

# Introducing IAASS



**INTERNATIONAL ASSOCIATION  
FOR THE ADVANCEMENT OF  
SPACE SAFETY**

**T**he International Association for the Advancement of Space Safety (IAASS), legally established April 16<sup>th</sup> 2004 in the Netherlands, is a non-profit organization dedicated to furthering international cooperation and scientific advancement in the field of space systems safety. In 2004 IAASS became a member of the International Astronautical Federation (IAF). In 2006 former US Senator John Glenn, first American to orbit, became Honorary Member of the IAASS. In 2010 IAASS was granted Observer status at the United Nations COPUOS (Committee on the Peaceful Uses of Space).

In accordance with the Association Charter, IAASS membership is open to anyone having a professional interest in space safety. Members can be physical persons, corporations, agencies, universities, institutions, and of other professional associations.

The Association exists to help shape and advance an international culture of space safety (technical, organizational and socio-political), which would contribute to make space missions, vehicles, stations, extraterrestrial habitats, equipment, and payloads safer for the general public, ground personnel, crews, and flight participants. The Association also pursues the safeguarding and sustainability of the on-orbit environment to allow unimpeded access to space by future generations.

The Association work will contribute to propagate the idea that the time is ripe for the establishment of an international civil space safety organization according to the model of ICAO (International Civil Aviation Organization), which so effectively advanced air travel safety.

## Mission

**A**dvancing space safety forms the foundation of our endeavour. Compared with the vastness of political, financial, and intellectual resources that space programs require our forces are minute, truly a drop in the ocean. Nevertheless, we want to be that drop and indeed a catalytic drop. We are committed, through the dedication and knowledge of our members, to internationally advance space safety, to help finally ensure that:

- No accident shall ever happen because the risk was badly measured or unwittingly underestimated.
- No accident shall ever happen because the necessary knowledge was not made available to others.
- No accident shall ever happen because of lack of management commitment and attention.
- No accident shall ever happen because lack of personal accountability makes people negligent.

The IAASS with its members and sponsors aims therefore to:

- **Advance** the science and application of space safety.
- **Improve** the communication, dissemination of knowledge, and cooperation between interested groups and individuals in this field and related fields. ▶▶





- **Improve** understanding and awareness of the space safety discipline.
- **Promote** and improve the development of space safety professionals and standards.
- **Advocate** the establishment of safety laws, rules, and regulatory bodies at national and international levels for the civil use of space.

## IAASS Primary Services

The IAASS primary services are:

- Facilitate information exchange between members through networking, news, journal and website
- Organization of safety conferences and seminars
- Establishment and maintenance of a world-class searchable database of published and electronic knowledge
- Performance of independent studies on behalf of corporate and institutional members
- Offer world-class space safety educational and training program and tools
- Offer/advertise selected consultancies from (retired) members
- Establish (or participate in) working group to develop international space safety standards.

## Values and Beliefs

The association's fundamental values and beliefs are:

**Excellence** – The Association will work to maintain its position as the primary and most knowledgeable forum worldwide for discussion, study, and exchange of information on space safety.

This also means that the work of the Association's Technical Committees will be further developed, and will continue to be based on robust processes for analysis, judgement, and formulation of policies and recommendations, without

cognitive bias. The only basis for confidence will be properly understood data and scientifically grounded assessments. Assumptions will be explicitly acknowledged and constantly challenged.

**Independence** – The Association will maintain an absolutely independent stance by never subscribing to those policies (of sponsors and non-sponsors) contrary to the Association beliefs, while continuing to press resolutely but discretely for their modification.

**Integrity** – Integrity will be the primary asset of the Association, on which to build a reputation as the world leading professional association for space safety. Nothing, nor sponsors' wishes, not financial support, nor opportunity for growth, will be more important than preserving the Association's integrity.

**Communication** – Free and unobstructed flow of information inside the Association. This means also having the courage to question current assumptions, and the willingness to ask even seemingly obvious questions, to listen actively, and be ready to teach and to learn. It also means being able to disagree vigorously and profitably and engage in productive dialogue.

