"[air navigation control, […] is a task involving the exercise of public authority and is not of an economic nature, since that activity constitutes a service in the public interest which is intended to protect both the users of air transport and the populations affected by aircraft flying over them". (Extract of decision C.364/92 of the European Court of Justice).

ATCEUC POSITION PAPER
SESAR OPERATIONNAL CONCEPT ELEMENTS

INTRODUCTION

Given the results of the D1 and D2 deliverable, and bearing in mind the ICAO principles, here are the key points our organization think should be considered in priority to build the operationnal concept. This paper also presents the views of controllers regarding some future concepts, such as 4D trajectories, and ASAS systems. There are other elements that could participate to the realization of SESAR objectives.
The Commission gave a mandate for SESAR, and defined the objectives to be reached. The position paper is structured around those objectives:

- Capacity x3
- Safety x10
- Cost /2
- Environmental impact –10 %

The annexes at the end of the document contain the following items:

- Eurocontrol guidelines for Air traffic control automation
- ICAO principles :
- ASAS application categories :

CAPACITY

Objective: Capacity x3.

Two perspectives should be considered when addressing capacity issues: Airports and en-route

The Airport perspective :

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It is, by now, a well known and well documented fact: airports are and will remain the bottleneck of the system. It is even stated in the deliverables.

- Everything must therefore be planned to maximize the **ground network** capacity : automation tools (DMAN, AMAN, SMAN) should be developed and used. These tools must be linked with en-route prediction tools for optimum efficiency. (Ground network capacity also encompasses constraints such as pax handling, parking capabilities…
  Runway throughput could be enhanced thanks to different tools: diminution of the wake vortex impact (minima reduction on both single and parallel runways), EGNOS based approaches with different thresholds, etc.
  In any case, intensive research must be conducted on how to optimise capacity in ***degraded weather conditions,*** and CDM relations must be enhanced.
- TMA capacity is always restrained by runways capacities even in highly complex TMA. However,to establish or maintain spacing in the sequencing and merging phase , ASAS can be a powerful tool to help and assist the controller.

En-route perspective

En route capacity could be maximised by :

- Lower flow complexity (better predictabily and restructuring of airspace)
- Automation tools built to help/assist the controller.
- Data link system : and similar applications aiming at reducing redundant tasks (frequency change instructions, initial clearance, …)
- Better use of the Flexible Use of Airspace concept (FUA).

SAFETY

Objective : safety x10

Measurement and report :

In order to improve, one must be able to measure.
The first thing will be to come to a common agreement on how to measure the safety level; European binding rules must be issued to force all providers to report all their safety cases to a global European data base. Reports should be anonymous and based on the works of the just culture workgroups.

Safety level enhancement :

Airport / On the ground:

- Runway incursion prevention systems should be issued and implemented. That issue is well identified, but further tools could be developed to further prevent runaway incursions;
- ASAS ATSA (see annex III) should be used for situational awareness

En-route :

Implementation of Data link. (Down streaming some aircraft parameters could yield significant results,…)

COST

Objective : cost / 2

Dividing the cost by two when the traffic triples is not conceivable. To address the issue of costs, one should broaden the scope of analysis, and encompass both direct and indirect costs (such as flight efficiency). The key element to enhance cost effectiveness is to focus on airspace design, as enhanced airspace design will allow users to fly as close as possible from their ideal "business trajectory". This involves a complete and massive defragmentation and it is unlikely to happen unless states and providers redefine a global strategy, focused on the common performance of the system rather than on their own individual performance. Some initiatives were launched and look promising. They should be pursued and examined in greater detail.

ENVIRONMENTAL IMPACT

Environmental impact objective -10 %

Many different issues will need to be addressed if one ever want to reach the above mentioned target:

- Airports and their vicinity. Environmental issues basically cover emission of Nox and noise
- High altitude. H_2O and Nox emissions
- Global perspective: CO_2 emissions.

The environmental impact is a complex issue, and it has, up to now and to our knowledge been hardly developed in SESAR. Given the magnitude and impact of environment, and judging by the way environmental issues recently gained importance in our professional life, greater emphasis should be placed on that issue

FUTURE CONCEPTS

ASAS :

ASAS full self separation in high density airspace within SESAR time frame is pure illusion, it's a research topic.

