



The Council of European Aerospace Societies

# Building the European Aerospace Science Base

Keith Hayward



25 years of  
The Council of European Aerospace Societies





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## 25 years of CEAS

### Contents

**CEAS President:**  
Prof Christophe Hermans

**Author:**  
Prof Keith Hayward

**Design and Typesetting:**  
Wayne J Davis

**Acknowledgements:**  
Emma Bossom, Chris Male,  
Cornelia Hillenherms, Fred  
Abbink

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The Royal Aeronautical Society  
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Introduction	4
Origins of CEAS	7
CEAS – Five themes build a history	10
1. Meeting the needs of a European aerospace industry	10
2. Disseminating knowledge: the CEAS Aeronautical Space Journals and Conferences	12
3. CEAS and European Aerospace Research Co-operation	15
4. Educating the next generation of engineers and technologists	17
5. Creating a wider international community	22



# Introduction

The Council of European Aerospace Societies (CEAS) is an international non-profit association dating back to 1993. Its primary aim is the development of a framework for encouraging co-operation between the major aerospace societies of Europe. Today it comprises 13 full Member societies: 3AF(AAAF) (France), AIAE (Spain), ALDAA (Italy), DGLR (Germany), FTF (Sweden), HAES (Greece), NVvL (The Netherlands), PSAA (Poland), RAAA (Romania), RAeS (United Kingdom), SVFW (Switzerland), TsAGI (Russia) and CzAes (Czech Republic); and six Corporate Members: ESA, EASA, Eurocontrol, EUROVIA, LAETA (Portugal) and VKI (Belgium). Furthermore, CEAS has memoranda of understanding (MoU) with ICAS (International Council of the Aeronautical Sciences), AIAA (American Institute of Aeronautics and Astronautics), AAE (Air and Space Academy), CSA (Chinese Society of Astronautics), KSAS (Korean Society for Aeronautical & Space Sciences), EREA (Association of European Research Establishments in Aeronautics) and EASN (European Aeronautics Science Network). Collectively the 13 CEAS Member Societies have over 34,000 members.

However, a bold statement of aims and objectives and a list of prestigious partner organisations hides a more complex and fascinating purpose and history. CEAS plays an increasingly important

role in stimulating and disseminating aeronautical and space research in Europe and in linking the Continent to a global scientific and technical community. It has also become a key element in encouraging and supporting future aerospace scientists and engineers and building an effective science and technology base for European industry.

## The European aerospace industry and its importance to the European economy

To possess a world-class aerospace industry is to lay claim to a place in one of the highest value manufacturing sectors. With a hundred-plus year history, aerospace may have the appearance of a mature industry but many countries still want to develop the capability to design and to manufacture air and spacecraft. If this is too ambitious an objective, many others want a piece of the action by joining a global supply chain, producing high-quality, high-worth parts and components. To achieve even a modest aerospace capability depends upon the quality of the scientific and technological base that sustains design, development and production, as well as the increasingly valuable aerospace after-market for high value services.



### A valuable European capability

Europe has this much-prized capability. Second only to the US in the total range and scope of its aerospace industry, Europe is its equal in civil aircraft, satellites, rocket launchers, tactical missiles and helicopters. It has a high degree of independence and autonomy in other military aerospace sectors. European engine and equipment companies supply into a global market. Five of its leading companies are in the global top ten.

According to the European Aerospace and Defence (ASD) industries trade association, the European aerospace industry generates a turnover of €140.5bn and employs 534,621 people in over 3,000 companies and 80,000 suppliers, many

**The European aerospace industry generates a turnover of €140.5bn and employs 534,621 people in over 3,000 companies and 80,000 suppliers**

of which are small and medium sized enterprises (SMEs). Civil aviation, space, defence and security are crucial sectors, contributing strongly to the attainment of many of Europe’s key socio-economic goals. Together, these industries ensure highly-skilled jobs, and foster Europe’s knowledge economy through massive R&D investment (the European aerospace industry invests €16bn per annum in R&D). The European aerospace industry, especially the civil sector, is also an important exporter, again benefiting the European Union (EU) economy in terms of jobs and economic development.

The world market for aerospace goods is expected to grow rapidly over the next decade. According to Airbus forecasts, the value of civil

aircraft sales alone up to 2030 is estimated to be in the region of US\$5.2tn. Europe can confidently expect to win at least half of this business. This strong position of strength translates into a significant surplus in the European Union’s overall trade balance; Europe can boast of few other industrial and technological areas in such a favourable position.

The EU Commission has recognised the importance of aerospace in the region’s economic and technological future in a number of recent policy documents. In recent years, space has received special attention, as the EU has assumed responsibility for formulating a strategy for the sector. Aerospace has an important place in the EU Horizon 2020 research programme. The European aerospace industry is leading technological

innovation in several areas, in particular in the technologies needed to meet ambitious environmental and energy efficiency targets. European aerospace companies are partners in several EU flagship research programmes, including CleanSky and SESAR. These collective efforts all contribute towards meeting European and global environmental objectives.

At a wider political and strategic level the preservation and development of a powerful core of European aerospace capabilities has critical implications for European defence and security. Ensuring state-of-the-art aerospace capabilities in Europe will provide a degree of military autonomy and freedom of action in world affairs, as well as fulfilling its international obligations.

Below: Organisations with which CEAS has a memoranda of understanding.



## The global challenge

But none of this can be taken for granted. Traditional competitors in North America are looking towards the next generation of civil and military aerospace products. The US clearly outspends Europe in military aviation and some areas of space. Catching up fully here may prove impossible but it will still be vital to maintain an edge in some of the emerging new technologies, especially as there is still an overlap between civil and military competencies. Similarly, there are complex technological links between aerospace and other industrial sectors that, over time contribute generally to the benefit of economic progress throughout the European economy. This includes the development of a range of innovative technology-based services with a societal impact well beyond aerospace and aviation.

Equally important, and perhaps even more so for European supplier companies, Russia, China, Japan, Brazil and several others have ambitions to develop world-class aerospace industries. For some, such as Russia, it's a case of rebuilding a once moribund Superpower military industry. For others, such as China, it is motivated to stake a claim as an emerging super power. In recent years, both Russia and China have made impressive steps to modernise their aerospace capabilities, both civil and military. Security and prestige interests may drive these ambitions but all of these new challengers also want a share in the economic value of aerospace.

CEAS's first Council Meeting held in Brussels on 6 December 2006. From left to right: Christophe Hermans, Gerard Fouilloux, Jean Michel Contant, Michel Scheller, Julián Slmón Calero, Sir Colin Terry, Wilhelm Cordula, Dieter Schmitt, Jean-Pierre Sanfourche, Ulf Olsson, Mario Pellerei, Peter Brandt and Joachim Szodruhc.



## Aerospace – a cutting-edge technological sector

Despite its long history, aerospace is still on the cutting edge of science and technology. Aerospace can be viewed as a group of industries, comprising inter alia structural engineering, propulsion, electrical and mechanical engineering, electronics, computing and several other discrete areas of activity. In turn, these elements draw upon a wide range of technologies and basic scientific principles, mainly but not exclusively from the physical and engineering disciplines. It follows that most of its products – certainly the core 'platforms' and 'sub systems' of civil and military aircraft – are individually of 'great systemic complexity'.

Despite advances in design and development techniques, bringing an aerospace product to market entails a long and uncertain iterative process, where continual support from the science and technology base to solve continuing problems is vital. For example, Rolls-Royce's engines incorporate the output of eight separate technological strands, including thermodynamics, aerodynamics, heat transfer, combustion, structures, materials' manufacturing processes, instrumentation and controls. As aerospace evolves, there will be a need for still more complex technological inputs including advanced information technology and cyber-dependent concepts.

To defend and increase Europe's aerospace capabilities, continued investment in research and technology acquisition will be essential. Areas such as unmanned vehicles, environmentally friendly airliners, a new generation of satellites and launchers and combat aircraft will need to be nurtured. This will also require investment in a new generation of trained and skilled people to sustain the human base that underpins the material qualities of European aerospace. In this respect the creation and evolution of CEAS has made increasingly important contributions to maintain the future strength of the European aeronautics and astronautics industry.

The development of aeronautics and astronautics is based upon research, the generation and employment of innovative technologies, integrated into industrially competitive products. The complete cycle of an aviation product may last between 20 and 30 years, which will require a large investment in initial development and continuous through-life upgrading. Currently, the aviation community shares Europe's vision for 2050 aviation and together they are building a strategic agenda for research and innovation to implement activities and remove obstacles to more effective research co-operation. For the past 25 years, CEAS has been closely involved in encouraging and sustaining this work.