**Education and Training** – The Association believes that space safety will be enhanced through expanded educational curricula, continuous professional development, and general professional upgrading through promotion and recognition of achievements of outstanding individuals. This also means that the Association considers safety education and training at every level of space programs and organizations a formidable tool for accident prevention.

**Proactive** – The Association believes that space safety is no accident. The Association will constantly seek to influence all segments of space programs management, engineering, and operation, to improve space safety standards, methods, organization, and to push the use of adequate technologies and inherently safe design solutions. This also means that the Association will spare no effort to make good policies and recommendations known to decision-makers.

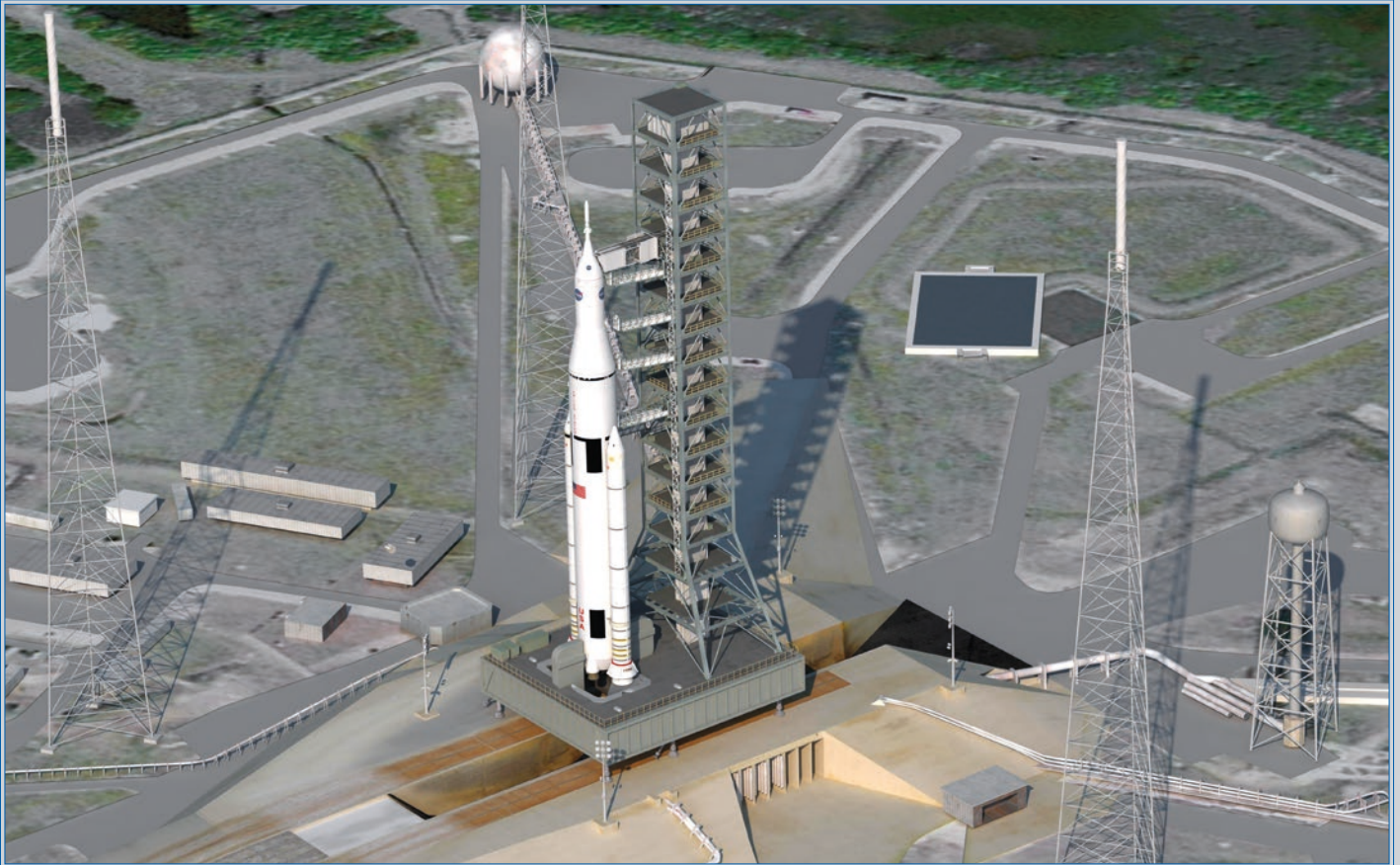
**Accountable** – The Association is fully accountable to its stakeholders, members, and sponsors for accurate and appropriate use of resources to achieve the goals of the Association. ▶▶

