

The DaherLAB: connecting startups and industry with the challenges of medium-sized and large companies

by

■ Stanislas Borowski ■

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Overview

Daher is a family-owned business founded in 1863. In 2014, it created an open innovation entity, the DaherLAB, in order to integrate new technologies such as artificial intelligence, blockchain, connected objects and so on. After a trial and error phase, during which even the solutions which had successful 'Proofs of Concept' (PoC: the realisation of an idea to demonstrate its feasibility or potential, often after testing) in the company sank into 'black holes', a dual system was successfully put in place. On one side, support functions were mobilised from the beginning of the process in order to overcome obstacles and internal inertia, which made it easier to make contracts with startups. On the other side, the innovation process was structured in a sort of 'push system' factory with three 'production lines' or stages (namely creation of PoCs, industrialisation, and deployment) to ensure that technologies which were of interest to the Group could be completely integrated at the end of the process.

Report by Élisabeth Bourguinat • Translation by Rachel Marlin

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I have been working for the Daher Group since 2014, and I am currently the director of the DaherLAB. Before I explain how the DaherLAB works, I would like to give you some background history about Daher.

The history of the Group

In 1863, Paul Daher created a shipping and trading company in Marseille. In 1880, it started specialising in the transportation of heavy machinery, and worked with leading French industrialists on their infrastructure projects in the railway and energy sectors.

In 1973, when oil prices shot up, Daher started working for developing countries which benefitted from the oil crisis, mainly in the Middle East and Africa.

In the 1980s, companies started subcontracting supplies to factories and distribution of products to clients. Consequently, Daher became a global logistics partner for French manufacturers.

When oil prices collapsed, the company found itself on the verge of bankruptcy. The crisis forced the logistics market to restructure. Some logistics companies, like FM Logistic, became generalists. Others, like Daher, were not large enough to be generalists, and so chose to specialise. Daher's chosen sectors were energy and aerospace.

An industrialist at the service of industry

A second change took place in the 1990s. In order to provide a better service to its clients, Daher decided to become an industrialist, and, in 1999, it bought Lhotellier Montrichard, a company specialising in aerospace logistics, defence and the production of special containers and high-tech aviation equipment. The integration of this industrial company into the Daher Group is an example of the growing trend for merging manufacturing and services, noticeable at the end of the 1990s and the early 2000s.

From 2003 onwards, Daher established itself as 'an industrialist at the service of other industrialists', and used its skills in the manufacturing industry to provide even better logistics service to satisfy the needs of its clients.

In 2009, it became an aircraft manufacturer as a result of the purchase of the Morane-Saulnier aviation company in Tarbes which produced 6-seater aircraft for private clients.

Between 2003 and 2015, the Group experienced very robust growth. Its turnover increased from 300 million Euros to 1 billion Euros, half of which was generated by its industrial activities, and the other half, services.

Following this period of transformation, Daher has now established itself in three main businesses: aircraft manufacturing; the manufacture of equipment for major aerospace and defence clients; and its original business, the provision of logistics and services for manufacturers.

The third industrial revolution

According to the economist Christian Saint-Étienne, the first two industrial revolutions - the first characterised by the steam engine, textiles and railways, and the second by electricity, the combustion engine, chemicals and pharmaceuticals - each lasted a century. In both cases, the first fifty years were devoted to the design of the offer, and the fifty years which followed, the development of this offer to meet demand. If the same pattern were applied to the third industrial revolution which began in the 1980s and was characterised by information technology (IT), nano- and bio-technologies, and cognitive services, one might assume that we are currently in the period of the design of the offer and that, from 2030 onwards, we will enter into the phase of 'response to the demand'.

As far as Daher is concerned, this third industrial revolution is a tremendous opportunity because it can be seen as distorting the boundaries between manufacturing and services. In the past, Daher was a pioneer in this merger and it reaped the benefits, giving the company a very good market position. Today, this market is characterised by industries which are more and more intelligent, supply chains which are increasingly integrated throughout the entire value chain, increasingly efficient ecosystems, and services ranging from expertise to integrated solutions, and this all takes place on a global scale.

This third revolution is the opportunity for Daher to become the leader in our businesses in terms of innovation, and to strengthen our operational excellence in order to ensure our competitiveness and profitability.

