CREATING SUCCESSFUL CABIN PRODUCTS THROUGH OPEN INNOVATION

Ingo Wuggetzer, Tobias Tamm, Michael Janz
AIRBUS Operations GmbH
Hamburg Germany

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Abstract

This paper introduces and describes the Open Innovation approach, a novel way for extending a company's innovative focus. By describing the Airbus Cabin approach, the paper highlights the applicability of open innovation to the aerospace sector. At the outset the theoretical framework of 'Open Innovation' will be summarised. Subsequently, the Airbus Cabin approach with particular focus on the department 'Cabin Innovation & Design' and its innovation process is outlined and the open innovation activities used at each process step are described. To conclude, the author will summarise the Airbus Cabin experience and gives recommendations on challenges and further opportunities that a company has to consider when executing and expanding an open innovation approach.

1 Traditional Models of Innovation and their Limitations

In the past, and still in the current majority of cases, innovation activities have been characterised by their company-centric focus. Innovation activities including Research & Development were conducted in-house based on the capabilities and skills of the company's staff and linked financial resources. On the one hand, such a way of working ensures that all the rewards of innovation activities are reaped; on the other hand this implies that all the risks remain in-house. Additionally, a company's potential for innovation success is limited by the company's resources (staff, financials, know-how). This model in which all process steps are completed in-house is termed "closed innovation".

Recent structural changes have been taking place globally, redefining the context in which a company operates. Three main areas of change can be identified making a new approach to innovation a necessity.

(1) In an increasingly interdependent world product lifecycles are shortening while at the same time development efforts for new products have increased. This results in a significant higher risk for a company to develop a new product. Developing the "wrong" product or being too late in the market place may now seriously endanger the viability of a business. Through globalisation and its accompanying changes, knowledge is evolving rapidly both quantitatively and spatially. (2) Moreover, expert staff's mobility between companies has increased. Thus, institutions are no longer able to have the most up-to date know-how base within their boundaries [1].
(3) Technology is progressing at rapid pace and it is within the convergence of various technological domains, e.g. in bio-chemistry, where most potential for future improvements and therefore for new inventions are to be found, cutting across traditional boundaries of competence.

These developments have reduced the impact and thus the applicability of the traditional model of innovation, especially in business segments characterised by a strong competitive environment. By staying 'inside', a company's potential is limited by its own resources. Potential for innovation has emerged 'outside'

and needs to be accessed. Taking account of these challenges, a new approach to innovation has emerged in recent years with the key characteristic of blurring the notions of 'inside' and 'outside'. Innovation processes are becoming permeable.

2 Open Innovation Model

There is consensus within the scientific and business communities about the positive aspects of employing external resources and combining them with internal resources during the innovation process. Henry Chesbrough has coined the term "Open Innovation" [2] describing its various characteristics stretching from restrictive and contractually defined co-operations to self-organised networks and communities. For him, Open Innovation is understood as a paradigm that "assumes that a firm can and should use external ideas as well as internal ideas, and internal and external paths to market [...] to advance their technology [1]. Open Innovation can take several forms:

- Outside-In: integration of external ideas and knowledge into the innovation process
- Inside-Out: externalisation of internal ideas and know-how or products, e.g. through licensing
- Coupled: an interactive and cooperative process to combine internal and external know-how

In the meantime, there is evidence confirming increased innovation potential and strategic competitive advantages through well organised open innovation activities. Although a large scale quantitative study confirming the commercial success of the Open Innovation approach is not yet available, there are sufficient company based case studies and qualitative analysis available which confirm the commercial success of this approach. For example, Proctor & Gamble has increased its product range based on external ideas from 10% to 35% within five years [3]. A different study suggests that cooperative innovations are able to reduce costs and risks by 60% - 90% [4]. IBM is cited as an example, generating additional 1.5bn € revenues through licensing agreements [4].

A large scale study by the University of Potsdam with companies focusing on Open Innovation confirms that 45% of participants witness higher customer satisfaction while a credible 25% are able to directly attribute higher profits to Open Innovation [5].