INTERNATIONAL ASSOCIATION  
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SPACE SAFETY

**JOURNAL of  
SPACE  
SAFETY  
ENGINEERING**

<http://iaass.space-safety.org/publications/journal/>





Artist's conception of the Space Launch System (SLS), NASA's next generation heavy-lift vehicle. - Credits: NASA

# Organization

**T**he governing body of the Association is the IAASS Board, which comprises up to 30 physical persons, who select the President. The IAASS Board members are elected by the General Assembly. The Board ensures by means of criteria approved by the General Assembly, that the nationality of its members adequately reflects the nationality of the members of the Association.

The IAASS is further organized in technical and standing committees. The chairmen of such committees are also members of the IAASS Board.

## Technical Committees

**T**he Technical Committees develop the IAASS vision for space safety, and create a strong link between professionals from agencies, industry, and academia. Only senior members and honorary higher-level members (associated fellow, fellow) of the Association, who satisfy specific criteria of expertise and excellence, can become members of the technical committees. The chairmen may also appoint non-members of the Association, responding to the same criteria above, as members of the technical committees.

The following committees and working groups are established under the lead and coordination of the IAASS Technical Director:

- Commercial Space & Systems Safety
- Launch and Re-entry Safety
- Space Hazards
- Space Safety Laws & Regulations
- Human Factors & Performance for Safety
- Safety Critical Software
- Space Traffic Management

## Standing Committees

**A**ny member of the Association can volunteer to fill vacancies in the following Standing Committees:

- Conference Program Committee
- Information and Communication Committee
- Membership Committee
- Safety Awards Committee
- Professional Training Programs Committee
- Academic Committee







## Membership Policy

The Association is based on the intellectual interaction of individual members who together shape the technical vision of the Association and make the Association services available to stakeholders. Individual members of the Association have voting rights.

Corporate and institutional members of the Association have a sponsor role and are the primary target of the Association services. Sponsors can participate in the General Assembly but they cannot vote.

## Why Become a Member?

The general motivation for becoming an (individual) member of the Association is to know, to be known, and to share experiences with other space safety professionals. In addition, a selected number of members (senior members, associated fellow, and fellow members) may volunteer to take part in the work of the Technical Committees (and specialized subcommittees) that shape the IAASS vision. The Technical Committees' (and subcommittees) goal is to become recognized world-class think-tanks in their field.

For the sake of establishing the excellence of the Association and to attract highly knowledgeable individuals, it is important that belonging to a higher membership level truly reflects the implied professional standing. In this respect the access to high membership levels (associated fellow, fellow) are defined in terms of objective admission criteria, and will be subjected to strict scrutiny to be adhered to with utmost zeal.

Prospective members are required to fill in a detailed questionnaire from which their professional profile will emerge as well their potential for involvement as lecturers or instructors in the educational and training programs of the Association. One of the primary cares of the Association is to facilitate effective networking of its members, for professional and social purposes. Members are encouraged to socially interact also on a local basis by forming Chapters, and by holding convivial meetings. The membership database will be accessible to all members under a code of privacy and confidentiality.



Capturing SpaceX's Dragon. Credits: NASA



Human-robotic cooperation in a complex EVA. - Credits: NASA

## Why Become a Sponsor?

Because of its very specialized field of interest, IAASS will remain a relatively small group of professionals yet a unique think-tank with a great potential for shaping attitude and culture of the wider space program community. As a consequence, the IAASS is unable to self-finance all its initiatives, and it needs sponsors support, in particular the space safety research and educational programs.

