

Prologue

The benefits for people and society are at the centre of the space strategy of the State Government of Hesse. Services, products, applications and technologies from the space industry must have a positive impact on the everyday life of our citizens, providing answers to the challenges faced by our society. This includes key issues such as environmental and climate protection, mobility, communications and security. As a cutting-edge and key technology, the space sector is of central importance for the scientific, research and industry location Hesse to the benefit of science, the economy and society. In addition, the space sector can also provide positive stimuli for future-orientated, social development through its fascination and its high potential for innovation.

We look forward to our joint dialogue and hope to inspire you!



Volker Bouffier
Minister President of the State of Hesse



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Space Coordinator of the State of Hesse

Introduction

The space strategy of the State Government of Hesse – the first in the history of the state – strives to strengthen the core competencies both of the state and for the state, and to use potential synergies to position the state of Hesse as a space location nationally, throughout Europe and internationally. Through targeted promotion, further development of skills and through the networking of the relevant stakeholders, Hesse should develop further its position in the space sector and raise its profile in technological and scientific areas.

The space strategy is embedded in the goals of the state government of Hesse, promoting education, science, research, technology and the economy. It complements the existing strategies of the Hessian state government and its ministries in different policies: industrial, innovation, cluster and network initiatives, mobility, digitalization, environmental protection, climate change, agricultural policies, state planning and regional policies. Space is an interdisciplinary topic, and the space strategy is also fully in line with the state's school, university and education policies, including promoting the STEM¹-subjects.

The Hessian space strategy moreover aligns the Hessian space activities with the current and future space activities of other German states, of Germany, the European Union and the European Space Agency ESA. Hessian space policy is characterised by intensive cooperation, at a national, international and above all European level.

The space strategy of the state government of Hesse creates the foundations for Hessian activities in space. The existing skills in the state should be consolidated and actively developed further. The main claim of the Hessian space strategy is its agility and adaptability: it is aimed at stimulating an important dialogue process among the relevant stakeholders in Hesse and it is not “set in stone”. It is orientated to the dynamic development of space applications and space technologies and will be reviewed on a regular basis: is it still valid and relevant, is it aligned with the needs of the stakeholders, has it met its defined goals?

¹ STEM: Science, Technology, Engineering and Mathematics

Space technology is strategically important and cutting-edge

Space is a strategically important technology, cutting-edge- and with cross-sectional character. It has a great potential for growth. Space ensures high-tech jobs in Hesse. At the same time, space is a driver of innovation. It creates opportunities for cooperation and for the transfer of knowledge and technology and boosts the performance of the economy in general.

The increasing trend towards commercialisation of space, so called “New Space”, initially driven by start-ups, has led to a paradigm shift. It shows a great dynamic and agility, a high potential for development and innovation, new business models and the development of disruptive technologies. In addition, “New Space“ leads to an increasing linkage of the space sector with classic “non-space“ areas and helps to lower barriers for entering the space sector.

Space is crucial to our everyday life

Space has become an integral part of our lives and indispensable in our increasingly interconnected world. In addition, space is now regarded as a critical infrastructure: satellites enable communication, everywhere and at all times, allow for the safe and reliable determination of location and time and contribute significantly to the protection of our environment and to our understanding of climate change through earth observation and weather sensors.



Photo: © ESA

Space contributes to state security and ensures strategic sovereignty

Products, processes and services from the space sector support politics and administration in meeting current challenges and contribute to the fulfilment of central sovereign tasks such as state and regional planning and urban development. Space provides important data for the detection of harmful environmental changes as well as for the monitoring of natural disasters, for early crisis detection and for crisis management.

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Space is fascinating and inspiring

Through its fascination and its high potential for innovation and by providing positive stimuli for a future-orientated social development, space contributes to the attractiveness of Hesse for international and national specialists and managers. Space has the potential to fascinate and motivate people and it can also inspire the arts and culture. It can awaken and encourage young people's interest in STEM topics. Since the basis for a later interest in the STEM topics can be laid in early childhood education, the education and schooling plan for children from 0-10 years old in Hesse and Hesse's approach of education from the very beginning make a decisive contribution to leveraging the fascination of space to strengthen STEM activities.



Photo: © ESA

In this way, the implementation-orientated Hessian space strategy serves the state of Hesse and its citizens, its space stakeholders in science, research, academic teaching, education and business - and thus, the economic, scientific, ecological and social development of the state.

Hesse has excellent conditions for the space sector

Hesse is a state with a thriving economy and a high quality of life – it provides all the prerequisites and excellent conditions for economic success and for future-orientated jobs.