# Origins of CEAS

From the mid-1980s, as the European aerospace industry grew closer together through a series of collaborative projects and the formation of more permanent cross-border industrial entities, it was evident that a closer co-operation between European aerospace scientists and engineers would be similarly desirable. This would be a fundamental step towards the creation of a more effective science and technology base to serve a rapidly integrating

organisation when, at the 1992 Farnborough Air Show, the three organisations, along with AIDAA (Italy), launched CEAS which was formally instituted at the 1993 Paris Air Show. Two years later AIAE (Spain) and NVvL (The Netherlands) came on board, followed by FTF (Sweden) and SVFW (Switzerland) in 1996. These eight bodies formed the core of the original Confederation of European Aerospace Societies, (CEAS).

***CEAS ‘flagged’ activities gradually built confidence among its members, showing that collective activity did not mean the loss of prized national characteristics***

European industrial and business structure. The various individual national European learned societies had served the aerospace community well for decades (in at least one case for over 100 years). Many had also collaborated on an ad hoc basis for many years. However, a closer, more permanent relationship had many potential benefits. At a symbolic level this would be a direct way of matching a European community of aerospace professionals with a European industry. More practically, it would help to increase the research leverage of the European aerospace scientific base through joint activity and the creation of a pan European network of researchers.

However, as in many things European, progress was at first slow and tentative. In 1986, the German Aerospace Research Agency (DGLR), the RAeS (UK) and the 3AF (France) began a series of regular meetings to review and discuss European co-operation issues. This led to a more formal

At this stage the partners still preferred an informal confederation with formal statutes but still without a defined legal identity. This was perhaps a natural reluctance on the part of national organisations with proud individual identities to surrender too much autonomy to a wider body. Nevertheless, over time, working under CEAS auspices and CEAS ‘flagged’ activities gradually built confidence among its members, showing that collective activity did not mean the loss of prized national characteristics – a process that echoed the slow confidence building among companies learning how to collaborate in the 1960s. On the other hand, historically, academia was generally well accustomed to collaboration and had already created extensive European networks.

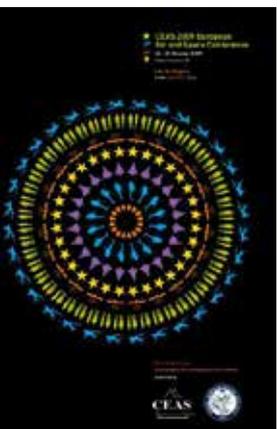
Even as a loose confederation, CEAS achieved some useful rationalisation in the area of conferences, reducing duplication and increasing their value to both academic and industrial

## CEAS Member Societies

<b>Year Founded</b> <b>1945</b>	<b>1928</b>	<b>1920</b>	<b>2006</b>	<b>1990</b>	<b>1912</b>	<b>1933</b>
<b>Year Joined</b> <b>1993</b>	<b>1995</b>	<b>1993</b>	<b>2011</b>	<b>2010</b>	<b>1993</b>	<b>1996</b>
<b>Individual Members</b> <b>1,500</b>	<b>2,725</b>	<b>260</b>	<b>115</b>	<b>100</b>	<b>2,700</b>	<b>1,330</b>



Above: The 2009 CEAS Conference Gala Dinner held under the shadow of Concorde  
Below: The programme for the RAeS hosted CEAS 2009 European Air and Sea Conference.



participants. At the same time CEAS began a transatlantic dialogue with the AIAA, including co-sponsorship of some of the major US conferences, including the Global Air & Space Conference, the Air & Space Symposium, the International Space Co-operation Workshops and a Space Policy seminar on Capitol Hill in the late 1990s.

However, reflecting the changes in the structure of the European aerospace industry, particularly the emergence of transnational enterprises and the growth of EU R&D budgets and programmes in the late 1990s, CEAS was also under pressure to move forward on to a different level of collective activity. CEAS was urged by several European industrialists and prominent aerospace researchers to improve its responsiveness to the needs of both individual and corporate members. There was a clear risk that, if CEAS did not evolve, other European aerospace entities could emerge to compete with, and possibly replace, CEAS. Thus, in 2003, the eight Constituent Societies agreed that a closer and deeper form of co-operation was required. This entailed the creation of an organisation with a formal legal standing and more extensive centralised resources, including a permanent office and staff, ideally located in Brussels. As an immediate aim, CEAS should establish its own peer-reviewed academic journal and launch other co-operative projects that would respond to the needs of a new generation of European aerospace engineers and scientists.

This was again not without some teething problems. The main and most acute problem was to formulate and to confirm a set of new statutes. Even before the 2005 agreement, a year had been spent discussing the general principles that would define the new CEAS. Part of the problem still stemmed from differing national cultures and the fact that

engineers and scientists are not necessarily good lawyers and CEAS members had some difficulty coming to terms with the legal precision necessary to create a more formal and legal identity. Even after years of loose partnership, coalescing the attitudes and positions of the various national bodies, reconciling often very different philosophies, was difficult. Some of these differences were the natural result of national cultures and traditional ways of doing things. Some of the CEAS partners were more than just academic bodies and possessed broader social functions and objectives; some acted as a link between members and their wider national aerospace and space communities. Some primarily represented the aerospace engineering and scientific community, whereas others had a membership derived from a wider aviation community, including civil and military personnel. In some cases, they would also act in a quasi-political fashion, seeking to influence national governments and other related bodies.

There were also wide disparities in size and scope. In general, most of the CEAS membership had a membership centred entirely on a single nation but some also had a global membership. At one end of the spectrum was the Royal Aeronautical Society (RAeS) with some 19,500 members located in over 100 countries. At the other end of the spectrum was the 200-member SWTW of Switzerland.

As a result, CEAS resembled a typical European institution and creating a more integrated body had to manage this wide range of interests and perspectives. In particular, the smaller member organisations wanted to have equal rights and obligations alongside the larger ones. Finding common ground proved difficult. The resulting process required a protracted series of negotiations

						
						
<b>1975</b>	<b>1941</b>	<b>2010</b>	<b>1866</b>	<b>1957</b>	<b>1918</b>	<b>1956</b>
<b>2007</b>	<b>1995</b>	<b>2009</b>	<b>1993</b>	<b>1996</b>	<b>2009</b>	<b>2010</b>
<b>365</b>	<b>353</b>	<b>120</b>	<b>23,590</b>	<b>250</b>	<b>4,400</b>	<b>-</b>

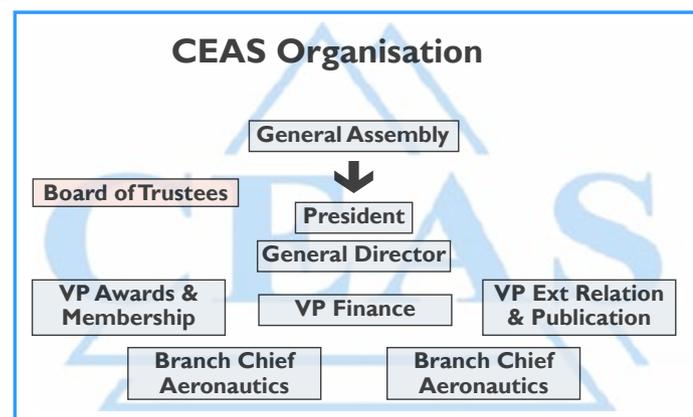
and iterations of the draft statutes, reconciling the different interests and traditions of the constituent societies. It was clear that the national associations would remain the fundamental pillars underpinning the wider European body. But, critically, all of the national societies were committed to delivering the benefits of European level co-operation, which all recognised could be best achieved through a tighter and stronger CEAS.

The resulting structure reflected these differing pressures and motivations. In addition to a formal European legal identity, the new organisation would also allow for the formation of national branches whose membership would be open to any individual member from the constituent societies wishing to join CEAS on an individual basis. These branches would have their own entity, with a series of technical committees that represented in the first instance nearly 800 aerospace experts, a branch newsletter and several other professional services. The Confederation of European Aerospace Societies duly became the Council of European Aerospace Societies recognised under Belgian law and officially came into being at the 2005 CEAS Conference in Hamburg.

Over the next few years, CEAS widened its European membership. In 2009, the Polish Society of Aerospace Sciences (PSAS) successfully applied to join the Council as Associate Member. In 2010, three other aerospace associations joined CEAS: the Czech Aeronautical Society (CzAes), Romanian Aeronautical & Astronautical Association (RAAA) and, as Corporate Member, the Von Karman Institute of Belgium (VKI). By 2010, CEAS could validly claim to represent the European aerospace research community.