Why should a corporation, agency, or government organization be interested in sponsoring IAASS? There are various reasons. Safety is a strategic business interest in the space industry, as in many other high-tech industries like commercial aviation, high speed trains, pharmaceuticals, etc. A single faulty product can kill people as well as the manufacturer's business. One or two accidents may cause the termination of a unique operational concept like happened with the Shuttle and with the supersonic Concorde. A single major disaster can even endanger an entire industrial sector like it is happening in the nuclear power generation business after the Fukushima disaster.

For the above reasons supporting space safety education and independent research can contribute to the future well being, progress, and expansion of the entire space industry. Furthermore, space industry, government organizations, and agencies are also interested to develop and maintain a "safety culture" within their own organizations. The IAASS training activities and gatherings represent a unique opportunity in this respect. In particular they allow cultural interactions among experts from all three communities operating in space, namely civil, military, and commercial.

## What Role for Academia?

The Association is the ideal ground for the academic world to meet and interact with industrial and institutional organizations. By attracting academic interest and involvement in space safety research activities the Association aims to effectively advance space safety to new levels, and possibly establish space system safety as an autonomous technical discipline. University members of the Associations will commit to promote specific academic programs, such as a Masters in space safety, undergraduate space safety courses, and PhD opportunities. The Association will also promote the establishment of scholarships for undergraduate and postgraduate students. ►►





Virgin Galactic will use a Boeing 747 to launch satellites into space. - Credits: Virgin Galactic

# Goals

**E**very space accident has a tremendous synergetic impact on the overall progress of space missions due to calendar delays, draw on resources, and diminished political motivation for new endeavours. The Association estimates that the collective impact of the two Shuttle accidents may account for an effective loss of progress in the US human spaceflight program of 15-20 years.

Advancing safety is not only a moral duty but the key for expanding space programs and making them more economically viable.

IAASS assumes in pursuing its mission and providing services that:

- International cooperation in civil space programs is the way ahead and it will become more and more important in future. Such cooperation will require innovative organizational solutions.
- The international dimension of public safety risk related to launch/reentry operations will become progressively more and more evident.
- Space-based safety critical services (e.g., air traffic control) and commercial human spaceflight will precipitate the establishment of international spaceflight regulations.
- No economic or political consideration justifies constraining the circulation of safety crucial and possibly life-saving information.
- Uniform safety standards are an important element to prevent unfair competition and expand commercial space activities.

## General Public Acceptability of Space Safety Risk

**T**he risk level currently achieved in human spaceflights differs from what is perceived as acceptable by the general public and by political representatives. Such discrepancy is a major threat to the continuation of human space programs, including commercial human spaceflight.

General public tolerance of accidents varies from system to system (and changes with time). In the US, one million people were killed in car accidents in the period 1975-2000. On average, every year 10 millions vehicles are involved in crashes, resulting in more than 40,000 people killed and 3 million injured. The risk of car accident is about 1 in 5000 departures. The safety risk in civil aviation is 1 in 2-3 millions departures. Although the aviation safety record is quite impressive compared to other transportation means, the aviation regulatory bodies have launched an initiative to reduce the accident rate to 1 in 10 million or better. The reason is that the projected traffic increase in the next decades would lead to an (absolute) number of accidents per year which could negatively influence the general public perception of air safety and in turn impact further industrial growth.

The level of risk of very complex space systems is embedded in the architecture and operational concept selected, as well as driven by the available technologies. One accident in less than 100 spaceflights was somehow "built-in" in the Shuttle program and could have been improved only marginally. Had the Shuttle have flown at a rate ►►





comparable to the initial plans, the entire fleet would have been wiped-out within a few years.

Pioneers of commercial human spaceflight often state that their suborbital craft would be “100 times safer” than government space systems. While they concede that suborbital flights are an order of magnitude less complex than orbital flights they seem eventually to count mainly on public risk acceptance comparable to early times of aviation and on a protective legislation. Unfortunately (for them) public acceptance of safety risk is much different nowadays. There is in particular very little or no public tolerance for failures which are within the reach of current knowledge and technologies, but are caused by economic pressure or by lack of suitable management / regulatory attention. Regardless of the extent to which liability laws may try to protect the commercial human spaceflight interests, industry may not be able to survive the public’s response to the first few accidents.

