



Skywin: Taking on a new dimension

An interview with Mr. Étienne POURBAIX,
Managing Director of the Skywin competitiveness cluster



And Mr. Stéphane GUALANDRIS,
Project Manager at Skywin

A new chairman for Skywin !

In September 2023, François Lepot (SAB) succeeded Jacques Smal as Chairman of Skywin. François Lepot, CEO of Safran Aero Boosters, has been appointed Chairman of the Skywin Wallonie competitiveness cluster. A civil engineer with a degree in electromechanics and aerospace engineering from the University of Liège, Lepot spent a year working for Cockerill-Sambre after graduation. He then devoted his entire career to one of Wallonia's leading aerospace companies, Techspace Aero, now Safran Aero Boosters.



François Lepot,
Chairman of Skywin

More specifically, the future CEO started at Herstal in the Design Office in 1993, before becoming Project Manager for the development of the CFM56-7 engine two years later, and then moving on to General Electric (US) and Snecma (France). In 1998, he became Technical Brand Manager for the General Electric and Pratt & Whitney engine programmes. In 2006, at the age of thirty-six, François Lepot was appointed Director of Operations, in charge of production, supply chain and investments. Finally, in 2019, he succeeded Yves Prete as CEO of SAB.

The Skywin cluster's strategy has been completely overhauled for 2022. Could you tell us more about it?

Étienne Pourbaix (E.P.). In 2022, the Walloon government reviewed its relationship with the 6 regional competitiveness clusters with the implementation of a multi-year contract of objectives and means that defines five missions. This was important for two reasons: the sustainability of the cluster is guaranteed in the medium term and its activity is both formalised and clarified. The conclusion of this contract was accompanied by internal reflection within the cluster on the technical axes.

What are the 5 missions of the Skywin cluster?

E.P. The first mission is to support the government's regional strategy by producing among others **technological and strategic roadmaps for the sectors** that are relevant to our cluster. We will come back to this. The second mission is **innovation**, based on two main areas: ensuring a **technological watch for members** (**seminars, participation** in fairs, etc.) to make them proactive, and organising two **calls for projects** per year in order to launch collaborative **R&D** projects to develop new technologies.

Third mission: to ensure the **economic growth** of the sectors covered by the cluster through **scaling-up**: this involves enabling SMEs

that have been established for 2 to 3 years with a marketable product or service and a small number of employees to move up a gear by acting on several levers simultaneously (commercial aspect, marketing, personnel management, innovation, new financial resources from the Walloon Region, etc.) We are keen to act as growth **accelerators** for potential future "nuggets": we target them, define together the points to be improved and establish an appropriate action plan.

The fourth mission concerns the development of **talent and training** along two lines: the reduction of labour shortages in the sectors concerned and the technological innovation generated by R&D projects. Design offices should not be the only beneficiaries of these advances: it is also in the interest of industry to make use of them in their production processes.

Finally, our fifth and last mission relates to **internationalization** in close cooperation with AWEX. It is crucial to increase the visibility of our four sectors, which are international by definition. This requires the use of digital tools but also, and above all, in-person participation in the largest specialised trade fairs throughout the world. To conclude this subject, let us specify that each of these five missions has been broken down for each sector.





Here we go!

E.P. The Skywin cluster has identified four sectors: aeronautics, space, drones and defence. In 2022 and 2023, we have produced the roadmaps for space, civil and military aerospace as well as drones. The aeronautics sector covers aircraft structures and engines thanks to the presence of a very dense industrial fabric in Wallonia. I am of course thinking of the two world leaders, Sonaca, which manufactures the leading edges of wings, and Safran Aero Boosters, which produces 60% of the boosters for the first stage of air compressors in aircraft. But there are also a great many SMEs, active in subcontracting or in direct access with the major contractors.

Skywin has defined 5 technological axes...

E.P. Indeed. These five technological axes or DAS were determined internally, in consultation with the project managers and member companies, and then approved in December 2021 by the cluster's board. The first axis is that of **flying substructures and subsystems** to provide global solutions to be integrated into an aircraft, a launcher or a satellite. It also includes new types of fuel (synthetic or hybrid fuel - combining paraffin for propulsion and electricity for air conditioning, cockpit lighting, etc. - and hydrogen), whose effects on structures are far from negligible.

The second DAS includes **innovative materials and processes** for the use of these materials, whether they are composite, hybrid (electronic equipment and composites using carbon fibres to make different layers of structures) or metallic (with lighter alloys). Mixed solutions are increasingly envisaged with the electrification of materials for control purposes but also to prevent the appearance of cracks or to calculate the resistance and wear of materials.

The third technological area is **embedded and communicating systems**, with a focus on the cyber security of systems communicating with the ground. The more intelligent and communicating the systems are, the higher the risk of cyber-attack.

The fourth axis includes the data economy and artificial intelligence: more and more satellites, drones and aircraft are generating data in real time. What remains to be done is to detect the relevant and useful information to be processed on the ground...