Daher R&T

Innovation has been a feature of the company for a long time via our research and technology (R&T) department which focusses on industrial processes, equipment manufacture, the formatting of composite materials, robotics, logistics processes, and so on.

This form of research is long-term. It can take as long as ten years between the initial innovation and the return on investment. Take the following example of the process: strategic marketing teams define a scenario which defines the segment of the aerospace market where Daher should be in 2040. Analysis is then conducted to determine what the company is capable of doing today in this segment, and the path the company needs to take in order to be competitive in this segment in the future. These conclusions determine the roadmaps which will then be applied to all the technologies involved (thermoplastic composite technology, thermosetting resin technology, robotic technology, metallic materials technology, and so on).

Three new tools

In addition to the R&T department which is like a marathon, Daher created the DaherLAB, a structure dedicated to short-term innovation. In comparison to R&T, it is a sprint! Its approach is completely different to the R&T approach. It analyses the entire ecosystem and identifies the new technologies (such as virtual reality, artificial intelligence and connected objects) which could allow us to develop new markets and services, or make us more competitive by applying them to all the company's sectors, including the operations department, our financial and legal departments, and the purchasing department.

The Group is well aware that innovation does not only take place in France. In order to make it easier to monitor technologies which are emerging throughout the world, Daher launched Armstrong by Daher in Silicon Valley in 2017.

Finally, Daher wants to promote intrapreneurship in order to stimulate innovation, and has already set up three spin-offs: Taman, an interim recruitment agency specialising in Daher's markets, especially the aerospace sector; Logistics Operations, a logistics subsidiary which offers extremely competitive costs and does not have the financial inertia of a large group; and Daher Software which develops mobile applications for operators in the field.

The DaherLAB

Let me present the DaherLAB in more detail. It was created in 2014 and its aim is to ensure connections between startups and industry. We have already identified and chosen more than 400 startups which potentially are of significant interest to our activities. We are currently working with about fifty of them.

The meeting between a large group like Daher, which is marked by its industrial culture and has many internal processes and a great deal of inertia, and small structures, which are much more agile and have different economic models, was not without its problems. In fact, we soon found ourselves at an impasse. For example, Daher provides startups with a three-month artificial intelligence service in a similar way to when it buys Enterprise Resource Planning (ERP) software projects worth several million Euros which last for years. This

method of functioning was totally illogical. We had to undertake an ‘acculturation’ process (ie. adapting the company to a different culture of innovation) of all the support functions, especially the purchasing and the legal departments, and also the IT department.

The DaherLAB now has six key missions. The first three are highly operational. They consist of detecting mature technologies in the market and evaluating how they might be of interest to our businesses in the short-term; maintaining a portfolio of attractive projects which are ready for industrialisation, in other words, projects whose production is ready to be used in Daher’s factories and warehouses; and, lastly, ensuring a technology watch on technologies such as artificial intelligence and blockchain, and explaining to all our employees (in the operations department, factories, warehouses, legal department, and so on) the purpose of these technologies and the impact they might have on our company. The last three missions are less operational. They involve the acculturation of the company to the innovation; working with the sales teams to develop innovation strategies with our clients; and, finally, strengthening our innovation ecosystem in order to identify new startups.

Proofs of concept

Hype Cycles are graphic representations of the lifecycles (maturity, adoption and application) of emerging technologies developed by the IT firm, Gartner. We use these curves (or ‘hype cycles’) to identify technologies which might be useful to the company, for example, real-time visibility. In a traditional structure, it is very difficult to launch a project involving real-time visibility because, even before investing, one has to let the client know the expected return on his investment. In some situations, it may be easy to calculate the return on investment for the purchase of an autoclave for example, but here it is complicated for this sort of application.

Like a chemical experiment

This prompted us to develop a PoC (proof of concept) approach which we use as if it were a chemical experiment. We start by describing the experiment which is to be carried out precisely; its nature, the context in which the experiment will be conducted (for example ‘this artificial intelligence application will be tested in the production sector to determine whether the product is substandard’), the length of time of the experiment, and the indicators which will make it possible to measure its impact.

