# Belgium in space: beSPACE's vision

*Open Letter to the Belgian Space Sector*

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The Belgian federal government committed in 2014 to create its own space agency to handle with the Belgian space policy. Meanwhile, the space sector has seen dramatic changes on a global scale, both with the rise of new commercial actors and space powers, and with the emergence of disruptive technical innovations. These changes call for an appropriate response from all stakeholders, private and public.

beSPACE represents a community of over 300 youths living or working in Belgium with a passion for space. Its core team wants to provide its vision of Belgium in space in order for its country to remain competitive and maintain its position as a European leader. The authors' point of view is based on their field experience, on their different expertise around space matters and on their desire to help building the future Belgian space agency.

This paper starts with a short review of the new global trends in space. Our recommendations to the Belgian space sector are then outlined and detailed.

beSPACE believes in an independent Belgian space agency leading dynamic strategies coherently at the community, regional and federal level. This future space agency will empower the Belgian space sector if it fosters its unity, vision, dynamism and innovation, allowing Belgium to grow as a space hot spot continuously improving its core skills.

We further urge all actors, public and private, to prepare the next generations of Belgian space experts and encourage trans-disciplinary partnerships. We consider these two elements as instrumental to stimulate innovation and excellence.

## The global space sector: new partners, new technologies, new objectives

In the last decade, actors from the private sector have increasingly become involved in space activities. While the movement started with projects carried by start-ups and Internet billionaires, large corporations from the information technology world, such as Google[1], Amazon or Facebook, are now also taking part in the game, attracted by new business models in telecommunications, Earth observation and even human spaceflight. These actors arrive with cutting-edge industrial practices, building on recent innovations such as 3D printing, lightweight materials, software-defined applications, etc. They also take advantage of many successful principles from the internet technology industry[2]: short and fast incremental developments, reliance on trial and error, modern communication strategies, a young and passionate workforce, remote teams, strong innovation culture, etc.

The impact of these changes is felt in every segment of the space value chain. Mass-produced miniaturised satellites are gathering more momentum, as exemplified by the partnership between OneWeb and Airbus Defence & Space for an initial production of 900 satellites. Regarding access to space, a whole new generation of micro-launchers tailored for small payloads (e.g. Rocket Lab, Virgin Galactic, etc.) is appearing and reusability is increasingly envisioned as a feasible concept (e.g. SpaceX, Blue Origin, etc.). Further downstream in the value chain, space operations are facing new challenges with satellite constellations in low Earth orbit. Lastly, space applications have never been so popular, with a growing population of end users for location-based services[3], Earth observation data[4] and space-based telecommunications[5]. From the regulatory point of view, these revolutionary changes also lead to new challenges such as space debris mitigation and radio frequency allocation.

In parallel to this "NewSpace" trend, a roadmap for ambitious large scale projects is being drawn in the longer term beyond Earth orbit. A good example thereof is the Moon Village concept, at the level of the European Space Agency, envisioned by the new director general Jan Woerner as a potential follow-up of the International Space Station. Closer to home, Luxembourg is seeking to become the global centre for asteroid mining[6].

[1] See for example: http://www.theatlantic.com/technology/archive/2016/03/terra-bella-planet-labs/472734/
[2] See for example: https://www.linkedin.com/pulse/spacex-bringing-agile-bdd-final-frontier-timothy-brandt
[3] See for example: http://ec.europa.eu/DocsRoom/documents/13429/attachments/1/translations/en/renditions/native
[4] See for example: http://www.directionsmag.com/entry/new-approaches-bring-earth-observation-data-to-wider-market/455766
[5] See for example: http://spacenews.com/signs-of-satellite-internet-gold-rush/
[6] See for example: http://www.news.com.au/technology/science/space/luxembourg-ramps-up-efforts-to-enter-asteroid-mining-space-race/news-story/66a88947167d810255408e07e159a8ce

## Recommendations: united, visionary, dynamic and innovative

Times are thus changing, with new partners, new technologies, and new objectives. Change means risk: the Belgian space sector could drop behind and never catch up. However, change also means opportunities. beSPACE sees the current situation as an occasion to create growth and high value-added employment in Belgium. Here are our four recommendations for taking advantage of this opportunity:

### 1. Create opportunities for the young generation

The average age of the NASA engineers present in the control room the night of the Apollo 11 splashdown was 28[7]. This simple fact goes to show that the dynamism of the young generation is needed to inspire new visions. With that regard, initiatives such as the National Trainee Programme, the YouSpace platform, the Odissea prize, or the Master of Space Studies at the KU Leuven should be celebrated and encouraged. However, we believe that even more can be done, in particular regarding the development of a global network and the communication within this network.