3 Airbus' implementation of Open Innovation principles

Established in 2005, the goal of 'Cabin Innovation & Design' within Airbus is to streamline all relevant activities in order to comply with and fulfil the AIRBUS Cabin Vision and Mission. Anticipating consumer needs is the basis for generating value for airlines and passengers realized efficiently by bringing latest technology into the aircraft cabin. To achieve these goals Airbus aims for a leading role in innovation, architecture and engineering competences and leveraging global partnerships.

The aircraft cabin passed through different development steps within the past decades. Originally being a luxury good, flying became affordable to a majority of the population during the fifties and sixties. Large jet-aircraft production was industrialized with focus on efficiency and no longer on comfort and luxury in the cabin. Since the beginning of the nineties the airline market then drastically changed in consequence to globalization, increasing airline competition and technological development. As the cabin is the place where the airline is in direct touch with its passengers, it became the focus of product differentiation. Cabin Innovation & Design therefore combines strong market and customer orientation with extensive technological and engineering competence. Serving as an interface between the two areas, the department ensures that market and customer needs as well as latest technologies are embraced in the cabin development process.

Shortened cabin product life-cycles due to the ever-increasing speed of technological change,

the desire to fulfil heterogeneous needs of passengers and airlines, the competitive commercial environment, as well as further increases in the efficiency of the innovation processes have led Cabin Innovation & Design to augment 'classical' innovation and research strategies with Open Innovation elements to strengthen Airbus' industry position. In general, Airbus is proactively sourcing for external knowledge to enhance its high knowledge base, to strengthen its innovative capabilities and to unlock potential, inaccessible up to now. Through the integration of outside ideas and expertise and by creating synergies Airbus is able to complement its internal resources and to absorb critically needed knowledge. For example, the consumer goods industry is a valuable field for Airbus Cabin Open Innovation activities for competences with a direct focus on consumer needs. This enhances value creation with the focus on the customers from the very beginning [6].

The Open Innovation activities are not per se limited to partners from the aerospace sector. Airbus is exceeding industry boundaries, sourcing for motivated partners from business and research segments outside the aerospace industry. Creative input from a different perspective enables jointly created and radically innovative ideas. Knowledge integration is therefore not limited to familiar cooperative ties with customers and suppliers but extends to pro-actively engaging cross-industry partnerships.

4 Airbus Cabin Upstream Product Development Process

The following section introduces the cabin upstream product development process, describing at each step the applied open innovation elements. In principle, the upstream development process is clustered into 3 major steps: upstream research, idea generation, and feasibility phase [Fig. 1]. After completion of these 3 steps, the conventional development process starts.

4.1 Step 1: Upstream Research

Upstream research is based on scenario analysis and anticipation of future macro and aerospace trends set the baseline for future activities which are complemented by technology scouting, market and consumer research, Lead User inputs and other activities. These results are starting points for the identification of strategic fields in which new developments shall take place. In general, developments are clustered along Airbus cabin value drivers:

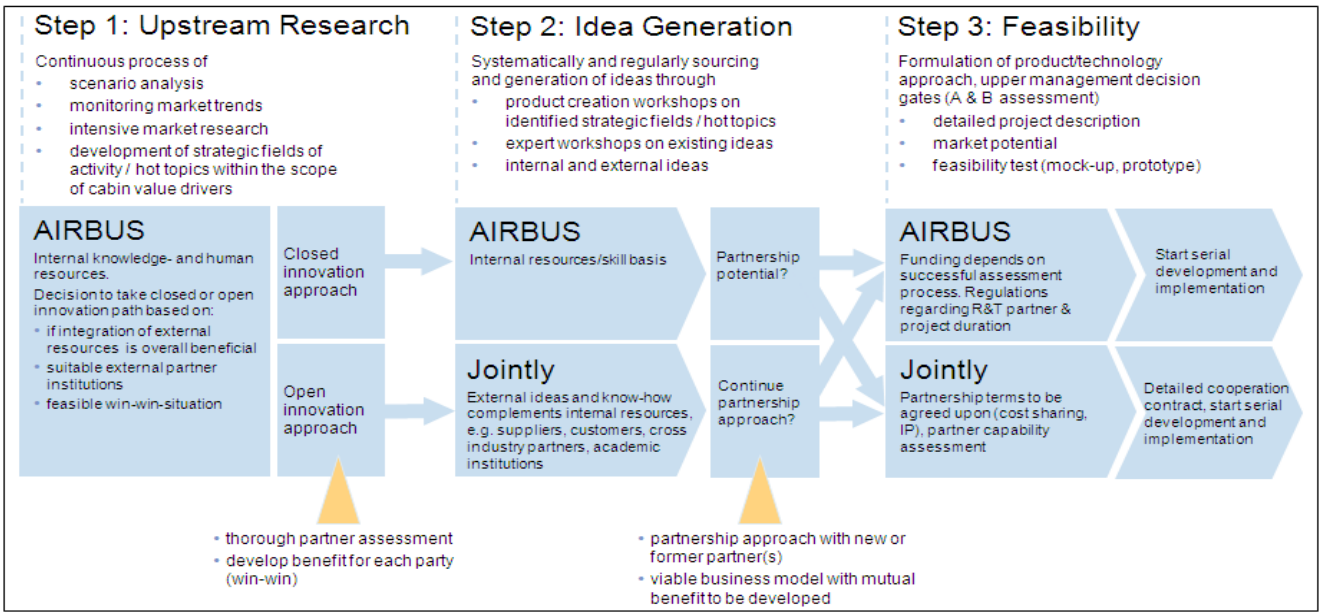

Fig. 1: Cabin Upstream Product Development Process 1

- *Comfort and services* with regard to passenger needs,
- *Efficiency* with regard to airline and passenger needs.

Upstream research is mostly carried out by internal expert-teams and strong ties within a consolidated network exist. Third party expertise is being introduced, mainly from related industries, e.g. automotive and transportation, which are facing similar challenges. Once strategic search fields have been identified, Airbus decides whether to exclusively or cooperatively continue the upstream product development process. Amongst others, this decision is based on the nature of the topic, i.e. if the integration of external resources is beneficial overall, if appropriate external partner institutions can be found and if a win-win-situation between the partners is feasible.

4.2. Step 2: Idea Generation

Succeeding the upstream research process, idea generation, collection and management is performed to develop potential solution scenarios and concepts. Airbus uses different channels to internalise external knowledge into the idea generation process and aims to systematically and regularly integrate ideas from outside the company's perimeter into the idea management processes, called 'innovation pipeline'.

One source of ideas are the Airbus employees that may independently contribute ideas to the cabin innovation pipeline through internal media such as mail, email and interactively through the company's intranet.

To actively foster an innovative spirit, product creation workshops to create new ideas are taking place at regular intervals on selected strategic search fields aligned with the cabin value drivers. Product creation workshops are carefully planned events, from the selection of the internal and external participants to the creation of an inspiring environment and the application of different creativity methods to support optimal results, i.e. product ideas. Depending on the topic, external participants, e.g. from universities, are invited. In addition, special product creation workshops are also taking place in which only one particular supplier or risk-share partner is participating. Such arrangements however need special agreements defining the IP rights between Airbus and the participants according to the guidelines outlined in the following chapters.

Prior to the decision for or against selecting a partner for this phase, a thorough partner assessment has to be carried out, including suppliers, customers, cross-industry partners as well as academic institutions. The possibility of a win-win-situation is as a major criterion when searching for potential partners.[1]

In brief, before entering a collaborative idea generation, the following questions regarding potential partners have to be answered:

- Is the partner able to provide valuable knowledge, information, competence or technology that complements and enhances the idea creation regarding the selected topic?
- In return, what benefit can Airbus provide to the partner company to become engaged in an idea generation process?
- Beyond the idea generation step, is there a long term perspective with regards to actual development and industrialisation potential with this partner?

Based on these criteria Airbus selects partners for a cooperative open innovation idea generation process.

Airbus also accesses external resources by

[1] In open innovation, a win does not necessarily imply a financial benefit but can also, if not more importantly (and especially in the idea generation phase), become an individual return in form of knowledge, experience or better applications [7].

setting up so-called lead-expert workshops, inviting external experts with corresponding industrial, technical or market-specific knowledge to develop (technical) solution approaches for existing ideas which are then further analysed in-house. Partners at this stage of the process may vary significantly. As implied earlier, external experts from suppliers, airlines or universities are just as relevant as those from entirely aerospace-extraneous institutions. For example, for a recent workshop on aircraft lavatories, Airbus invited experts which are challenged by customer needs similar to our industry. Therefore, experts on lavatory design from hotels, fitness clubs, and public lavatories were invited together with experts on hygiene from the medical sector and bathroom designers from the architectural domain.