## Goal # 1

**T**he Association will promote a program management culture that puts safety targets ahead of mission objectives from the early stages of conceptual design to achieve risk levels representing a substantial improvement over previous generations of vehicles, and continuously improves on previous achievement.

## Goal # 2

**T**he Association will advocate for an international regulatory framework for commercial human spaceflight, as well as the legal definition of personal responsibility and accountability for space preventable accidents.

highly respected as the expression of experts’ consensus and as repositories of collective knowledge. Compliance with procedures and standards is therefore regarded as a “natural” attitude of mature organizations. In other cultures, the “master” attitude, which is the jealous ownership of personal technical knowledge, may be common and the individual expert judgement could easily prevail over anonymous standards unless enforced by law. Of course, each cultural attitude has its pros and cons. Geniality and inventiveness are not captured and passed by means of procedures and standards. Blind adherence to standards can sometimes generate a bureaucratic mind detached from reality, which may generate unexpected hazards. Nevertheless, standards related to safety have been the first to be generated in many industries for the obvious purpose of communicating lessons learned from accidents.

With reference to specific safety culture differences, we can mention as example the fact that in the western world, manufacturers have the duty and responsibility to prevent accidents due to foreseeable misuse of their products. This is not the case in certain other cultures where the manufacturer has only the responsibility to provide correct “instructions for safe use.”

Bridging technical cultural differences when an international space program is already under way is quite demanding and not very efficient, due to non-technical factors such as schedule constraints, political will, organizational set-up, etc. Instead, carrying out technical exchange and coordination in advance and in a “neutral” atmosphere away from the immediate program’s pressure could greatly facilitate active listening and unbiased attitudes.

## Goal # 3

**T**he Association will promote an international culture of space safety in the form of consensus standards and recommended practices. Ideas, concepts, and experiences would be compared and judged uniquely on the basis of their technical value.

## International and Commercial Human Spaceflight

International and commercial human spaceflight programs (in lieu of national ones) may be the norm in future. There are important cultural differences that can increase the safety risk. This applies to crew operations as well to design teams and goes beyond the language barrier.

Some differences are related to national culture in general while other are specific to safety culture maturity. The differences originate from traditions, past experiences, environment, government policies, and various degrees of public “tolerance” of accidents.

An example of general cultural attitude that may increase the safety risk is the one towards procedures and standards. In some cultures, technical procedures and standards are

## International Public Safety Risk

In space programs, there are several public risk management issues which are at the same time national and international in scope. Launches and reentries often represent a safety risk for both local and foreign populations due to nominal conditions and failures (high stored energy, debris trajectories, use of radioactive power generation sources, and so on).

There are a number of trends to be watched in the launch industry:

- a) privatization of launch services and spaceports,
- b) commercial pressure to make current (western) safety standards less stringent with reference to launcher design and frequency of use of flight corridors,
- c) relocation of launchers away from their original launch sites, to more densely populated areas and on different flight paths.







- d) increased automation of safety officer tasks for flight termination.

Safety of reentry is also attracting new attention:

- a) following recent uncontrolled reentries of big decommissioned satellites,
- b) increased concern for aviation safety following the Shuttle Columbia accident,
- c) new entrants in the controlled reentry arena.

Furthermore, deep space exploration missions will continue to require use of nuclear power source (NPS). This is a safety field in which international regulations are long overdue. The safety certification process varies from country to country, although the risk is absolutely global in nature.

## Goal # 4

The Association will watch and evaluate space programs to see how well a positive public safety record is reached and maintained worldwide. The Association will promote international regulations to ensure uniform safety certification processes, and the use of validated risk assessment tools.

# IAASS Code of Ethics and Professional Conduct

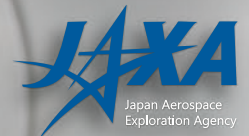
**A**n IAASS member shall at all times order his conduct as to uphold the dignity and reputation of the Association. He will act with fairness and integrity towards all persons with whom his work is connected and towards other members.