We then carry out the experiment in the field. The DaherLAB does not have its own laboratory. Its ‘playing fields’ are industrial sites, logistics sites and service sites.

At the end of the experiment, like a chemist, we analyse all the recorded results to discover how the experiment progressed and to determine whether it is necessary to go any further. The data collected is either quantitative or qualitative, and therefore it is possible to calculate a return on investment. We can then consider industrialisation, in other words, we can decide whether to integrate this new technology into one of Daher’s areas of activity.

Different profiles

Developing a PoC involves both Daher employees and people outside the company. They include the company presenting the new technology; the DaherLAB project managers who have ‘hybrid’ profiles, in other words they are equally at ease talking with the director of a logistics site as with the artificial intelligence developer; the expert in the sector in question who has detailed knowledge of the problems to be solved, and the issues to be addressed; and, finally, the Group’s support functions, especially members of the purchasing department.

Red cards

Our interaction with members of the purchasing department was quite complicated because in the beginning they often showed us a ‘red card’. For example, they explained that their objective was to reduce the number of suppliers and that we were in the process of creating new suppliers; they sometimes cautioned us, explaining that the innovation raised the problematic question of intellectual property. Normally, when the PoC was finished,

we could proceed to the next stage in the process, but because of these red cards, this was not the case. After two years, we realised that the PoCs were being stopped in their tracks, and disappeared into 'black holes', never to be seen again!

Reinventing the innovation process

We realised, therefore, that we had to completely rethink our innovation process because if it stopped systematically at the PoC stage without going any further, we were just spending money rather than creating value. We discussed this issue with the top management in our three businesses as well as the key people in the IT, purchasing and legal departments.

The process which we devised has three phases. The first phase is the creation of the PoC. The DaherLAB, which is in charge of this, organises a trial experiment and collects the data which is necessary to make an investment possible. The second phase is industrialisation which is handled by the IT department. The innovation has to be integrated into the company's complex organisation, and we have to anticipate all the necessary training programmes for our staff in order to make this a deployable turnkey project in terms of operations. The final phase is deployment which is the responsibility of the directors of the factory or logistics sites.

In order to carry out this innovation process, we had to devise new rules, especially rules regarding purchasing. In general, a large group pays its suppliers forty-five days end of month, but unforeseeable events may cause a delay, and sometimes an invoice is not paid until six months later. This can be catastrophic for a startup which needs cash all the time. We now have a member of the purchasing department who deals exclusively with innovation, and there is also an unbreakable rule: for all purchases regarding PoCs, DaherLAB must make a down payment of 50 % when placing the order. For a large group, whose turnover is 1 billion Euros, a down payment on an invoice of between 30,000 and 50,000 Euros is not a significant amount, but for a startup, it is crucial.

We also made changes in our legal department. A contract for a programme lasting ten years cannot be drafted in the same way as a contract for the provision of an algorithm lasting three months. We have now drawn up extremely simplified purchasing contracts with non-disclosure clauses reduced to one year instead of five or ten years.

We have also tried to involve the directors of operations more. Previously, when all the necessary steps for the PoC had been taken and the industrialisation process was complete, we used to tell them, for example, that they could go ahead with the project and that the break-even point was in one-and-a-half years' time. However, nothing would happen because the directors were not convinced that the new technology was really going to improve their profit and loss account. Now, innovation experts, who have been chosen for their proficiency in this sector, have been appointed in each operational department. They spend their time analysing the results of the PoCs and understanding the ways in which new technologies can be applied to their sector. They register the deployment in the roadmaps and project budgets, and make sure that the factory directors are well informed about these technologies and that they appreciate why these technologies are beneficial to their unit.

A 'push system' factory

In the end, one could argue that we have built the equivalent of a 'push system' factory (where production exceeds demand) except that it is the innovative ideas which are the basis for our work. I compare myself to a factory director in charge of three 'production lines': the PoC, industrialisation, and deployment, assisted at each stage by the relevant manager.