Here, reputable and internationally renowned public stakeholders have their registered offices. With the two **International Organisations, ESA's centre ESOC (the European Space Operations Centre) and EUMETSAT (the European Organisation for the Exploitation of Meteorological Satellites)**, Hesse has institutions with unique competencies in the planning and the control of complex processes and space missions, which contribute significantly to the profile and performance of Hesse as a space location.

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Photo: Main control room in ESOC © ESA

With the tasks performed at ESOC, in particular space safety, space debris monitoring and space situational awareness (SSA) ESOC is an internationally renowned centre of excellence, unique in Europe. For decades, EUMETSAT with its various satellite systems has contributed to monitoring weather and climate events and through its application-oriented processing of satellite data enables precise weather forecasting and climate modelling.



Photo: EUMETSAT in Darmstadt © EUMETSAT

The spectrum of the Hessian space stakeholders is even broader:



Illustration: Overview space stakeholders in Hesse © Hessian State Chancellery

Hesse is the headquarters of important **federal authorities** using space data and making them available to public and private users: The **German Weather Service (DWD)**, as the national, civil meteorological service of the Federal Republic, renders meteorological and climatological services based on data from weather satellites. **German Air Traffic Control (DFS)** uses weather satellite data, data from earth observation, navigation and communication satellites. Based on extremely precise real-time data from space it is able not only to calculate safe flight routes, but also routes which are environmentally friendly and with minimum noise. The **Federal Agency for Cartography and Geodesy (BKG)** is responsible for the creation and provision of products for geodetic reference frameworks, for monitoring stations and data analysis of space geodetic techniques as well as the provision of the Centre for Satellite Based Crisis Information (ZKI).

In cooperation with these above-mentioned public institutions, Hesse offers universities, research institutes and companies excellent opportunities for the development of new technologies and innovative business models.

Hessian universities contribute to a considerable extent to the capacity of the state through a diverse spectrum of research and development activities in space or connected to space. They conduct fundamental scientific research, for example in the area of materials sciences, as well as application-orientated technological development, such as electrical space power units or non-intrusive diagnostic processes. Moreover, the research work of Hessian universities for the application and use of remote sensing data, for example for the application of satellite data for environmental research or to geodetic earth observation is of great importance. Scientific teaching in various relevant subjects supplement the portfolio of Hessian universities in space.

In Hesse, important space-related research activities are also carried out in numerous **research establishments**. The bandwidth of the research and development activities extends from basic research on the fundamentals of physics to application-orientated research in space infrastructures.

Numerous small, medium and large companies contribute with their space-related products, services and processes to economic growth and to the creation of high-tech jobs in the state, well-known and active in regional and pan-regional markets, including “hidden champions“ with global outreach.



Photo: Malargü Ground station DSA 3 © ESA

The **economy in Hesse** is characterized by a broad palette of space-related products and services. This extends from research, development, manufacture and distribution of various industrial products through diverse enterprise-related services to technical consultancy, quality assurance and the certification of firms in the space industry. In addition, in Hesse, a ground station, as a transmission and reception station with its more than 135 antennae, takes care of permanent communications with satellites.

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Numerous **economic and industrial associations** with operations throughout Germany and direct or indirect relation to the space sector have their headquarters in Hesse. Examples include the German Federation of Reinforced Plastics (AVK), the Association of Machine and Plant Engineering (VDMA), the Association for Electrical, Electronic and Information Technologies (VDE) as well as the Electrical and Electronic Manufacturers' Central Association (ZVEI). Specific Hessian associations with relevance to the space sector are the Association of Hessian Enterprises VhU and Hessenmetall.

For the promotion of new businesses, especially innovative start-ups, **incubators** in Hesse support the development of the space industry. Cesah GmbH, the Centre for Satellite Navigation in Hessen, as a joint initiative of the state of Hesse and ESA supported by the state of Hesse, the city of Darmstadt, the Technical University Darmstadt and renowned industry and research organisations, was established in 2007 as a centre of competence for the application of space technologies. On behalf of ESA, cesah also operates the ESA Business Incubation Centre (BIC) Hessen & Baden-Württemberg. Since its foundation, cesah has supported more than 130 trendsetting start-ups with innovative business models. Here, start-ups receive not only organisational and financial support, but also technological assistance from experts in ESOC and EUMETSAT.



Foto: © cesah GmbH

There are more than 40 **cluster and network initiatives** in various key technological fields in Hesse. The core activities of these think-tanks lie in the networking and exchange of views and information between stakeholders in science, research, product companies and users. Together, the member institutions and firms create a high degree of visibility, developing new business models and implementing cooperation projects. Of particular relevance for space-related activities in Hesse are the House of Logistics and Mobility HOLM, with Cluster@HOLM², as well as the Competence Centre Aerospace Kassel-Calden (CCA) and the Material-, Plastics-, Metal- Processing-, Engineering-, Optics- and ICT-clusters and networks.