1. A member shall at all times take care to ensure that his work and the products of his work constitute no avoidable danger of death or injury.
2. A member shall take all steps to maintain and develop his professional competence by attention to new developments in space safety science and engineering. He shall also encourage persons working under his supervision to do so.
3. A member shall not undertake responsibility as a safety scientist, engineer, or manager, which he does not believe himself competent to discharge.
4. A member shall accept personal responsibility for all work done by him or under his supervision or direction. He shall take all reasonable steps to ensure that persons working under his authority are competent to carry out the tasks assigned to them and that they accept personal responsibility for work done under the authority delegated to them.
5. A member whose professional advice is not accepted shall take all reasonable steps to ensure that the person overruling or neglecting his advice is aware of any danger which the member believes may result from such overruling or neglect.
6. A member shall not make any public statement in his capacity as a safety scientist, engineer, or manager without ensuring that his qualification to make such a statement and any association he may have with any party which may benefit from the statement are made known to the person or persons to whom it is directed.
7. A member shall not recklessly or maliciously damage or attempt to damage, whether directly or indirectly, the professional reputation, prospects, or business of another safety professional. A member shall never publicly criticize other members (individual or corporate) or take any initiative that can somehow tarnish their public image.
8. A member shall not in self-laudatory language or in any manner derogatory to the professional dignity, advertise or write articles for publication, nor shall he authorize any such advertisement or article to be written or published by any other person.
9. A member shall not use his access to personal data of other members for purposes different from professional networking. In particular he will not use such access to recruit personnel, for direct offering of professional services, or for direct selling and advertising products of any kind.
10. Membership in IAASS may at times place individuals in situations where their statements or actions could be interpreted as carrying the "weight" of the Association. An IAASS member will exercise care not to misrepresent IAASS, or positions and policies of IAASS.
11. IAASS is an international association devoted to the values of equality, tolerance, and respect for others. Discriminatory attitudes between members on the basis of race, sex, religion, age, disability, nationality, or other such factors is an explicit violation of IAASS policy.

By applying to become a member of the IAASS an explicit commitment is made to observe the above code of Ethic and Professional Conduct. Violation of the code is inconsistent with membership in the IAASS.

# 12<sup>th</sup> IAASS Conference

International Association for the Advancement of Space Safety



## MAKING SPACE TRAVEL SAFER

22-24 MAY 2023  
OSAKA - JAPAN

<https://www.iaassconference2023.space-safety.org/>



**Safety Design for Space Systems**  
Elsevier 2009

Progress in space safety lies in the acceptance of safety design and engineering as an integral part of the design and implementation process for new space systems. Safety must be seen as the principle design driver of utmost importance from the outset of the design process, which is only achieved through a culture change that moves all stakeholders toward front-end loaded safety concepts. Superb quality information for engineers, programme managers, suppliers and aerospace technologists. Also available in Chinese.



**Space Safety Regulations and Standards**  
Elsevier 2011

Space Safety Regulations and Standards is the definitive book on regulatory initiatives involving space safety, new space safety standards, and safety related to new space technologies under development. More than 30 world experts come together in this book to share their detailed knowledge of regulatory and standard making processes in the area, combining otherwise disparate information into one essential reference and providing case studies to illustrate applications throughout space programs internationally.



**Safety Design for Space Operations**  
Elsevier 2013

Safety Design for Space Operations provides the practical how-to guidance and knowledge base needed to facilitate safe and effective operations safety in line with current regulations. With information on space operations safety design currently disparate and difficult to find in one place, this unique reference brings together essential material on: safety design practices, advanced analysis methods, and implementation procedures.



**Space Safety and Human Performance**  
Elsevier 2017

During spaceflight, human performance can be deeply affected by physical, psychological and psychosocial stressors. Human-system integration, strict selection, intensive training and operational rules are used as countermeasures to prepare individuals and teams to effectively manage systems failures and challenging emergencies. The book is primarily centered on human on-board but also covers operators of control centers on ground and behavior aspects of complex organizations.