Roland Fairfield, the then President of the Royal Aeronautical Society and a member of the CEAS Council, summed up the rationale for the new CEAS:

“Having painted a brief picture of an industry facing formidable challenges, let me touch upon where I believe that professional societies and CEAS in particular should fit in. Government agencies face a huge problem soliciting views from all the various interested parties within aviation, when considering policy formulation and solidifying planning decisions. Often, the most relevant inputs are not effectively heard. Professional Societies with a broad membership from the entire spectrum of aviation are in a unique position to bring together and consolidate views into a simple digestible format. By doing this, government agencies are more likely to value inputs, engage in meaningful debate, and produce timely relevant plans. In effect, we have to view this as ‘helping them to help us’. The new CEAS, while maintaining the existence of its constituent societies, will offer the European aerospace community better responses to the challenges of the millennium. I have no doubt that the new CEAS will grow rapidly and help the European aerospace communities to better express their new strength and confidence within the modern co-operative Europe.”



# Five themes build a history

Over the years, five linked themes have shaped the history of CEAS: matching the needs of industry with academic research; disseminating the results of academic research; facilitating greater coherence in European aerospace research; helping to build the future human science and technology base; and forging links with a wider global aerospace research community.

## 1. Meeting the needs of a European aerospace industry

The primary aims and objectives of CEAS are simple but a cogent reflection of the needs of the European aerospace industry and the complex nature of aerospace science and engineering. CEAS statutes define these simply as to “foster the development of

aeronautics & astronautics and to promote aerospace and to increase the visibility and serve interests of the European aerospace community.”

As Joachim Szodruich, the then CEAS President, wrote in the January 2009 Bulletin: “From the very beginning, we in CEAS had the vision to engage

ourselves not only in purely technical matters but in today’s environment you have to communicate what you are doing and you have to discuss how you would like to shape the future specifically also to policy makers and in general to all of your stakeholders.”

From its birth, the CEAS mission was to add value at a European level to the wide range of services provided by its constituent member societies; creating the conditions for a better dialogue between them and the European institutions, industry,

government and academia. From the outset, CEAS reached out to the European Commission, ASD (the aerospace defence industry association), ACARE (the advisory committee for aeronautics research in Europe) and ESA (European Space Agency).

To meet these objectives CEAS developed several inter-related approaches: the creation of a coherent programme of specialised and interdisciplinary meetings; the dissemination of research and publication of scientific and technical information; and the encouragement of international co-operation through the creation of multinational committees, task forces and study groups.

An early intervention by CEAS on behalf of the European aerospace industry was the publication of a major position paper entitled *Aeronautical Research and Technology – a Strategic Imperative for Europe* in 1997. The paper urged the Commission and EU member states to support European aerospace as an economic and strategic asset. In particular, it argued for an increase in joint investment by governments and industry in technology acquisition – to support the fundamental building blocks of aerospace progress. This approach was very much in line with CEAS’s commitment to building the European aerospace science and technology base; it did not advocate specific project based investment but argued for work on, for example, risk reducing technology demonstration that would benefit a large swathe of companies, large and small. Similarly, the aim of this activity should be to link all participants in the research community – industry, national research establishments, specialist research companies and academia.

The CEAS paper noted that while Europe had considerable strength in fundamental research, both in terms generally of investment and human resources, there were still limitations stemming from a lack of close and lasting co-operation between



Former CEAS President, Joachim Szodruich receiving his CEAS Gold Award at Delft in 2015.

CEAS has reached out to the European Commission, ASD (the Aerospace and Defence Industry association of Europe), ACARE (Advisory Committee for Aeronautics Research in Europe) and ESA (European Space Agency).



**Gathering together aeronautical engineers and experts and showcasing examples of technology is really a great way to show what a positive, long-term story the European aeronautical industry is.**

**Tom Enders,  
Chief Executive Officer of Airbus**



nations. The EU was also urged to recognise aerospace as a sector in its own right and to fund specific aeronautical research programmes.

Similarly, the relaunched CEAS was quick to establish a direct link with industry. This was underlined by a joint conference held in December 2010 under the auspices of CEAS and ASD in Brussels. Organised during the ASD Aeroweek, the Conference was attended by nearly 200 delegates. Its main objective was to present and to discuss the strategic issues facing European aerospace in the light of contemporary economic and environmental realities and the challenges and opportunities posed by the trends in European political development.

Tom Enders, Chief Executive Officer of Airbus, set the tone: “I think this somehow sums up some of the challenges we face. Gathering together aeronautical engineers and experts and showcasing examples of technology is really a great way to show what a positive, long-term story the European aeronautical industry is.” Sabine Laruelle, representing the Belgian EU Presidency and Minister for SME and Scientific Policy, noted the wider political importance of CEAS/industry co-operation: “The current success of European aerospace should not hide the enormous technological, scientific and political challenges the

European Union faces today. The emergence of Brazil, Russia, India and China in the aerospace sector does not allow EU member states to procrastinate any longer.” Both Enders and Laruelle recognised that there was a fundamental need for European industry and academia to work together to ensure the competitiveness of European companies. European technological leadership would continue to be the major competitive differentiator but substantial and sustainable investments in technologies of today and tomorrow were needed, to assure the future of European aerospace.

Since its foundation, CEAS has played a pivotal role in the process of linking industry with a stronger, more integrated scientific and technological base; progress has been based on a collective effort between academia and industry but CEAS’s critical function was to provide a bridge between the industrial user and the academic community. This was a transnational community, in many aspects a community of scientists, researchers and engineers. In this respect, CEAS’s main contribution to the joint endeavour has been in helping to encourage the environment necessary to develop winning technologies, and to encourage its members in the creation of a more unified European aerospace network.



The 2015 CEAS Delft Dinner on The Majesteit.

### 2013 CEAS Aerospace Congress Linköping – adding defence to the CEAS portfolio

A further development in the link between CEAS and industry came in 2013 at the Linköping Conference with the introduction of a session dedicated to

defence-related science and technology. Defence issues had been part of several earlier CEAS activities but the Linköping event marked a step change in CEAS's engagement in defence questions. The motivation was clear: European defence agencies faced shrinking budgets, yet the dangers facing Europe had not diminished. Increasing the priority assigned to aerospace defence affairs in the CEAS conference agenda was yet another step in widening CEAS's role in encouraging European industrial and technological collaboration. This included the introduction of operational questions into CEAS proceedings as well as publicising growing concerns about the future of the European combat aircraft sector.

Following the Linköping conference, military aerospace issues became a regular feature of the CEAS conference agenda. At the 2015 Delft conference this comprised an expert panel on the future of European air power, focusing on future needs and requirements of European military aerospace, both manned and unmanned. Again, this included both technical and operational issues, underlining the fact that CEAS was prepared to go beyond a narrowly defined scientific and technological brief.

In a few short years, CEAS forged close links with European industry, as well as beginning to reach out to European policy makers. This linkage will increasingly involve CEAS and its members helping to direct the agenda and priorities of European aerospace technological and industrial policy. As the EU also begins to develop research and development policies for the defence sector, this may also require CEAS to contribute to the formation of a coherent and effective research programme for military aerospace.



At the 2013 CEAS Conference in Delft.

## The European Rotorcraft Forum

The European Rotorcraft Forum (ERF) is one of the premier events in the rotorcraft community's calendar, bringing together manufacturers, research establishments, academia, operators and regulatory agencies to discuss advances in research, development, design, manufacturing, testing and operation of rotorcraft. The first ERF was held in Southampton, England, in 1975. The ERF is now organised by the various national aeronautical societies and is co-sponsored by CEAS.



The ERFs are special events for the international rotorcraft community and are especially important for students presenting papers to an audience of senior academics and industrialists. The ERF is an ideal opportunity for the presentation of collaborative results, the description of new technologies and operational capability for a development programme, or the first announcement of new draft regulations. The ERF International Committee, responsible for the technical programme of the Forum, aims to provide a window on the rotorcraft world, to stimulate discussion and even provoke innovation. The Forum takes place annually across Europe, rotating around the United Kingdom, Germany, France, Italy, The Netherlands and Russia.