Just as diverse as the stakeholders in Hesse are their space-related **fields of expertise and space activities**. The broad range extends from space-related basic research to applied research, experimental development, application, production, distribution, and sales. The clustering into five overarching themes shows the strength of Hessian organisations:

- **space technology (20 %)**
- **cross-cutting technologies and topics (29 %)**
- **space applications and operation (28 %)**
- **space science (16 %)**
- **space policy, space law (7 %)**

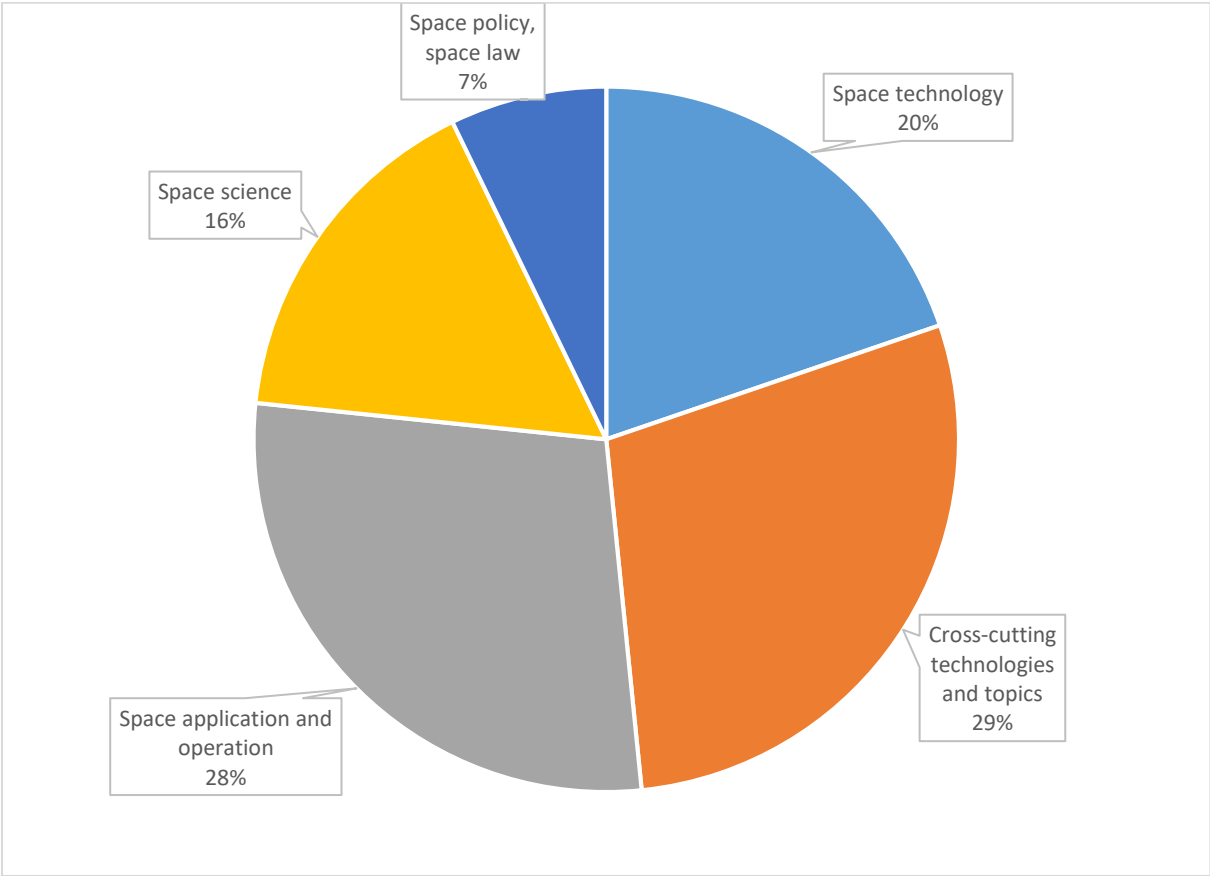


Illustration: Overall percentage distribution of the activities of the Hessian stakeholders: © Hessische Staatskanzlei

The Hessian state government with its ministries supports and promotes the whole palette of space activities in Hesse. Thereby virtually all Hessian ministries are directly or indirectly

² as the joint umbrella brand for the clusters Hesse Logistics, Hesse Mobility and Hesse Aviation

involved: both actively in policy making and as a customer, user and provider of space-related services and products. The following are some examples of specific relevance.