One implementation step is to finance scholarships - from the public or private sector - to attend international educational programmes and conferences such as the International Space University, the Erasmus Mundus Master Course on Space Science and Technology, the Space Generation Congress, etc.

Another way of creating opportunities and promoting space to the young generation is to include space applications in the curriculum of engineers, scientists and other related studies. This could even start at a secondary school level, for example through visits of the universities and companies that are involved in the space business. The Belgian space industry is a lively environment, but it is also generally considered as very exclusive and hard to integrate as a young worker. Promoting it and communicating about its accessibility or target professional profiles would be beneficial.

### 2. Include new trends in the national space strategy

The trends of the international space industry identified above should be specifically included in the national space strategy. This is not only required to ensure that Belgium remains a relevant actor on the space scene, but also to create new opportunities and attract foreign investment. This was for example the case in Glasgow, where support to the small satellite manufacturer Clyde Space led to the establishment of the European headquarter of the US-based constellation operator Spire, eventually leading to the creation of over 50 jobs[8]. Not to mention that taking part in exciting projects will inspire the young generation to orient themselves towards science and technology education.

[7] See : http://www.popularmechanics.com/space/a4288/4318625/
[8] See : http://www.bbc.com/news/uk-scotland-scotland-business-33066479

In parallel, grass-root innovation should be supported. Although there is a fertile ground for innovation, Belgian start-ups in the space sector are relatively few, and space-related research at universities is struggling. It is the view of beSPACE that with limited but strategic investments in ground-breaking technology and with sustained support of university research and innovative start-ups, Belgium could be a leader in the space industry of tomorrow.

### 3. Encourage transdisciplinary dialogue

On the one hand, there is in Belgium a clear lack of communication around our national space capability: the average person, and in particular the younger generation, is relatively oblivious to our achievements. On the other hand, the space sector is increasingly characterised by the use of non-space technologies and expertise. These concern not only engineering but also new disciplines such as architecture (i.e. design of space habitats) or digital arts (i.e. virtual reality and robotics).

One way to address both these issues could be in the effervescent Belgian art scene. Indeed, numerous stakeholders are starting to recognise the potential of linking the art and technical communities. Institutions such as the European Space Agency, the European Organization for Nuclear Research and even private companies such as Planet, have all opened artist residence programs on their premises. Art could play an interesting role both by pushing the sector's creativity, forcing "out-of-the-box" thinking, and by reaching out to a wider audience. We therefore recommend to set up of a meeting place between artists and the space community, similar to the Observatoire de l'Espace of CNES, the French space agency. This platform could offer different services such as artist residency in research centres, competitions, exhibitions, conferences or workshops.

### 4. Keep the federal core while opening up to regions

In Belgium, space policy is the result of an interplay between the different levels of government. The federal level is responsible for space applications and research in the frame of international organisations, and thus manages the Belgian participation to ESA programmes, Eumetsat weather satellites and space programmes managed by the EU such as Galileo and Copernicus. Scientific research in other domains is a responsibility of the communities, whereas applied research and industrial policy are a regional responsibility.

Furthermore, different levels of power have different needs for space tools (such as satellite images, navigation services, telecommunication, etc.) in the implementation of their policies. Consider for instance of the armed forces, police, monitoring of fisheries at sea, agricultural policy or regional planning and zoning.

It is crucial that there is a sufficient level of communication and collaboration between the different levels of power. All levels of government must have access to the appropriate space-based data &

services. At the same time, our space industry and research centres can profit from working together across the country - and internationally. Space commercialization at the regional level allows to position cities and regions as space innovation centres and to create jobs. Fostering the network effect should thus be high on the priority list.

It is thus, in our view, of prime importance for the Belgian Space Agency to be an independent organism, with enough flexibility to act as a forum where needs, ambitions and budgets from the community, regional, and federal levels are discussed and matched. In order for this to work, all of these need to have a place at the table. Moreover, actions should be taken to foster the dialogue between the non-governmental stakeholders in the different regions (e.g. the Flemish Aerospace Group, Skywin Wallonie, Bruspace and Belgospace, universities and research centres, ESA BICs and the private space industry).

At the same time, to safeguard Belgium's influence in the international space scene, the country should speak with one voice at the different international space organisations and with partner countries such as France, Germany and Spain.

Belgium invests a large amount of tax money in space research and applications. Our governments owe it to the taxpayers to transcend administrative and political conflicts and to ensure that the public investment gets us the greatest possible return in terms of useful scientific research, contracts and value for industry, commercialization potential and space-based tools and data to serve the needs of government and citizens.