Finally, the fifth technological axis **encompasses simulation and digital modelling** (with the digital twin in particular). It is increasingly common to develop digital models before an initial prototyping. This fifth axis also aims to make the most of the very substantial physical testing facilities that we are lucky enough to have in the Walloon region. There is, of course, the Liège Space Centre (CSL), whose simulation system with vacuum tanks 6 m in diameter is used to reproduce the effect of the vacuum of space and is recognised by the ESA. I am also thinking of the cyclotron at UCLouvain, which is used to simulate the influence of cosmic radiation, which is very harmful, on satellites in orbit. And let's not forget the private equipment, which can be used for R&D projects, such as test engine facilities from Safran in Liège to simulate the operation of aircraft engines or a large anechoic chamber from AGC Glass Europe group to simulate the electromagnetic environment and observe the reactions of antennas to electromagnetic disturbances. As you can see, we have a lot to offer!

The health crisis linked to Covid-19 brought the aeronautical sector to a sudden halt with a high risk: the erosion of R&D skills with the departure of engineers to other sectors. Following the example of the important aids granted by the French and German governments, the Walloon government launched the WINGS project in the summer of 2020 to support the regional aeronautical sector, and it is Skywin that was naturally entrusted with its implementation. I'll let Stéphane Gualandris speak more about this.

Now that activity has resumed, we are faced with another challenge: recruiting competent and qualified personnel to compensate for the departure of many people to other sectors.

Let's talk about the WINGS project!

Stéphane Gualandris (S.G.). This is an aerospace technological innovation partnership that was launched in the last quarter of 2020 to respond to a double challenge: the health crisis and the grounding of the Boeing 737 Max.

It brings now together **21 partners** (2 additional SMEs joined the partnership):
- 3 three large companies: Safran Aero Boosters, Sonaca, Thales Belgium,



- 11 SMEs: GDTech - CAD and CAE engineering service, Any-Shape - Additive Manufacturing, Calyos - Passive thermal management systems development and manufacture, Techno-chim - Surface treatment of metals, V2i - Vibration testing and measurement, numerical simulations, control and monitoring of NDT, MachineSight - Integration into special machines, mechatronics engineering design office, MSC Software Belgium, Rovitech - Integration of inspection solutions, DELTATEC - Development and manufacture of electronic systems, thermal, IoT, AI, Coexpair and ID Industrie & Développement,
- 7 research centres: CENAERO - Aeronautical design, processes, spacecraft, buildings and smart cities, von Karman Institute - R&D fluid mechanics, CRM - Metallurgy, characterization of metallic materials, assembly, coatings, industrial processes, CETIC - Software engineering, communicating embedded systems, data science, Sirris - Composite materials, metals, modelling, digital simulation, industrial processes, Multitel - Applied photonics, signal processing, electronic prototyping, AI, Materia Nova - Polymeric Materials, Surface Coatings and design of batteries.

How is this project organized in concrete terms?

S.G. WINGS is at this time a 3,5-year project with a budget of € 115.5 million, 75% of which is public funding. This is a colossal amount if you consider that a project labelled by Skywin generally has 3 to 5 M€. This public investment is important because it allows the private partners to take risks while keeping the work of the personnel assigned to aerospace research and thus avoiding the flight of talent to other sectors of activity. The administrative steering of the project was entrusted to our cluster for the transition from phase 1 to phase 2 (a “go no go” evaluation has decided on the continuation until at least 30th April 2024 of the project by the Cabinet of Minister of Economy Willy Borsus and the Walloon

Public Service Economy, Employment, Research). This steering is done in agreement with Safran Aero Boosters, in charge of coordination. In addition, the project mobilises 285 full-time equivalents. The objective of WINGS is to enable our aerospace industry to maintain its R&D efforts at low TRL levels (2, 3 and 4) with a view to designing a low-carbon aircraft by 2035 (which implies a 30% reduction in fuel consumption per passenger) and a carbon-neutral aircraft by 2050, in accordance with the Paris agreements.

Could you tell us about the research themes of WINGS?

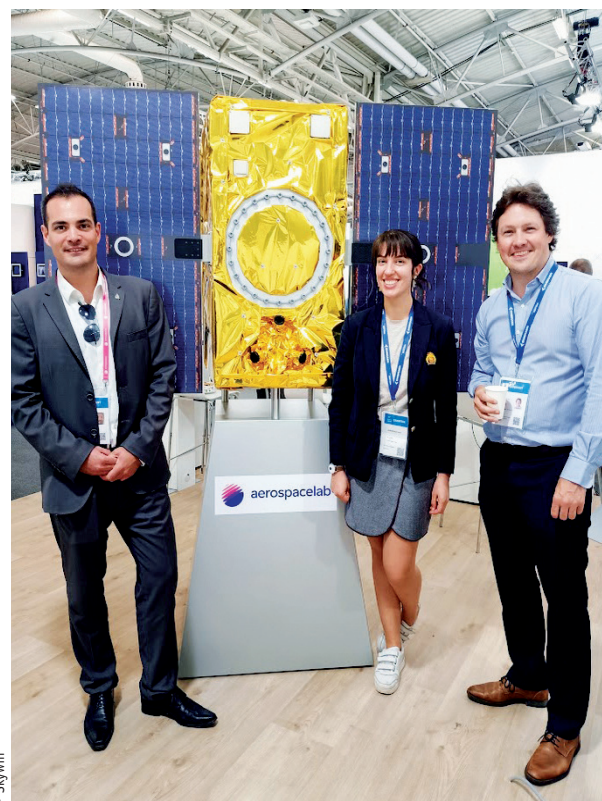
S.G. Six themes have been defined:

- Aerostructure,
- Propulsion,
- Communication systems,
- Materials and processes,
- Digitalization and digital simulation,
- Industry 4.0.