## 2. Disseminating knowledge: the CEAS Aeronautical Journal, the CEAS Space Journal and the CEAS Conferences

From its foundation, an important goal of CEAS was the promotion of effective knowledge transfer and information exchange through the creation of a professional network of scholars and practitioners. In the early days of CEAS, this goal was largely achieved by member societies seeking CEAS endorsement and possibly further support for essentially national activities. But, as the European research and technology base moved closer together and developed into a worldwide top-class scientific community, a more activist and pan-European approach was needed, creating a more substantive and routine European forum for disseminating research results and findings.

The first step in this direction was the decision in October 2002 to publish a *Quarterly Newsletter* (CEAS *Quarterly Bulletin*). The CEAS Council felt that the organisation had reached a point where a direct means of communication was needed between the 25,000 members who formed the CEAS community. This would help to strengthen the growing network of European aerospace researchers. The *Newsletter*

was also conceived as a way of informing CEAS members of European Union research programmes and wider events in European aerospace.

However, the decision to publish a peer reviewed archival journal was a much more ambitious step. The main motivation was again the feeling that European fragmentation was especially evident in the publication of research findings. Although Europe produced a number of fine national journals overseen by a range of different organisations, increasing cooperation within European industry and academia suggested the need for a powerful pan-European scientific journal. During the early 2000s, several CEAS member societies began to push for a genuinely European scientific publication.

In 2009, CEAS decided to launch two linked peer-reviewed research publications, the *CEAS Aeronautical Journal* and the *CEAS Space Journal*, with a focus on aeronautics and space respectively. Initially, both publications were sponsored by the German Aerospace Centre (DLR) and the European Space Agency (ESA) and from the onset, through to today, are published by Springer. Continuing support from DLR and ESA was vital in establishing these publications as a credible and influential forum for the dissemination of aerospace research, the two institutions continue to pay for the Managing Editors. Most of the early papers came from the large research institutions and agencies or as the output of German or European Conferences. But, as the Journals built a reputation for scholarly rigour, they began to attract submissions from European scientists and engineers, as well as from the broader international aerospace community. The two journals are not only important and sovereign publications in their own right but also transformed CEAS into an active research-sponsoring organisation.

As CEAS 2009-2010 President Joachim Szodruich wrote in the first issue of the *CEAS Aeronautical Journal* published in August 2011,

“With this first issue of the all-new *CEAS Aeronautical Journal* the Council of European Aerospace Societies (CEAS) is proud to offer scientists and engineers in Europe and around the world a first-class journal for the publication of their high-quality research, technological and developmental results.” The quality of its publications plays a role in the recognition of a governing body such as CEAS. Its promoters were fully convinced that both Journals could potentially play a future strong role in increasing awareness as regards European aerospace research. And it was a well-known fact that researchers and engineers had an underlying interest in sharing their latest hard-earned scientific and technological advancements with the aerospace community in order to gain acknowledgement of the results from their peers. Launching the CEAS Journals presented an excellent platform to attain these objectives.

### The Journals today

From the outset, the intention behind the peer-reviewed CEAS Journals was to provide a broad and interdisciplinary coverage of aerospace topics. Today, The *CEAS Aeronautical Journal* makes a major contribution to Europe’s high-quality aeronautical research, technological and developmental environment. The *CEAS Space Journal* provides in-depth reviews of current developments in specific areas of relevance to space, and future potential directions results in all areas of space-related science and technology including the identification of important spin-off capabilities and applications. The *CEAS Aeronautical* and *Space Journals* are indexed in Scopus which allow an assessment of their scientific impact compared to other world journals in the subject.



The CEAS Quarterly Newsletter, produced since 2002.



The CEAS Aeronautical Journal and the CEAS Space Journal, both have been produced since 2010.

<b>The CEAS Aeronautical Journal</b>				
<b>Submission</b>	<b>2013</b>	<b>2014</b>	<b>2015</b>	<b>2016*</b>
<b>Total submitted</b>	93	68	88	105
<b>Total assessed</b>	45	57	41	58
accept	34	49	30	46
reject	11	8	11	12
Acceptance rate	76%	86%	73%	79%
Rejection rate	24%	14%	27%	21%
Average days to first decision	86	114	56	132
Average days to final disposition – accept	228	218	273	267
Average days to final disposition – reject	177	118	123	167

Table 1: Editorial status summary, *CEAS Aeronautical Journal* 2013-2016.

<b>The CEAS Space Journal</b>				
<b>Submission</b>	<b>2013</b>	<b>2014</b>	<b>2015</b>	<b>2016*</b>
<b>Total submitted</b>	43	37	59	34
<b>Total assessed</b>	38	15	46	38
accept	28	13	35	29
reject	10	2	11	9
Acceptance rate	74%	87%	76%	76%
Rejection rate	26%	13%	24%	24%
Average days to first decision	75	59	42	57
Average days to final disposition – accept	197	160	155	53
Average days to final disposition – reject	60	103	71	78

Table 3: Editorial status summary, *CEAS Space Journal* 2013-2016.

<b>The CEAS Aeronautical Journal</b>								
<b>Country</b>	<b>number of manuscripts submitted</b>				<b>number of manuscripts accepted</b>			
	2013	2014	2015	2016*	2013	2014	2015	2016*
Germany	57	52	44	55	23	42	24	34
UK	2	2	1	2	1	1	2	1
Austria	–	–	3	–	–	–	–1	–1
Sweden	3	2	–	–	–	–	1	–
Turkey	2	–	–	–	–	–	1	–
USA	3	1	1	1	2	1	1	1
Australia	1	–	2	1	–	1	–	1
Bulgaria	1	–	–	–	–	1	–	–
Canada	–	1	–	1	1	–	–	–
France	1	1	3	5	2	1	–	–
India	6	3	7	11	1	–	–	–
Italy	4	–	1	8	3	–	–	3
Malta	1	1	–	–	–	2	–	–
Russia	1	1	1	3	1	–	–	–
Algeria	1	–	1	1	–	–	–	–
China	3	2	13	7	–	–	–	1
Iran	7	–	4	1	–	–	–	–
Malaysia	–	–	1	2	–	–	–	–
Mexico	–	–	1	–	–	–	–	–
Netherlands	–	–	2	6	–	–	–	4
Spain	–	1	3	–	–	–	–	1
Czech Rep.	–	–	–	1	–	–	–	–
Switzerland	–	1	–	–	–	–	–	–
<b>Total</b>	<b>93</b>	<b>68</b>	<b>88</b>	<b>104</b>	<b>34</b>	<b>49</b>	<b>30</b>	<b>46</b>

Table 2: Author country of origin of manuscripts submitted and accepted.

\*The number of 'Total assessed' submissions only refers to the papers submitted in the same year.

<b>The CEAS Space Journal</b>								
<b>Country</b>	<b>number of manuscripts submitted</b>				<b>number of manuscripts accepted</b>			
	2013	2014	2015	2016*	2013	2014	2015	2016*
Germany	20	11	20	14	15	6	15	16
Belgium	1	–	1	2	–	–	–	2
Netherlands	2	2	3	3	2	1	3	2
United Kingdom	1	–	6	–	2	–	1	2
China	1	1	4	5	1	–	–	1
France	1	3	4	–	1	2	2	1
Georgia	2	1	–	1	2	–	–	1
Greece	–	–	1	–	–	–	–	1
Italy	2	5	6	–	1	2	5	1
Spain	–	2	1	1	–	–	2	1
United States	–	2	3	2	–	1	1	1
Austria	1	1	–	–	–	1	–	–
Canada	–	2	–	–	–	–	2	–
Denmark	1	–	–	–	1	–	–	–
India	5	1	4	2	–	–	1	–
Poland	1	–	1	–	1	–	–	–
Portugal	–	2	–	–	1	1	1	–
Sweden	1	–	–	–	1	–	–	–
<b>Total</b>	<b>39</b>	<b>33</b>	<b>54</b>	<b>30</b>	<b>28</b>	<b>14</b>	<b>33</b>	<b>29</b>

Table 4: Author country of origin of manuscripts submitted and accepted.

*CEAS Aeronautical Journal*  
*CEAS Space Journal*  
Other means of disseminating  
aerospace knowledge

From its foundation, CEAS worked hard organising technical workshops and symposia, as well as holding formal conferences on specific disciplines and wider aerospace topics. CEAS has convened a number of joint conferences, including the first European Air and Space Conference held in Brussels in May 2002. Partners included the European aerospace trade association AECMA, the AAAF(3AF) (Association Aéronautique et Astronautique de France) and EUROSPACE (Association for the European Space Industry). This conference brought together some 300 high-level representatives and experts from the EU institutions, the aerospace industry and other aviation bodies from all over Europe. AECMA and European Commission representatives made two keynote speeches while plenary sessions focused on broad strategic issues, followed by a wide range of specialist panels on defence, civil aviation, European space policy and R&T policy.