As in any factory, there is stock available because production times are not the same for the three 'production lines'. It takes between three and six months to make a PoC whereas industrialisation and deployment may take six months to a year, as they first have to be recorded in the following year's budget. Therefore, the PoCs

are held in reserve while awaiting industrialisation. When the budget has been approved, the second 'production line' can use this stock to industrialise the new technologies and 'de-risk' them for future users. In this way, a second stock is created with ready-to-deploy solutions. Lastly, there is a third 'production line' for the operational staff who will deploy the solutions in their factories or warehouses. My aim, as a factory director, is to reduce stock as much as possible in order to create a 'just-in-time' production system.

To speed things up, some directors of operational units make allowances for a small industrialisation budget in their investments. This enables them to implement a technology or training modules quickly. We cannot do the same in the deployment process because the amount of money necessary to implement a solution in approximately one hundred sites is substantial, and this expense has to be taken into account in the budget.

Referring to this process metaphorically as a 'push system' factory is a good way to communicate with the production and logistics directors. They are more familiar with this idea than innovation concepts or proofs of concept. They find our approach more practical, tangible and easier to understand.

The results

The DaherLAB creates approximately thirty PoCs every year, and the success rate is between 40 % and 50 %. This means that one in two innovations passes the test and successfully demonstrates its value and feasibility. It joins the other accepted PoC innovations which are waiting to be industrialised.

Out of approximately one hundred innovation projects which had successful PoCs, about thirty were industrialised, and 19 were deployed in factories.

The case of ITER

In May 2018, at a conference about supply chains, we met the directors of DCbrain, a startup specialising in artificial intelligence. Its technology, which until then had only been applied in heating networks and in oil and gas distribution, consists of creating a digital double which not only simulates a given situation, but optimises it by using the deep reinforcement learning method. Having checked that this technology could be applied to our logistics business, we looked for a sector in Daher where we could integrate it, and asked our in-house experts to investigate this possibility.

A headache at Cadarache

We identified a stock management problem with our client, ITER. ITER is the experimental nuclear fusion reactor project located next to the French Atomic Energy Commission's site in Cadarache, southern France. Approximately 10,000 packages of components manufactured in this programme's seven member countries are delivered to this site every day, and they have to be distributed among the site's ten warehouses. We also have to estimate future storage capacity and assess whether it is necessary to create additional storage space, and then inform our client about this. We are able to make these assumptions because every trimester we have to update our forecasts of incoming and outgoing flows for the next 24 months.

The previous simulation software was not flexible enough to incorporate the requirements and management of additional storage zones, and every update was very expensive. As a result, the software was hardly used, and the engineers used to tinker about with Excel macros in an attempt to make forecasts. It was a real headache.

A successful PoC

With DCbrain, we created a PoC which started in September and lasted six months. The first three months were devoted to collecting data and becoming familiar with the algorithm (called Marvin). In the last three months, we carried out operational tests. We gave Marvin a set of rules (for example, no packages weighing more than 10 kilos were to be stocked on the top shelf; packages containing chemical products should be placed

in a retention container; and oversized packages should be left on the floor), and then we put him to work as if he were an intern.

Marvin was given a number of exercises to carry out, using data which we had collected over the past twenty years, including putting approximately 30,000 packages in place. In the beginning, Marvin made a number of mistakes, but the department managers agreed that he improved rapidly. We made him carry out operational tests, and, thanks to Marvin, the amount of engineering time necessary to draw up the provisional three-month forecast was reduced from three weeks to half a day. The PoC was hailed to be a great success, and ITER agreed to let us proceed with the industrialisation of the project.

Rapid industrialisation

An important question remained: should we integrate this algorithm into our IT system? We knew that DCbrain would keep its intellectual property, and so it was agreed that the operational staff could work on the startup's platform, and the analyses generated by the algorithm could be automatically integrated into our database. Because of this choice, industrialisation only took two months. This was purely due to the fact that the different teams (the operations, purchasing, and legal departments) had been part of the project from the very start: they had worked on the PoC part, and had a clear understanding of what was necessary for industrialisation. Had this experience taken place in the first two years of the DaherLAB's existence, it is likely that the PoC would have met with the same results, but that the project would have subsequently foundered and disappeared into one of these 'black holes'...

In the end, we were not only able to meet the obligations we had made to our client, ITER, but we also were able to dispel some of the prejudices inside our company about artificial intelligence, and to show that it was simply a tool which we supplement with our skills and which enables us to address real operational challenges.