Hessian Agency for Nature Conservation, Environment and Geology (HLNUG)

HLNUG has set up a competence centre for remote-sensing. It identifies opportunities for the application of space data in the environmental sector and exchanges information with the environmental agencies of the other German states and with federal authorities. For the fulfilment of its tasks, HLNUG already relies strongly on satellite data. Based on spatial reference data and thematic data, assessments of specific situations can be made on a Hesse-wide basis and recommendations for relevant action formulated. The condition of lakes and rivers, the risk of flooding, damage to nature and the landscape, the status and changes in the ground and its surface level, the situation of agriculture are ascertainable via earth observations and targeted inspections can be introduced.

State Company HessenForst

HessenForst uses earth observation data especially for monitoring the situation in the forests, for the detection of forest fires and for the mapping of forest damage. Remote-sensing data is supplemented by data from aircraft or drones.

Hessian Administration for Ground Management and Geoinformation (HVBG)

Among the core tasks of HVBG are the sustainable supply of high-quality geoinformation, land management and the valuation of real estate. HVBG supplies spatial reference data and thematic data and makes available up-to-the-minute, satellite-based remote sensing data. HVBG, via the very precise Realtime Positioning Service of "SAPOS", supports users through the use of Galileo data in property surveys, engineering geodesy and water surveying. Remote sensing data is also used for the automatic control of agricultural and construction machinery as well as for other geodetic applications. Through the cost-free provision (Open Data) of the Hessian SAPOS service, HVBG renders, amongst others, an important contribution to precision farming. Furthermore, the comprehensive offer of basic spatial data through online-based services creates the framework and the opportunities for diverse applications of earth observation data. The Central Competence Centre for Geoinformation, set up by HVBG, coordinates the creation and expansion of the geodata infrastructure of the state of Hesse and its municipal authorities. In particular, it operates the "Geoportal Hesse" as the central access point to the online-based geo-services of the state and thus makes available to a wide group of users these official geodata, including services based on satellite remote sensing data.

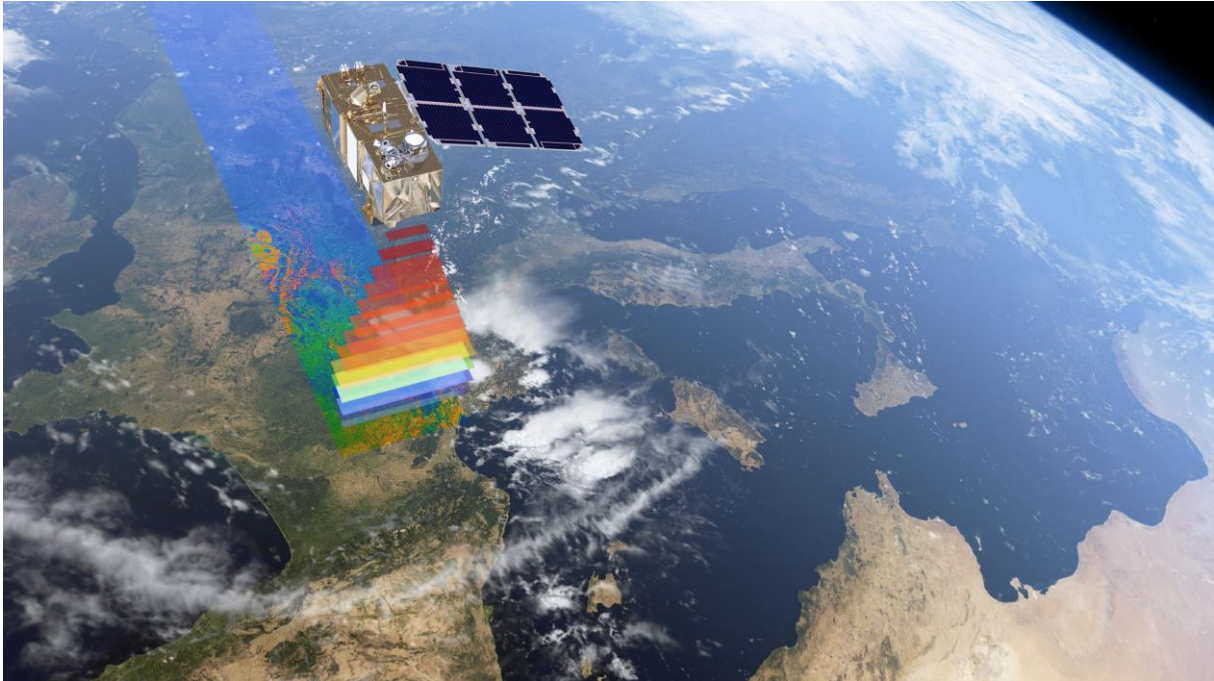


Photo: Schematic representation of optical measuring by Copernicus Sentinel 2 © ESA

Hessian State Statistical Office (HSL)

Data from space also supplies HSL with important prerequisites for the fulfilment of its statutory obligations: the generation and provision of high-value statistics. These statistics form an indispensable foundation of planning and decision-making for the state government, for the administration and for the economy. Using AI and especially machine learning methods, HSL captures, among other things, agricultural areas under cultivation and crop yields. It thus makes an important contribution to precision farming.