### CEAS Conferences

Every two years CEAS organises a regular biennial European Aerospace Congress. Since the first event in 2007, this has become a cornerstone of CEAS dissemination activity. The inaugural conference in Berlin attracted more than 1,000 participants from 30 nations, presenting over 500 high-quality papers. This event was followed by conferences in Manchester (2009), Venice (2011), Linköping (2013), Delft (2015) and Bucharest planned for 2017. The conferences have included visits to local aerospace centres and other sites of aerospace interest. The best of the conference papers were published in the *CEAS Journal*, including position and discussion papers on issues of particular importance to the scientific community or to the future generally of European aerospace.

### Technical Committees

CEAS has promoted specific research activity through its various Space and Aeronautics Technical Committees. These have encompassed a wide range of topics, including structures, propulsion, robotics, aerothermodynamics, power generation and guidance, navigation and control, materials, rotorcraft, aeroelasticity & structural dynamics, avionics, cabin systems and aircraft design.

CEAS recognises individuals or teams, who have made outstanding contributions of European recognition to the advancement of aerospace in Europe with the yearly Gold Award. From 1998 until 2016 the CEAS Gold Award was presented 18 times.

### 3. CEAS and European Aerospace Research Co-operation

In the early 2000s, CEAS emerged in its own right as an active focus for European aerospace research. This reflected a view often expressed by the European Commission at the time that, while there were many European-level research initiatives, the co-ordination and collective dissemination of aerospace and air transport research remained weak. The CEAS Council felt that there it could help increase the leverage of European research by encouraging more cross-border collaboration between European academic and industrial researchers. In 2012, CEAS joined with five other European aerospace research organisations: (ECCOMAS (European Community on Computational Methods in Applied Sciences), ERCOFTAC (European Research Community On Flow, Turbulence And Combustion), EUCASS (European Conference for Aeronautics and Space Sciences), EUROMECH (EUROPEAN MECHANICS SOCIETY) and EUROTURBO (European Turbomachinery Conference) to create an EU body and electronic platform, E-CAERO (EU funded), to collect and to disseminate aerospace research data.

The objectives of E-CAERO were:

- Δ To reinforce the network of participating organisations by promoting inter-organisational co-operation.
- Δ To identify and promote best practice in co-operative research.
- Δ To improve industrial end-users participation in research conducted by member organisations.
- Δ To simulate the emergence of collaborative work culture between national associations.

As a first step, E-CAERO conducted a systematic survey of European and International research dissemination activity to provide a detailed picture of the different structures, methodologies, priorities and resources of the participating organisations. This encouraged the emergence of long-term contacts and communication between



CEAS joined with five other European aerospace research organisations to collect and to create an EU body and electronic platform, E-CAERO (EU funded), to collect and to disseminate aerospace research data.



member associations, other potential partners and the European Commission. From this base, CEAS and its partners took steps specifically to improve links between the academic community and industrial end-users. In the first instance, this took the form of organising high quality events aimed directly at industrial participation.

In 2013, Rudolf Strohmeier, Deputy Director-General for EU Research DG, underlined the importance of this work. Referring to the newly launched 'Strategic Research and Innovation Agenda' (SRIA) of the 'Advisory Committee for Aviation Research and Innovation in Europe' (ACARE), as well as other EU aviation-related

too many journals today resulting in a fragmented landscape." Europe had "excellent researchers and scientific societies of high quality. Therefore, we should be able to make the best use of these assets and enhance the impact of our publications and communications. I call you to redouble your efforts to raise the impact and to demonstrate that Europe has a common co-ordinated scientific landscape." He concluded that the E-CAERO project was a clear step in the right direction.

The links pioneered by E-CAERO and other CEAS activities were reinforced during the Delft Conference in September 2015, when CEAS and the Association of European Research Establishments in Aeronautics (EREA) signed a memorandum of understanding. EREA was founded in May 1999 as a non-profit organisation drawing together Europe's 11 leading national aerospace research centres. Its aims were:

- △ To provide scientific and technical support to industrial projects;
- △ To promote and represent joint interests;
- △ To intensify the co-operation in the field of civil, military and space-related aviation research;
- △ To improve and intensify the co-operation with third parties in the field of aviation, and to facilitate an integrated management of joint activities, thereby contributing to Europe's role as a global player in aviation.
- △ To co-operate with authorities and industry to define and implement a long-term research policy encompassing both commercial and technological dimensions;



CEAS Conferences have taken place in such cities as Berlin (2007), Manchester (2009), Venice (2011), Linköping (2013), Delft (2015) and Bucharest (2017).

programmes such as 'Clean Sky' and 'SESAR', he said that, to achieve maximum impact from EU research projects, it was vital that the science base should also move closer together. There were still "too many societies, too many conferences, and

Δ To provide objective, neutral and impartial expertise to EU, national authorities, industry and other bodies.

In signing the 2015 MoU, EREA and CEAS agreed to promote knowledge exchange between specialists (at a European level); encourage publication of research in the peer-reviewed CEAS Aeronautical and Space journals; strengthen the education and training of students and young engineers in the field of aerospace; increase the global visibility of European aviation science and technology; and to take further action designed to influence key European institutions, particularly in the arena of future European aerospace and aviation research policy.

At a functional level, the two organisations have pledged to seek wider recognition and awareness of the aerospace and aviation sciences as a major field of European research; to enhance the scientific and technical quality of events and conferences by pooling expertise (speakers, common programmes and committee membership); to increase the visibility of European aviation events and publications; to enhance the impact and accessibility of publications relevant to the

European aviation and aerospace community by encouraging open access to peer-reviewed output and research notes; and finally, and by no means the least objective, to facilitate the access of the young researchers to state-of-the-art information and provide networking opportunities.

#### 4. Educating the next generation of engineers and technologists

The EU, like most established Western aerospace manufacturing centres, is facing a demographic crisis, as a generation of engineers and technicians reaches retirement. This issue was underlined in an October 2016 issue of *Aviation Week* that described the impending crisis of recruitment in the French aerospace industry. Despite high levels of unemployment, French aerospace companies found it increasingly difficult to find the workers needed to meet demand. This is despite the fact that aerospace jobs are generally attractive, secure and highly paid. While aerospace companies have partnered with local and national authorities, they need more innovative ways to entice young people to join the industry; there are emerging skill gaps and shortages, despite in many cases free



2015 Delft signing the EREA CEAS MoU.

A CEAS conference in Bologna.





Astrium



Rolls-Royce

Technicians and engineers at satellite producers Astrium and engine makers Rolls-Royce.

training packages. However, too many students and their parents still believe that factory-working conditions have not improved over the past 100 years.

At the graduate level, young people may also be tempted by the higher starting salaries offered in the financial services sector, or the dynamism of the IT and computer games industries. In the US, the attractions of Silicon Valley are clear for the latest generation of graduate and postgraduate personnel qualified in the STEM (science, technology, engineering and mathematics) subjects, as well as the Internet service providers, such as Amazon and Google. These trends are also well established in Europe. The cause of the drain is not just money but also the faster product cycles of other high-tech industries, where individuals can take an idea to a finished product in less than five years, compared to the decades of development often the norm in aerospace.

Meeting this challenge, especially at the level of graduate and post-graduate scientists and engineers has emerged as one of the key CEAS themes. As CEAS 2011-2012 President Pierre Bescond noted in 2009: "The future of Europe is in the hands of its youth: this is a basic truth. In the aerospace sector, its projects are becoming more and more complex and are developed across several national borders.

To overcome the numerous challenges presented by a fierce worldwide aerospace market, talented engineers are needed but across Europe the most brilliant students often prefer careers in business and finance to those in science, technology and engineering. Action is clearly necessary to reverse this trend by taking the measures that will enable the aerospace sector to attract this calibre of student."

In December 2010, Tom Enders, Chief Executive of Airbus, told the CEAS-ASD conference in Brussels that: "The key resource which we have here in European aerospace is our intellectual capability in design and systems integration. And we need to keep it that way."

The aeronautic industry alone has half a million highly qualified directly-employed engineers – and more were needed. Enders said that one option was clearly "to find homegrown talent, matured and educated in European universities and allowed to flourish with European-based companies. Engineering and natural sciences were the building blocks of Europe's economic position in the world and aerospace companies do a lot to encourage young people to consider a career in engineering." But the sector would have to compete with other high-technology industries. Every year the European aeronautic sector had a shortfall of between 3,000 and 3,500 engineers.