Pieces of advice

To sum up, my first piece of advice is to think small and move fast, and to favour short and repetitive cycles rather than large-scale ambitious projects. One should test quickly and quickly recognise failure. It is best to conduct a test which only lasts three months: this will cost the company approximately 30,000 Euros, but this short period of time should be sufficient to realise, for example, that there is not enough data for the application or that the chosen technology is, as yet, underdeveloped.

My second piece of advice is to make sure that the employees in the company are well informed about startups, the way they work, and their short-, medium- and long-term challenges. Sometimes members of our purchasing department were opposed to a PoC because they claimed that the startup's cash flow was very low. I had to inform them that the startup was going to receive 5 million Euros in the next month as a result of fundraising.

My third piece of advice is to consider startups as genuine suppliers who therefore should be paid. Too many people think it is normal to ask startups to work on four projects at the same time without paying them, but this puts them in danger because they generally need cash to survive financially, and it is risky to spread themselves too thinly. On the other hand, one must not consider startups as typical suppliers. They ought to have short contracts and rapid payment facilities. In other words, startups should be treated like genuine suppliers, and, most importantly, be handled with kid gloves.

Finally, all the people involved in making sure that the project advances smoothly through the industrialisation and deployment phases must be mobilised as soon as the initial PoC phase begins.

Discussion



The client's place in the innovation process

A speaker: *How are Daher's clients integrated into the innovation process?*

Stanislas Borowski: When we supply services in the logistics sector, we set out the objectives (for example, cost reduction or quality improvement) and the transformation plan with the client. Daher makes a commitment to suggest innovations, but it is the client who determines the course of events.

We also take part in a collaborative innovation programme, jointly financed by the client, in situations when the client wants to pursue further research into a specific technology.

Finally, we help certain clients to develop their own roadmap in terms of Logistics 4.0 or Supply Chain 4.0.

As far as the industrial part is concerned, innovation is a long-term project and may take between three and five years. We develop collaborative road maps which include partnerships with the academic community, and develop grant proposals (such as research tax credit subsidies), and so on.

We are currently working with Airbus and Safran on a project for a hybrid aircraft. The three companies share the same goals and participate in the financing. A Daher aircraft will be used as the demo.

The choice of technologies

Speaker: *The concept of artificial intelligence is very broad. How do you choose the more specific subjects on which you are going to work?*

S. B.: We took a great deal of time to screen the subjects which may be interesting for our sectors of activity in terms of artificial intelligence, and we selected four: machine learning, which I mentioned earlier; natural language processing, where the aim is to enable operators to communicate more easily with machines; computer vision, which allows algorithms for example to detect faults in supply parts or supply errors; and techniques which enable robotics and cobotics to reproduce human gestures or actions.

Spin-offs

Speaker: *What is Daher's financial commitment in spin-off operations?*

S. B.: The spin-offs are completely financed by Daher, and our relations with the startups which result from the spin-offs are similar to those which they might have with venture capital funds. The project is defined according to its nature and its progression, and each time that one of the milestones has been successfully reached, a startup can ask the Group for further investment in order to grow even more.

A change of culture?

Speaker: *You described the support functions' acculturation process. Did this process change all the procedures in the company?*

S. B.: People became more familiar about the idea of working in short cycles and simplifying certain procedures. However, in our manufacturing industry, it is still more important to have firm contracts which last for decades for the supply of raw materials. We need to be open-minded and not necessarily change all the procedures.

Speaker: *Has acculturation also taken place in senior management?*

S. B.: Our president, Patrick Daher and our CEO, Didier Kayat, totally support the DaherLAB approach, and, with the arrival of more and more innovations and spin-offs, the other members of the executive committee are starting to understand the benefits of artificial intelligence and blockchain for our businesses.

To make this acculturation process easier, in the beginning all the members of the executive committee spent a week in Silicon Valley. We now send approximately forty executives there every year to follow our Armstrong by Daher innovation programme. During the week-long programme, half the time is spent in studying specific projects (related to project lines, strategic planning, or case studies of sales or operational problems) and devising solutions. During the rest of the time, Group representatives can discover the Silicon Valley ecosystem, and learn how American entrepreneurs develop their companies and deal with ethical problems raised by new technologies.