Cyber and IT security

Under the auspices of the Hessian Ministry of the Interior, Hessian state authorities pay special attention to cyber and IT security in the utilization of space data. In doing so, the development of and adherence to security standards and concepts play a prominent role. As with the processing of data from earth-based systems, the Hessian state administration also has a special obligation to ensure cyber and IT security in the use of space data. It is of utmost importance to ensure the confidentiality, availability and integrity of digitally processed information.

Requirements of the stakeholders

The successful implementation of the Hessian space strategy requires involvement of the relevant stakeholders. To get an insight into the activities of universities, research institutes, companies, international organisations and national authorities as well as to identify the stakeholder's needs, a survey was carried out. The following needs were given highest priority:

- networking,
- information on funding programmes,
- events,
- contact to customers in the state government.

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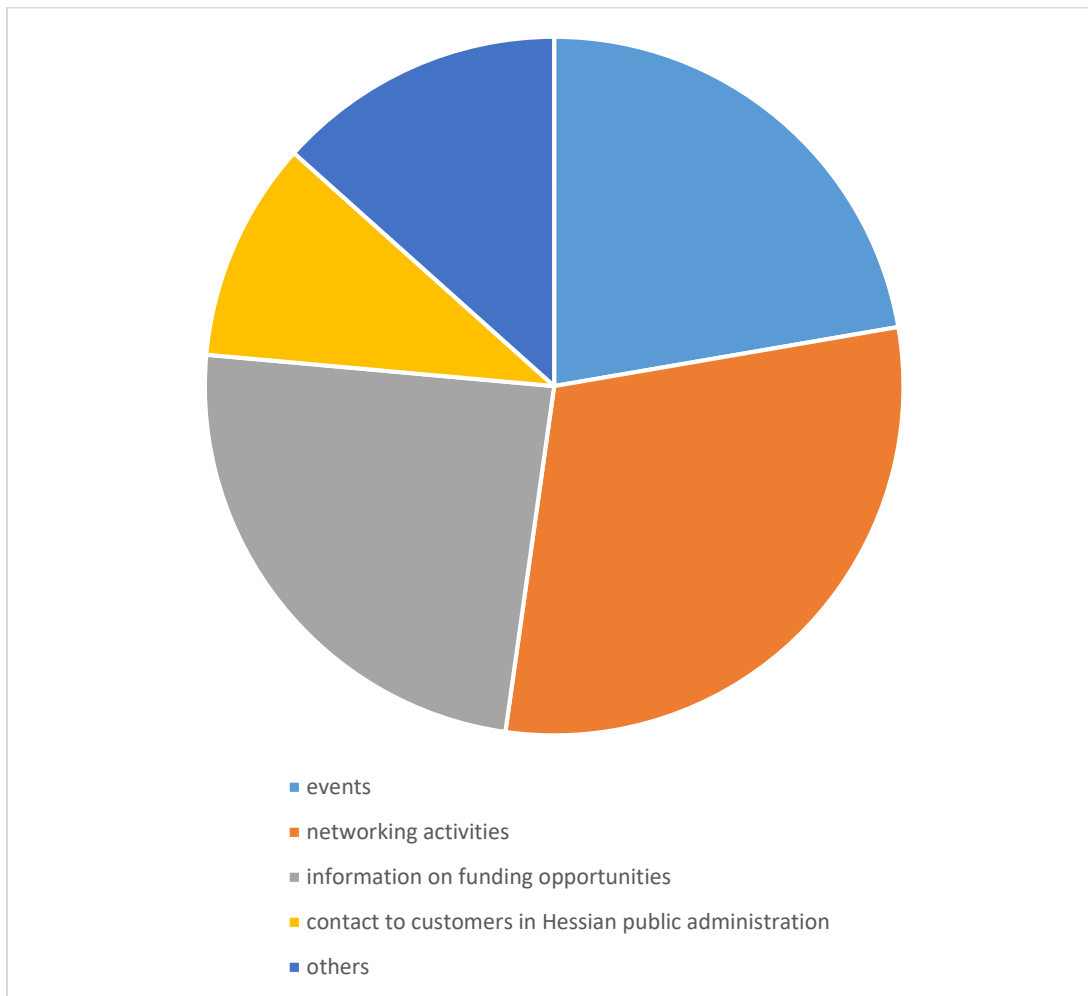


Illustration: replies of the stakeholders questioned on their needs © Hessische Staatskanzlei

Mission statement, goals and role of Hessian government in space

The mission statement

Hesse stands for a committed, active space policy with the inclusion of all stakeholders along the entire knowledge- and value-chain.