Pierre Bescond, CEAS President 2011/12

Another option, Enders noted, was to tap overseas talent, either by encouraging inward migration or by setting up overseas subsidiaries. The risk was that this could lead to the permanent loss of European-based output and jobs, as well as further encouraging overseas competition through the development of indigenous capabilities. The best and most secure route to European aerospace prosperity was by encouraging European scientists and engineers to take up an aerospace career.

For its part, CEAS had already begun to make some important contacts in Brussels and through work in stimulating aerospace awareness at a graduate level through a number of European funded programmes and contracts, such as the EC RESTARTS (Raising European Students Awareness in Aeronautical Research Through School-Labs) workshop. However, the Commission did not award a follow-up contract. Not to be deterred, CEAS shifted ground to meet other Commission RFPs dealing with the promotion of aerospace as a career for students and young professionals. This led to the creation of ECAero, where a consortium of research groups, including CEAS, won EU support for educational work. Although only lasting until 2013, this provided CEAS with experience in working with other organisations on education, training and research. These tentative steps encouraged CEAS to develop further its work promoting the next generation of engineers and scientists. Such activity became an integral part of the CEAS conference and publishing strategy.

CEAS' educational role was further reinforced by its formal links with the European Association of Aerospace Students (EUROAVIA), representing the interests of over 2,000 students from 38 universities in 19 European countries. Together, CEAS and EUROAVIA have sought to promote scholarships, competitions and other opportunities at student level. EUROAVIA is now a CEAS Corporate Member and invited to all CEAS Board of Trustees meetings.

Similarly, CEAS tried hard to attract young post-graduate aerospace engineers and scientists to its conferences and other events, with special rates and activities designed to assist in networking and career building. As part of this drive, the European Young Aerospace Professional Forum (EYAP) was launched at the CEAS 2009 Manchester Conference. This was promoted by the Young Members Board of the Royal Aeronautical Society, with the aim of providing a virtual venue for young aerospace professionals from around the continent to meet and share ideas. EYAP was intended to be a new forum dedicated to early career aerospace professionals, graduates and students in Europe, offering them the possibility to have a first-hand contact with the available array of firms and institutions.

The EYAP has six objectives:

- △ To stand as the foundation, and framework necessary for the professional collaboration between the European Young Aerospace Professionals with a global outreach;
- △ To help cater for the professional and career requirements of the European Young Aerospace Professionals (EYAP);
- △ To stand as a voice and representation of the European young aerospace professionals in matters concerning the European aerospace industry and to inform CEAS about the issues and concerns of the EYAP;
- △ To help acquire new skills;
- △ To provide updated information about the latest developments in the aerospace industries;
- △ Provide an opportunity for members to showcase their work, talents and abilities to the European aerospace industry.

The Education day at the CEAS 2013 Conference was another milestone in its growing commitment to education and training. This was fully in tune with

CEAS 2014  
Brussels  
Conference.





BAE Systems

Apprentices at BAE Systems' Preston Training School.

the aerospace community's wider thinking about its needs looking towards a 2050 horizon. As 2013 CEAS President David Marshall noted, this process went beyond formal links and programmes: "We all have our personal contacts either with children or students. We often are or have been working in situations where

students to engineering studies. But are we sure we can attract sufficient young people? Are they driven and inspired to create the technologies for the next generation of air transport and space missions? The challenges we are facing require creative people who can develop incremental as well as disruptive

## ***Solving world problems attracts students to engineering studies. But are we sure we can attract sufficient young people? Are they driven and inspired to create the technologies...***

clear training needs appear and need to be met." A key objective for CEAS was spreading examples of good practice in engaging young people from school to university.

Aldert Kamp, Director of Education Aerospace Engineering at TU Delft in 2015, re-iterated this theme: "We face great challenges: an exponential growth in air transport, the depletion of oil, global warming, noise pollution and better safety. Europe wants to maintain its competitive and leading position in aviation, aeronautics and spaceflight by conquering these challenges. Are we ready for that? The challenges may be comparable to the Moon race in the sixties. That attracted thousands of young people to our aerospace sector. Solving world problems attracts

innovations. Are we sure we are ready to educate young generations of aerospace engineers with the innovative power we need?"

CEAS was, in this sense, pushing at an open door, reflecting growing concerns from industry and the research community. University courses had to be both academically challenging and matching the needs of industry and research. This should include standard three-cycle programme structures and common accreditation criteria all over Europe; and an industrial community that engages with students from an early stage in their development, mentoring them during their studies, and providing them interesting and challenging career opportunities. CEAS was committed to the principle of career-long learning, with an academic and training base



David Marshall, CEAS President 2013

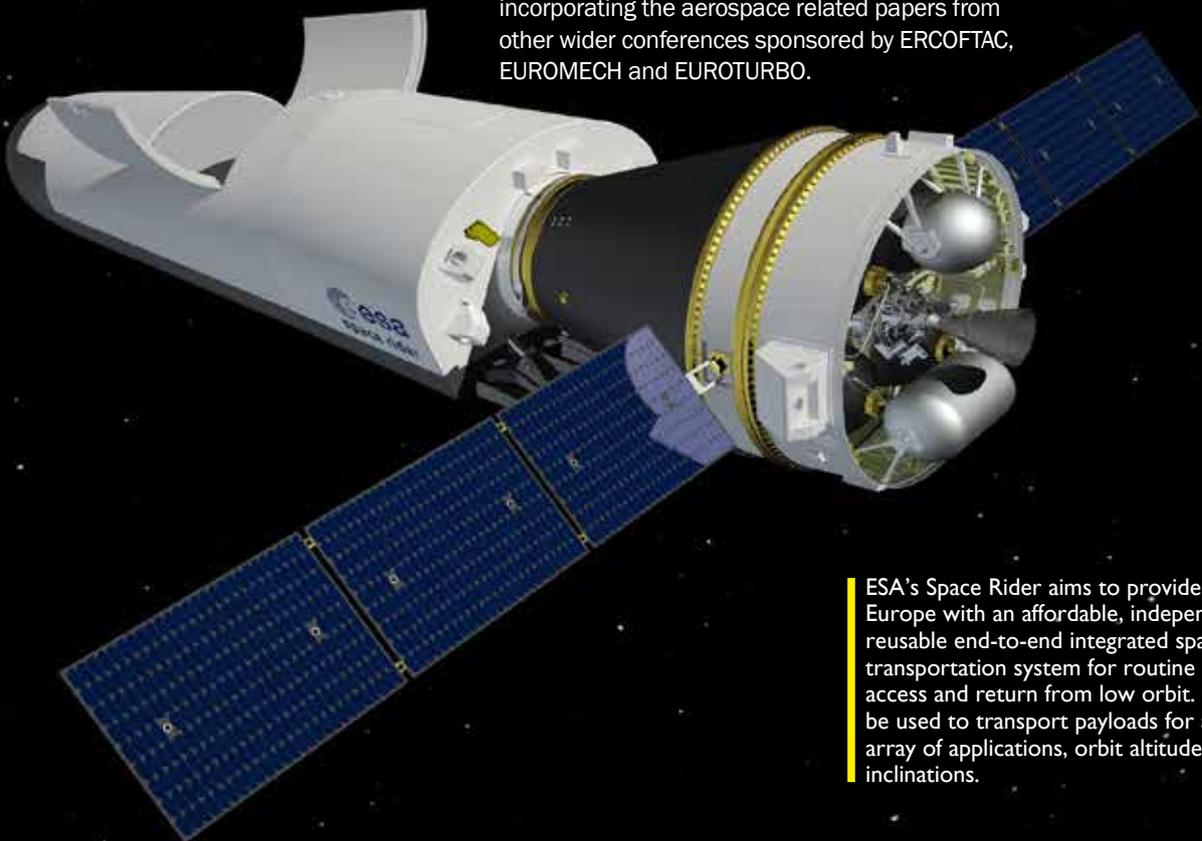
able quickly to respond to new demands and requirements. This implied new knowledge but also creativity, practical experience, and knowledge of non-engineering disciplines. Moreover, this implied an ability to co-operate in international multidisciplinary teams.