The transition to industrialisation

Speaker: *The startup world is very innovative and changes very quickly. Between the moment when you create the PoC and the moment when you begin industrialisation and then deployment, applications which have been tested can rotate or become obsolete. How do you deal with this risk?*

S. B.: The DaherLAB's budget is not the same from one year to the next. Every year, I have a budget which I spend over the months, but I cannot commit to buying a technology one year in advance. Startups are well aware from the start that just because tests are carried out, it does not mean that there is necessarily an obligation to buy the solution.

For example, we tested an IT robot technology to automate tasks which had no added value (using double entries and 'copy and paste' functions between different programmes). We demonstrated that this technology saved an enormous amount of time. However, in the feedback from the PoC, we found that in order to use this software, some programming was necessary and this was not sufficiently self-explanatory for the potential software users. In the end, we chose a different application which was more compatible with our activities.

Three possible channels for innovations

Speaker: *You mentioned cases where Daher takes the initiative, but is it sometimes the case that operational staff raise questions or startups suggest new technologies?*

S. B.: We have three large channels for innovations, and three corresponding financial packages.

In the first channel, every year, a call for projects is organised within the company. A member of the DaherLAB visits certain factories and logistics sites in order to organise creative workshops with the operational staff, identify the problems they have encountered (time-wasting, substandard operations, and so on), and organise brainstorming sessions to solve problems. This call for projects is also put on-line so that all employees who have Internet access can take part. When we have about 150 ideas, we chose the ones we want to examine further. The operational staff make the first selection and then a scientific board approves a dozen or so projects which will be carried out within the year.

The second channel is the 'techno push' approach. We devote a great deal of time to events and fairs. We also read articles in magazines to learn about the most interesting emerging technologies, identify promising startups, and keep up to date about what is happening in our sectors of activity. I do not expect my teams to be experts in artificial intelligence or blockchain, but I do want them to know, roughly speaking, how a new technology works and which skills are necessary to use it. We then try and find a place where we can test it, as we did for ITER.

The third channel comes from our financial package which helps us to find answers to questions from the operational staff who are faced with a specific problem and need to test a solution quickly. For example, if they lose parts in the factory, they may suggest the need for a geo-localisation system, and when they have found several suppliers, they would like to test each of their ideas. We provide them with the funding for the testing and the methodology to help them put together their investment project.

What does Daher bring to startups?

Speaker: *You have explained what the startups bring to Daher, but what does Daher bring to startups? Startups need clients, but also testing partners, references, investors, maybe even manufacturing groups which are ready to buy them. Which role does Daher play?*

S. B.: Our Group does not have venture capital funds and so it cannot finance external startups. However, if one of the startups is a 'target company' because it is truly strategic for Daher, we might consider buying it. In this situation, it would take the form of a conventional M&A (mergers and acquisitions) process.

Our main value proposition for startups is that we can offer them a huge playing field which, thanks to the Group's history, includes diverse sectors of activity.

We also serve as a reference for them, as in the recent example when a startup with which we had been working asked for funding from the BPI bank.

Hybrid profiles

Speaker: *Where does your hybrid profile, which is a combination of industrial and startup culture, come from? How have you managed to maintain this profile over time?*

S. B.: I have always been a bit of a geek. I loved IT, video games, new technologies, and so on, but I also have a creative side; I like drawing. After my studies in general engineering, I took a training course in innovation management before I started working for various manufacturing groups. Today, I spend one-third of my time in Daher's factories and warehouses with operational staff; one-third studying innovation ecosystems; and the remaining third trying to connect the two...

■ Presentation of the speaker ■

Stanislas Borowski: graduate of the École Supérieure des Technologies Industrielles Avancées (ESTIA). He trained at the University of Wolverhampton and the CEDEP. He is an engineer specialising in management technology and innovation. He worked in various innovation departments in the aerospace industry before joining Daher in 2014 as Innovation project manager before being promoted to director of the DaherLAB in 2018. Having spent six years working in Daher's Open Innovation laboratory, he is now deputy director of Open Innovation, principally in charge of the development of new innovation and development models for private and public partnerships. He is creative and passionate about innovation, new technologies and industry.



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