ASAS seems very promising, however, as a situation awareness tool in the European core area, especially on the apron, or to establish and maintain spacing in the sequencing and merging phase

4D capabilities:

4D predictions will be useful for better predictability.

4D "CLOSED-LOOP" CONTRACTS :

- ***Climbing phase*** : it is *physically* impossible for an aircraft to respect *both* a 3D tube and a time constraint. Those contracts could therefore only be used , if practicable, either in cruising and/or descent.

- ***Cruising*** : the foreseen impact of those contracts on fuel efficiency is so high that they can only be considered for very short periods of time (10 to 15 minutes) as a way to relieve the attention of the controllers.
- ***Descent*** : in configuration of sequencing and merging, due to the foreseen limitations of the avionic accuracy, this technique seems less promising than ASAS or classical control (either on open vectors or stacking).

CONCLUSION

The future ATM system will be human centred and safety oriented, or it will not be.
Automation will assist controllers in their decision making process, while preserving their skills and abilities to deal with unusual situations
It will handle more traffic at a high safety level and provide a more efficient service to its Users while reducing global ATM related costs

Annex I Eurocontrol guidelines for Air traffic control automation

1 The controller is responsible for the safe, orderly and efficient flow of air traffic. (S)he has final authority with adequate information and means to exercise this authority.
2 The full authority, when required, is obtained with simple intuitive actions, while aiming at eliminating the risks of adverse effect.
3 The design accommodates for a wide range of controller skills and experience.
4 The design is dictated by safety and efficiency in that order of priority.
5 The design aims at simplifying the controllers' tasks, by enhancing situational and system status awareness.
6 The automation is considered as a complement available to the controller, who can decide when to delegate and what level of assistance is desirable, according to the situation.
7 The human machine interfaces are designed considering system features, together with controller's strengths and weaknesses.
8 State of the art human factors considerations are applied in the system design process to manage the potential human errors.
9 The overall design favours collaborative communication.
10 The use of new technologies and implementation of new functionalities are dictated by significant safety benefits, obvious operational advantages and a clear response to the controller's needs

Annex II ICAO principles :

Safety. The attainment of a safe system is the highest priority in air traffic management and, a comprehensive safety management process is implemented that enables the ATM community to achieve efficient and effective outcomes.

Human. The human will play an essential -and where necessary, central - role in the global ATM system. The human is responsible for managing the system, monitoring its performance, and monitoring, when necessary, to ensure the desired system outcome. Due consideration of human factors must be given in all aspects of the system.

Technology. The ATM operational concept addresses the functions needed for ATM without reference to any specific technology and is open to new technology. Surveillance, navigation and communication systems, and advanced information management technology, are used to functionally combine the ground-based and airborne system elements into a fully integrated, interoperable, and robust ATM system. This allows flexibility across regions, homogeneous areas or major traffic flows to meet the requirements of the concept. "

Annex III: ASAS application categories :

Airborne Traffic Situational Awareness applications (ASAS ATSA): These applicationsare aimed at enhancing the flight crews'knowledge of the surrounding trafficsituation both in the air and on the airport surface, and thus improving the flight crew's decision process for the safe and efficient management of their flight. No changes in separation tasks or responsibility are required for these applications.

Airborne Spacing applications: These applications require flight crews to achieve and maintain a given spacing with designated aircraft, as specified in a new ATC instruction. Although the flight crews are given new tasks, separation provision is still the controller's responsibility and applicable separation minima are unchanged

Airborne Separation applications: In these applications, the controller delegates separation responsibility and transfers the corresponding separation tasks to the flight crew, who ensures that the applicable airborne separation minima are met. The separation responsibility delegated to the flight crew is limited to designated aircraft, specified by a new clearance, and is limited in time, space, and scope. Except in these specific circumstances, separation provision is still the controller's responsibility. These applications will require the definition of airborne separation standards.

Airborne Self-separation applications: These applications require flight crews to separate their flight from all surrounding traffic, in accordance with the applicable airborne separation minima and rules of flight.