CEAS was increasingly aware of the challenges posed by fewer students choosing to take the STEM subjects. Courses had to be academically challenging but the naked truth was that many students who came to university searching for the excitement of aeronautics and spaceflight often found traditional and old-fashioned approaches to the subject. As Professor Kamp noted: “In the world of appealing projects and cool products, they often find a death march of naked math and science, taught in impersonal lecture halls. Transferring information through rote memorisation and taught by staff selected for their academic excellence but who had little or no practical engineering experience. These factors are embarrassing and repulsive.” CEAS had to promote approaches that emphasised creativity, collaboration, multidisciplinary thinking and risk taking – soft skills alongside the hard skills of mathematics and science. This was a clear challenge to European colleges and universities to enter a new world of aeronautical and space education – to make the

system ‘fit for purpose’. As Kamp eloquently noted: “If we really want to maintain our leadership, we have to break the conservatism in the educational systems. This will be a real challenge for Europe.”

Such sentiments were very much in line with industry thinking. Knowledge and qualifications were assumed; the main requirements were problem solving, adaptability, critical thinking, collaborating in multidisciplinary teams, agility and communicating. These were the ‘survival skills’ of a modern aerospace industry. These requirements would have to inform future curricula development. These were not new ideas but traditional university structures remained resistant to change. The CEAS challenge was to force the pace of change; to get more and better engineers who can develop incrementally as well as disruptive innovations in aerospace.

In this context, the 2015 Delft Conference was a key showcase for CEAS’s educational objectives. Over 140 aerospace students from the Technical University of Delft and the aerospace divisions of other Dutch colleges attended the keynote lectures and specialist workshops. In the future, CEAS intends to disseminate conference papers directly to students, young professionals and to individual members. The ECAERO initiative will also support project activities towards this objective and incorporating the aerospace related papers from other wider conferences sponsored by ERCOFTAC, EUROMECH and EUROTURBO.



ESA's Space Rider aims to provide Europe with an affordable, independent, reusable end-to-end integrated space transportation system for routine access and return from low orbit. It will be used to transport payloads for an array of applications, orbit altitudes and inclinations.



Crown copyright

An artist's impression of the UK's proposed spaceport.

## 5. Creating a wider international community

CEAS has developed a distinct European identity and a well-defined brief to encourage greater collaboration between European aerospace researchers. It is built on a coalition of leading European national organisations and has set out a stall to assist and to support European aerospace and aviation industries. But aerospace science and technology – the search for and dissemination of knowledge – are a global phenomenon. The international nature of CEAS was therefore especially important in an age of aerospace globalisation, when the well-established research communities in Europe and North America no longer monopolised technical innovation in aerospace. A fully open exchange aerospace research was constrained by the fact that intellectual property is a key economic and industrial competitiveness; and equally, technological advance is an element of national security. Both are good reasons to protect knowledge. Nevertheless, innovation to the benefit of all in the aerospace community is best fostered through an open culture with a free exchange of ideas and people.

From its birth CEAS recognised this elementary principle and sought actively to expand its network outside the countries of the European Union. As 2000-2002 CEAS President Szodruch noted in 2009: “CEAS is already Europe’s number one Society but, with the enlargement of the European Union and the increasing industrial and research interest in aeronautics and space over the past years, there are a number of Societies in various countries which seem to be very interesting partners for CEAS in the future. Let me also emphasise our intent to co-operate in specific cases also on a global basis. We will observe carefully the European and international developments concerning further partnerships and co-operation and we strongly believe that we can offer

new services and create exciting opportunities to all our members.”

The globalisation process objective was mainly realised through the creation of a network of memoranda of understanding with diverse international bodies, including the International Council for the Aeronautical Sciences (ICAS), the American Institute of Aeronautics and Astronautics (AIAA), the (French) Air and Space Academy (AAE), the Chinese Society of Aeronautics (CSA), the Korean Society for Aeronautical and Space Science (KSAS), the Association of European Research Establishments in Aeronautics (EREA) and the European Aeronautics Science Network (EASN). CEAS also sought to work with a wide range of organisations in aeronautics and astronautics and allied fields and other similar institutions and agencies in the fields of aeronautics and astronautics.

In 2007 CEAS signed an agreement with colleagues from China, the CSAS (the CSA). Two years later, the Russian community joined CEAS, when TsAGI – the Central Aerohydrodynamic Institute and Russian Aerospace Society – was unanimously accepted as a new full member. In the same year, CEAS formed a partnership with the Korean Society for Aeronautics and Space Sciences (KSAS). This was followed by a formal link with the US AIAA. Referring to this transatlantic link in 2011, CEAS President Pierre Bescond underlined the two-way nature of these contacts: “In an age of global industrial links, it was (even) important to establish links even between national competitors. I strongly encourage the European Conference organisers to establish close links with AIAA – let’s make use of it, let’s open our windows! This, in turn, will help Europe better balance its presence and image with AIAA. I’m sure our American colleagues will benefit from it too.”

Building on relations with the Association of European Research Establishments in Aeronautics (EREA) will also be of prime importance to CEAS. EREA has over 5,000 researchers and scientists, around 175 PhD and MSc thesis students and publishes over 6,000 papers annually. CEAS hopes to publish a significant proportion of this output in its journals and to become a regular platform for EREA researchers and management. By the same token, following initial contacts with the EU Clean Sky in 2015, CEAS intends to strengthen its relationship with this important initiative.

Another important element for CEAS will be building more extensive links with European universities and university professors. To this end, in March 2016 a MoU between the European Aeronautics Science Network (EASN) and CEAS was signed in Barcelona. This MoU will be upgraded into a CEAS-EASN

co-operation agreement, with the intention of organising a joint CEAS-EASN biennial aerospace congress and other specialist congresses.

## And on to the next 25 years

In 2014 the incoming CEAS President, Fred Abbink, initiated a discussion on future strategy for CEAS. Key questions were:

- △ How to strengthen relations with the constituent societies and their individual members?
- △ How to further support the aerospace students and young professionals, necessary for the future of the aerospace industry?
- △ How to strengthen relationships with European organisations, such as ACARE and EREA, as well as with the international organisations with which CEAS has established MoUs?

This was a process involving all CEAS stakeholders and included an extensive questionnaire sent to CEAS member societies. The response was a clear commitment to the idea of ‘adding European value’ to CEAS member organisations, reflecting the well-established principle of European subsidiarity. This would involve seeking closer relations with European institutions, such as the EU Commission and Parliament, as well as functional agencies, such as EASA. Clearly there would have to be a degree of caution in getting closer to ‘political’ bodies but there will be good reason for CEAS to provide a source of objective and disinterested technical information.

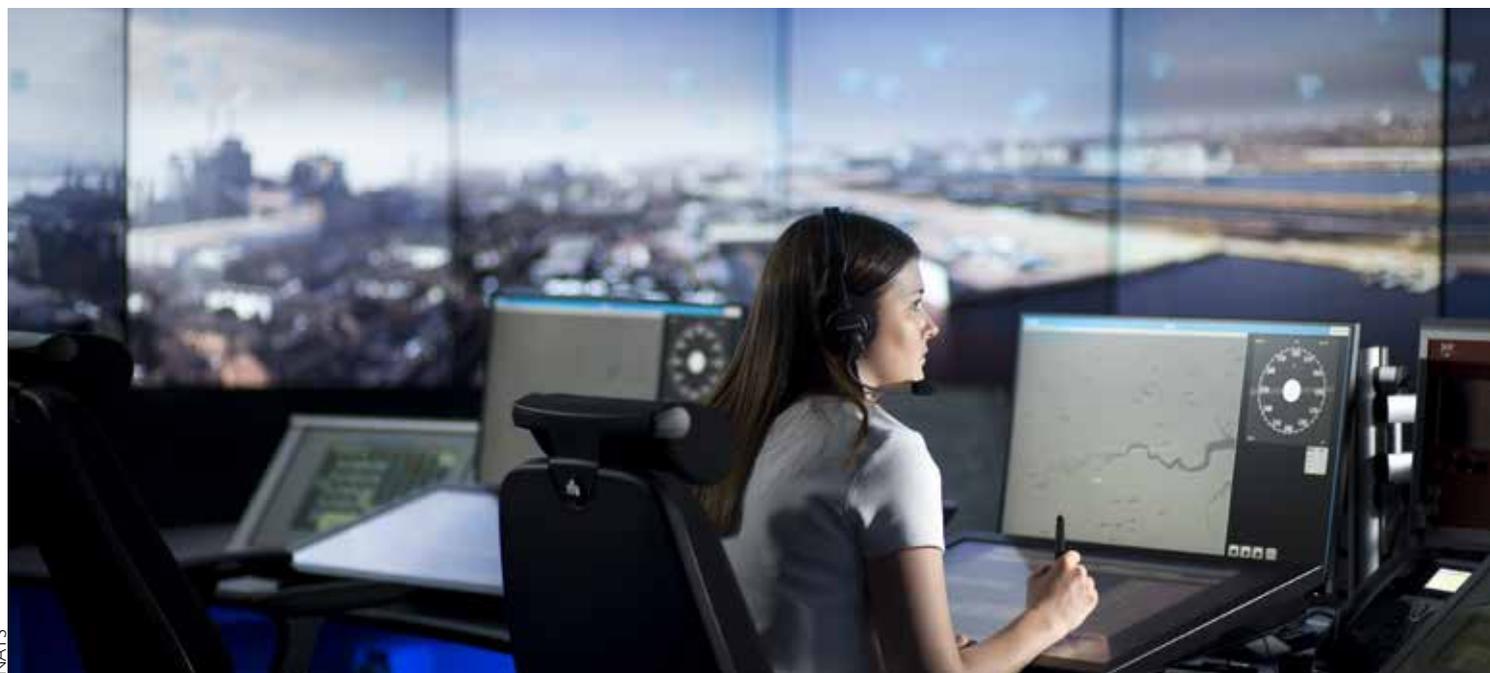
This could involve strengthening CEAS’s permanent staff in Brussels, as well as seeking funding for collaborative research on a case-by-case basis.