Through the creation of synergies between the stakeholders and by promoting their networking, we contribute to increasing both their efficiency and visibility. By making their potential more visible, we strengthen the competitiveness of Hessian universities, research institutes and enterprises on the national, European and global level. In doing so, we strive for coherence and international cooperation, characterised by an actively shaped policy with a positive attitude towards space, its potential and its use for peaceful purposes.

In this way, we intend to contribute to strengthening the economic and innovative capabilities of the Hessian companies engaged in space and support them in developing and marketing space-related products, processes and services.

Sustainability encompasses applications on earth as well as in-orbit in the interest of protecting space infrastructure. This includes innovative concepts to prevent space debris and for its removal.

Thereby, Hessen's space policy is always orientated towards the benefit of the people in our state. For this reason, we will make use of the potential of space for our citizens in order to improve the quality of their lives, of our common environment and security, especially in times of crisis. With the help of the space sector, we also contribute to protecting, preserving and saving the resources of our earth for future generations.

The goals of the Hessian space policy

The goals of the Hessian space policy must lie in the further development of existing competencies in the public and commercial sectors, as well as in the expansion of the traditional “non-space” areas, in order to maintain and expand the capabilities of Hesse. This applies to both economic and societal aspects. Central factors are the creation and maintenance of jobs and wealth, and the increase in capacity of Hesse in sectors such as industry and commerce, environment and mobility, as well as improving resilience against challenges such as climate change and energy and resource scarcity.

Space should be used across the full spectrum of opportunities for the future development of our state. This includes economic and scientific aspects (“space“ and “non-space“), societal opportunities (including motivation through fascination and inspiration), education and academia as well as additional general challenges (e.g. climate, weather, noise, environment, agriculture, health, communications, mobility, resources). In this respect, the Hessian space strategy pursues five significant goals:

- creating synergies,
- showing opportunities,
- promoting networking,
- increasing visibility,
- striving for coherence

and overall promotes the further strategic development and strengthening of Hesse as a leading space location.

