and Capacity Management: deals with matching the requested flights with available capacity. This discipline is necessary because an air traffic controller can only safely handle a limited number of flights simultaneously.
- Air Traffic Control (ATC): deals with keep-
NEED FOR A DEED
The three aforementioned disciplines of ATM deal with optimization. The Airspace Management must optimize the pre-planned routes, Air Traffic Flow and Capacity Management must optimize the amount of flights with the number of air traffic controllers. Air Traffic Control itself aims for having as many take-offs and landings per hour while still maintaining safety regulations. This is a difficult job since the European airspace is one of the busiest in the world with over 33,000 flights on busy days, making air traffic control even more complex. It becomes harder and harder as time progresses, since air traffic levels keep increasing.

In order to maintain an efficient, safe and punctual ATM system, action needs to be taken. There is a ‘need for a deed’.

This deed comes, amongst other SES components, in the form of the Single European Sky ATM Research. The term research might indicate that it is merely theoretical, but it certainly is not: “Although SESAR is a research, it is aimed to achieve tangible goals. It is because of this that SESAR is a promising research.”

The tangible goals of this research are connected to the three disciplines of ATM. By the year 2020, the research program should have achieved the following goals:

- enable a three-fold increase in airspace capacity
- improve safety by a factor of ten
- provide a ten percent reduction in the environmental impact per flight
- reduce air traffic management costs by fifty percent
- reduce delays in the air and on the ground.

The goals indicate an emphasis on cost-efficiency, safety and environmental sustainability.

ENVIRONMENT
Global warming is a hot topic nowadays. In order to fight global warming, measures have to be taken. In the aerospace industry this boils down to a reduction of fuel usage. The most obvious solution to a reduction in fuel consumption would be to improve the engines used on aircraft and to reduce the drag by designing more aerodynamically efficient wings. As was mentioned before, SESAR deals with Air Traffic Management. Although it may not seem obvious, ATM is directly related to the environmental sustainability of aviation. It affects when, how far, how high, how fast and how efficiently aircraft fly. Air Traffic Management thus influences the amount of fuel used in aviation. Therefore, the goals of SESAR are (strongly) related to environmental issues. Airspace Management sets the pre-planned routes for aircraft to fly, which may be more efficient in terms of flight time, by taking the curvature of the Earth into account. In addition, there are possibilities to reduce the loiter phase of an aircraft before it is cleared to land. This decrease in flight time reduces the fuel consumption even further. If a decrease in the loiter phase can be accomplished in the entire aviation industry, a major decrease of fuel consumption could be achieved: “SESAR technology will enable more direct flight paths and smoother descent and climb that will eliminate some of the main causes of avoidable waste.” The specific goal of SESAR is to achieve a reduction of the environmental impact per flight by ten percent. Besides this, SESAR will also address the issue of noise pollution.

SESAR UNITED AND FUNDING
The issues described in the previous section seem rather obvious, so why was the ATM system not implemented before? In the past it actually was, but it did not achieve the goals set. This partial failure was mainly due to a lack of commitment of the stakeholders and other involved parties.

To change this and actually achieve the goals set for the SESAR program, things have to be done differently. Therefore, SESAR is a joint endeavour led by SESAR Joint Undertaking (SESAR JU). SESAR JU was founded by the European Community and Eurocontrol. SESAR JU involves multiple aviation players; both civil and military, as well as aircraft manufacturers such as Airbus. All the parties involved are committed to implement the idea of a Single European Sky. The Dutch branch of Thales also contributes to the SESAR program. It developed a system called Microwave Landing System (MLS). This system is designed to reduce fuel consumption and emissions by improving the flow of air traffic and minimizing the time between departures and landings. “The SESAR program consists of sixteen so-called work packages. SESAR JU is responsible for the coordination of these work packages. For more information about the SESAR program, visit their website: http://www.sesarju.eu/programme.

CONCLUSION
As global warming is becoming more severe, actions need to be taken. The SESAR program aims to reduce fuel consumption in aviation, thereby enhancing the cost-efficiency. Furthermore, the safety in aviation is about to improve due to the SES initiative. Time will tell if it really works out.

References
www.sesarju.eu
www.eurocontrol.int
www.thalesgroup.com

Aviation Department
The Aviation Department (LVD) of the Society of Aerospace Engineering Students ‘Leonardo da Vinci’ fulfills the needs of aviation enthusiasts by organizing activities like lectures and excursions in the Netherlands and abroad.

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