There is no doubting the urgency of answering these questions as the European aerospace industry, or all its evident quality and promise, faces an unsettling future. CEAS will need to evolve and to adapt to meet these changing circumstances. Politically and economically, Europe faces a difficult future. The problems stemming from the different levels of economic development and the perceived weakness of the Euro block of EU members; the rise of nationalist movements; the imminent departure of a leading member of the Union; as well as the uncertainties generated by the new US administration – all of these will combine to create a problematic near future.

Of these, Brexit will raise serious questions about the role of one of Europe’s key aerospace nations. Although much of the British industry is interdependent with its neighbours, there are bound to be issues surrounding increased transaction costs within transnational firms and cross-border supply chains. Any constraints on the free exchange of personnel may also complicate staffing and the ease of moving key people to match evolving work requirements and emergencies. For the science base – CEAS’s primary concern – the free movement of people and continued involvement by UK researchers and agencies in EU-funded programmes will be of critical importance.

In the wider world, fears of increased protectionism and economic nationalism, especially across the

Air traffic controllers demonstrate the digital tower control room at London City Airport which will open in 2019.



Atlantic, threaten trade wars and damaging effects in key markets, especially civil aerospace. Strategic uncertainty may also put an increased premium on defence technological co-operation and the need to fund more intensively European military aerospace.

Whatever the next decade might entail, there is no doubt that continued investment in the European aerospace science and technology base will be justified and necessary to defend the scale and scope of the one of the region's critical industries. Two and a half decades, roughly a generation and a half of an aircraft product-cycle, will undoubtedly see considerable change in the technology underpinning commercial success and competitiveness. More complex, cyber-dependent systems, autonomous vehicles, intelligent materials, dual propulsion and energy-generating engine concepts, as well as further demanding innovations in process technology will continue to stretch scientific and engineering minds. Creating 'greener' civil aviation and exploiting cheaper access to space will pose new challenges. All of these will further underline the value of a pan-European approach to education and training, as well as exploring the intellectual challenge of future aerospace development.

Airstar Aerospace is providing Thales Alenia Space with the Stratobus drone/satellite hybrid balloon's fully-equipped envelope.

On the basis of the past quarter century of evolution and activity, CEAS should be well placed to play an influential role in this exciting future. The organisation has come a long way in the years since its formation. It has developed into a network



Volga-Dnepr



Airstar



of 34,000 European aerospace professionals, sharing knowledge through general and specialist conferences; its quarterly Bulletins, Journals and books have begun to make their mark; and in extending co-operation through links with similar organisations in the US, China, Korea and elsewhere it has created a valuable global network. It has also established close professional relationships with European research agencies and regulatory bodies, including the EU and its Framework Programmes, such as Clean Sky and SESAR, and other European organisations, such as ESA, EASA, ASD, EDA, ACARE, GARTEUR and EREA. Perhaps most important of all, CEAS plays a major role in the development of a new generation of European aerospace professionals which will underpin European future capabilities in aeronautics and astronautics.

CEAS has acted as a force to fuse the various strengths of Europe's aerospace academic community into a true 'confederacy' of institutions. CEAS 2011-2012 President Pierre Bescond described this in an analogy with chemistry: "I would say that CEAS has to play a catalytic role: the catalyst does not appear in

the equation of the chemical reaction but it facilitates it and, in certain cases, without it the reaction would not take place. CEAS can also act as an amplifier of communications and co-operative actions between the member societies. We never must interfere with them, but I'm sure we can help extend the perimeter of their action in the European context."

CEAS's true impact on European aerospace is only just beginning to be felt. The deliberate effort to forge direct links with industry and the European Institutions aim to create an active community of interest concerned to promote the interests of industry and academia to underpin the future technological strength of a key economic force. This will embrace support for education and training – the next generation of engineers and scientists. At the same time, this will not be a closed, protectionist society but one willing to forge global relationships to the mutual benefit of all who seek to understand the theory and application of aerospace science and technology and practitioners looking to build efficient, effective, environmentally friendly and, above all, safe aircraft and spacecraft.

Russia's Volga-Dnepr shows its giant Antonov An-124-100 airlifter concept due in the 2040s.

# Appendix

## CEAS Presidents 1989-2017

1989: Pierre Contensou (France)

1990: Frank Holroyd (UK)

1991: Michel Bignier (France)

*Since the legal establishment of the CEAS Confederation*

1992: Hans Hoffmann (DGLR)

1993: Frank Holroyd (UK)

1994: Jean Charles Poggi (France)

1995: Ernesto Valerani (Italy)

1996: Rolf Stuessel (DGLR)

1997: Rudolph Roos (The Netherlands)

1998: Carlos de Andres (Spain)

1999: Trevor Truman (UK)

2000: Jean Charles Poggi (France)

2000-2002: Joachim Szodruich (DGLR)

2003: Fedde Holwerda (NVvL)

2004-2006: Julian Simon Calero (AIAE)

2007: Colin Terry (RAeS)

2008: Georges Bridel (SWFW)

2009-2010: Joachim Szodruich (DGLR)

2011-2012: Pierre Bescond (3AF)

2013: David Marshall (RAeS)

2014-2016: Fred Abbink (NVvL)

2017: Christophe Hermans (NVvL)

## CEAS Gold Awards

1998: Jean Pierson (France)

1999: Walter Kröll (Germany)

2000: Ralph Robins (UK)

2001: Paulo Santini (Italy)

2002: Fredrik Engstrom (Sweden)

2003: Richard Case (UK)

2004: Alvaro Azcarrage (Spain)

2005: Rainer Hertrich (Germany)

2007: David Southwood (UK)

2008: Jean-Paul Béchat (France)

2009: Carl Peter Fichtmüller (Germany)

2010: Ernesto Valerani (Italy)

2011: Stamatios Krimigis (Greece)

2012: Manfred Fuchs (Germany)

2013: Louis Gallois (France)

2014: Fred Abbink (The Netherlands)

2015: Joachim Szodruich (Germany)

2016: Gordon McConnell (UK)

2017: Eric Dautriat (France)

## Specialist Networks and Committees

### Aeronautical Branch Technical Committees

△ Aero-acoustics

△ Rotorcraft

△ Aeroelasticity and structural dynamics

△ Guidance, navigation and control

△ Aircraft design

△ Integrated air transport operations

### Aeronautical Branch Networks

△ Air transport system

△ Avionics

△ Cabin systems

△ Flight physics

△ On-board energy

△ Propulsion systems

△ Structural design and materials

△ Testing/sensors

△ UAVs

### Space Branch Networks

△ Structures

△ Thermal

△ ECLS

△ Mechanisms

△ Robotics

△ Propulsion

△ Aerothermodynamics

△ Guidance navigation and control

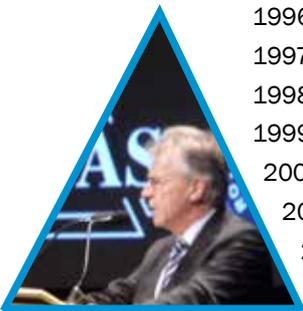
△ Power

△ Mission design and space systems

△ Satellite communications

△ Materials

△ Optics, optoelectronics and photonics



Joachim Szodruich, CEAS President 2009/10







The Council of European Aerospace Societies