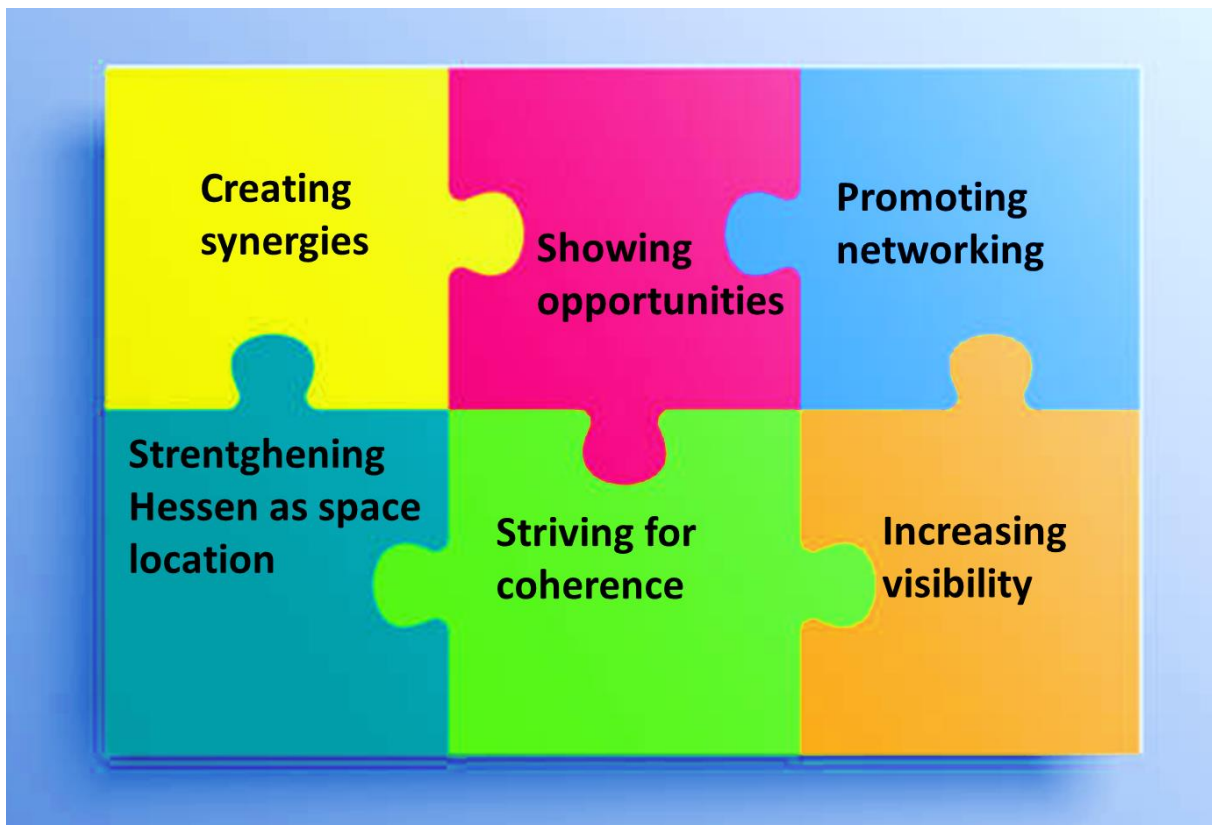


Illustration: goals of the Hessian space policy © Hessische Staatskanzlei

The role of Hessian politics in the space sector

The role of Hessian politics in the space sector should be orientated to the worldwide development of space and be aligned correspondingly. Micromanagement should be avoided. Instead, the state takes the role of

- an intermediary,
- an enabler and
- a demanding customer, orientated to the needs of the state (e.g. purchaser of data, application-oriented data and service products as well as apps).

The opportunities for the use of space competencies for “non-space” areas and vice-versa should be identified and supported.

Utilisation of the knowledge derived from space programmes is particularly valuable for governments to find solutions to global and regional challenges (e.g. climate, weather, noise, protection of natural resources, security). Government policies should use space in a targeted way to shape societal development.

Through active politics in Berlin (federal ministries), Brussels (European Commission, European Parliament), Paris (ESA) Hesse’s interests can be positioned and systematically pursued, where relevant, together with other German states with their own space strategies.

The Hessian State Government will do its utmost to ensure that Hessen as a space location secures and builds upon its good start position compared to other European space locations. The establishment of the European Union’s Space Agency EUSPA must not lead to the relocation of tasks that were previously reliably performed by ESA/ESOC and EUMETSAT.

At a time in which national and European finances face multiple challenges, it is more important than ever to handle public money carefully and to avoid unnecessary double structures at the expense of the German and European taxpayers.

Against the background of the war in Ukraine and possible withdrawal strategies regarding cooperation with Russia in space policy, this question is especially urgent. The state government of Hesse calls for a rapid decision in support of the capabilities and functioning structures of ESA and of EUMETSAT. A concentration of the financial resources and responsibilities has priority for Hesse. The state government supports the identical political course of the federal government in this matter.