For example, the “propulsion” theme focuses on the development of new decarbonised modes with hydrogen or sustainable alternative fuels. Similarly, the “digitalisation and digital simulation” theme focuses on virtual testing and digital continuity.

What about the future prospects for WINGS?

S.G. We are more than fourth fifths through the project, which will end in April 2024 for phase 2 of the project. The first results are already being seen, as patents have already been filed. Ultimately, we expect to have 600 to 650 deliverables and we expect to increase the TRL level of the research projects with a view to their subsequent integration into projects such as Clean Aviation, Horizon Europe or Regional projects in line with the six WINGS research themes. This is crucial to initiate R&D with a more industrial vocation for results expected by 2030-2035.



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WINGS3, extended and strengthened

On the occasion of the Paris Air Show in June 2023, the Wings project partners communicated externally for the first time.

During the event, Minister of Economy Willy Borsus announced that he would be proposing to the Walloon government that phase 2 of WINGS project be extended by 14 months to 30 June 2025.

Twenty million euros will be made available, in addition to the 82 million already invested by Wallonia for the first two phases of WINGS.

This is a fine acknowledgement by the Region of the work done and the results achieved. 29 patents have already been filed.

Let's come back to the "space", "UAV" and "defence" sectors...

E.P. For more than 50 years, the Walloon space sector has been an important part of the Belgian sector, which ranks 5th in Europe in terms of investment both in research and in the space industry (305 million euros a year).

The Walloon space sector includes 40 active players who generated a turnover of 300 million euros in 2022 and provides more than 2,000 direct jobs.

The "space" sector is divided into seven main areas: the ground segment; launchers and space vehicles; satellites; instruments (for Earth observation); testing of space equipment; ground-based satellite applications; space science which covers scientific missions and exploration.

In 2022, our cluster has developed a roadmap to more actively support two major space value chains:

- The Earth Observation industrial chain (bringing together more than 25 actors) including the Upstream and the Downstream Segment and cybersecurity dimensions,
- The space transportation, in its "reusable launcher" segment which brings together more than 15 actors.

Regional support and public funding will be provided from 2023 to complement important industrial investments in these two sectors.

At the same time, Research Centres and Universities will be structured through the Joint Research Institute for Space (JRI4Space) to jointly develop these fields by pooling equipment and supporting more than 30 theses.

The results of these industrial and scientific projects are expected by 2025 to place our region among the most active European Regions in the field of New Space.

The "drone" sector is not yet in a mature phase from an industrial point of view. The cause is essentially regulatory: the public authorities have not yet completely transposed the relevant European regulations into local law, which is delaying the development of the professional drone sector. For example, it is not yet allowed in Belgium to operate drones that can be flown beyond direct vision.

In the meantime, synergies should be developed between drones and satellites to cross-reference data at these two Earth observation scales.

Despite these legal and administrative issues, the drone sector is strongly growing in Wallonia. It mainly revolves around the following activities:

- Development of on-board applications, which can be closely linked to on-board applications in space;
- Development of services of all types for industry and the public sector;
- Machine design for various applications;
- Design of on-board electronics;
- Autonomous flight;
- Pilot training;
- Diversified testing facilities.

For its part, the "defence" sector has once again become an essential sector with the war in Ukraine. This situation has created a new dynamic and a renewal of the R&D projects devoted to it, some of which are supported by the European Commission. Furthermore, Skywin has concluded an agreement with the MecaTech cluster to coordinate together this sector, whose increasingly complex weapons systems integrate land, air and UAV armaments.

The Walloon sector devoted to Defence and Security is a historical sector resulting from the metallurgical and mechanical skills acquired in the 20th century. It is still a growing sector in Wallonia. It brings together several large companies (Belgian and international) as well as an extremely dynamic network of SMEs that are constantly developing new skills.

The Defence and Security activity focuses on the following areas:

- Structures (metal and composite, shielding) for military aviation and land armored vehicles ;
- Military aircraft engines (production and MRO);
- Maintenance for military aviation (planes and helicopters);
- Complex Systems integration;
- Military drone system (sensors, secure operating systems, remote control, etc.);
- Weaponry;
- Weapon boarding system on-board air carrier (pod) or ground (turret);
- Secure communication system for military mission aircraft (Awacs, maritime patrol, etc.);
- Embedded electronic systems according to military and civil qualification.

Key figures of the Skywin cluster

- 148 members
- 98 projects labelled since 2007
- 295 M€ of total project budget
- for 2023: 3 new labelled projects