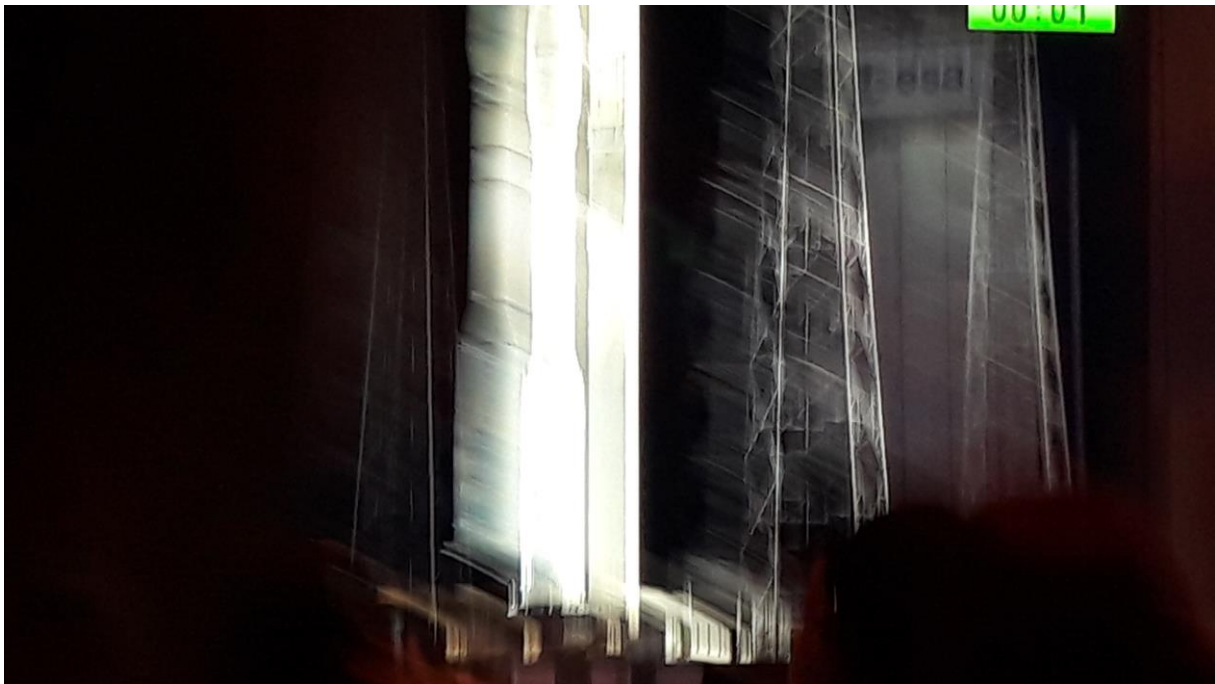


Photo: Vega rocket 1 second before lift-off with the Copernicus Sentinel 2-B on 7 March 2017 © Hessische Staatskanzlei

The existing strategies, cluster policies, network and technology initiatives in Hessen will be specifically linked to the space strategy in order to promote synergies in the best possible way and to support the networking of stakeholders along the entire knowledge and value chain.

Hessen's success as a space location also depends on the ministries of the Hessian state administration, with their respective technical expertise and responsibility, working together with their agencies in a targeted manner and to a greater extent than before. Against this background, all ministries and agencies of the Hessian state government were included in the strategy development process and their role for space and the space stakeholders in Hessen was documented. The exchange with the ministries and agencies on opportunities, user requirements, product developments and technology promotion in the field of space will be managed more intensively and in a more goal-oriented manner in future via the Hessian Space Coordinator with the aim of institutionalising internal networking.



Illustratio: © Hessen Trade&Invest GmbH

Implementation concept

Already the cabinet decision regarding the appointment of the space coordinator of the Hessian state government (decision of the Hessian cabinet of 5 July 2021) encompasses numerous measures, the implementation of which could contribute to the strengthening of the space location Hesse. This process will be continually enhanced. Clustering in **internal measures and in external measures** offers a basis for the implementation of the abovementioned measures as well as their further detailed specification.

Internal measures (state government, ministries and agencies)

➤ The activities and requirements of the Hessian state government

Following the performance of a strengths and weaknesses analysis, amongst other measures, a regular exchange between the space coordinator and the ministries and agencies has already started. At least once a year, a meeting of the space coordinator will take place with all ministries and state agencies in Hesse. In this way, a mutual information and feedback of the activities of the space coordinator to the ministries and agencies will take place. In this way, information is exchanged, specific needs and requirements can be taken into account. This can and should later lead to the establishment of a “marketplace” for external stakeholders.

➤ Hessian clustering and networking initiatives

Together with the Ministry of Economics, a concept for the development of a special space cluster of relevant Hessian stakeholders should be worked out. The networking with other clusters in Hesse will be strengthened. The goal is the creation of a Hessian virtual think-tank

for space, aimed at the exchange and networking of the stakeholders in science, research, companies, public administration, international organisations for the systematic and institutionalised exchange with the Hessian space coordinator, complementing his activities.

➤ **Coordination and control of the space related activities of the Hessian state government**

The office of the Hessian space coordinator has been set up directly in the Hessian state chancellery, with a direct line to the Hessian Minister President, thereby placing in one hand central competencies and topics of outstanding strategic significance.

For the first time, a coordinated inter-ministerial cooperation has been established, whereby all relevant topics can be combined in developing a coherent, future-oriented space policy for Hesse. This should be supported by

- reports on space activities in the cabinet and the Hessian Parliament as well as
- external cabinet meetings at space stakeholder`s locations in Hesse.

External measures

➤ **public relations and information dissemination about existing activities, future chances and opportunities of space for Hesse**

The State of Hesse (still) has a comparatively limited profile within the space sector and is nationally, and above all internationally, still not perceived as a space location commensurate with its real strengths and qualities.

In order to **establish and increase the visibility** of space in Hesse, an active **public relations and information campaign** is key. For this reason, information measures relating to existing activities, future chances and opportunities of the space sector for Hesse will be further developed, towards the general public, the economy, science and public authorities.

The competencies of Hesse, its enterprises, universities and research stakeholders and the space location Hesse as such must be further mapped out in detail. Hesse will develop further its image as an attractive space location and make it visible. The objective advantages and strengths of the space location Hesse will be highlighted and made use of. An important element in the strengthening the external perception of the location is also strengthening self-perception: identity creates image. That is why, alongside effective external measures, identity strengthening developments are to be promoted, with the following serving as examples.

- websites such as www.raumfahrtkoordinator.hessen.de and www.hessen.de,
- lobbying for Hessian stakeholders and those interested in space,
- events (specialist as well as events for the general public),
- visits of the space coordinator to space companies,
- visits of the space coordinator to schools and universities.

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