All ideas are collected, analysed and managed in the so-called 'Innovation Pipeline' which is permeable to ideas from within and outside of Airbus as described above. 'Cabin Innovation and Design' is collecting approximately 500-600 ideas per year which are fed into a two stage-gate analysis and evaluation process. At the first stage, all ideas are evaluated by a cross-functional expert and management board to gauge their technology and market potential. 10% of all ideas successfully pass this stage. They are then analysed and assessed in more detail, especially to fully describe the technological approach and to quantify the assumed benefits. Based on these analyses a second assessment board with top-management representatives then decides and selects the top ideas which will be exploited by starting an innovation project. From past experience, Airbus Cabin is launching five new project ideas per year which are conducted in the feasibility phase described in the next chapter.

4.3. Step 3: Feasibility Phase

Following the Idea Generation and Innovation Pipeline Phase, a systematic feasibility phase is launched on those ideas with the most promising potential. Step 3 leads from the raw idea to a more detailed analysis, defining the technological approach, and up to prototyping and test runs before finally making a decision on continuing with serial development.

In general, Airbus follows a two-way approach within its upstream development process, starting from the idea generation step. One represents an Open Innovation, the other a closed innovation path. The two may intersect between the idea generation and feasibility step, allowing to switch from the closed to the open innovation path and vice versa [Fig. 1].

Firstly, for ideas generated solely by Airbus in step 2, the company may choose an open innovation approach for the feasibility phase by cooperating with an external development and industrialisation partner. Depending on the nature of the project, this increases flexibility and leverages opportunities. Compared to the traditional, vertically integrated approach, open innovation offers opportunities to execute a project faster, with less bureaucracy and with fewer investments. These advantages are of course subject to finding the right partner(s) and developing a viable business model for each side. Secondly, previously cooperatively created ideas may now, after successfully passing the in-depth review, be developed the traditional way, i.e. developed and industrialised by Airbus, with officially allocated partner companies and budget and subject to ownership agreement on the jointly generated ideas. As a third option, jointly generated ideas may be further developed with an external partner different from the partner from the idea generation phase. This is subject to negotiations on property issues between the co-owning parties, too. Yet Airbus usually aims to continue the development process with partners from the idea generation phase. The described two-way approach allows Airbus to integrate knowledge and technology when needed and at the right time for applications.

Moving from an internal idea generation phase to an open innovation approach Airbus has to ensure a win-win situation with the partner to engage into a cooperative feasibility phase. At this stage, economic factors dominate the

business case over soft factors (knowledge, experience, better applications, etc.) which are playing an important role in the previous phase, in order to create win-win-situations. The following questions have to be answered for partner selection:

Is the partner able to provide the necessary resources, i.e. competence, technology and capabilities that are needed for the further cooperative development, industrialisation and implementation?
How can the jointly created value be exploited for mutual benefit?

Following the open innovation path from this step onwards, the parties have to agree on the partnership terms, including but not limited to IP ownership and use rights, cost splitting, etc. This is followed by the formulation of the technological approach and the demonstration of feasibility of the project through mock-ups or prototypes. Throughout the process, the partnership is being examined in order to prove the partner's capability to fulfil aerospace and Airbus' quality standards. After successfully passing the feasibility phase and approval in a comprehensive testing process, Airbus and partners may formulate a detailed co-operation contract and start serial development and implementation. Airbus has currently several projects running in which such an agreement has been implemented and the participating parties are now working towards developing product ideas for a superior cabin. In these projects, Airbus together with the partner(s) try to prove the concept and the benefits of a particular product or technical solution as quickly as possible. This is usually performed by the means of mock-ups or prototypes (depending on the topic) to be in a position to assess the potential of the idea and to decide on continuation of the project. This minimises the exposure of a development risk considerably and therefore increases the acceptance of such an approach both internally and by a partner.

5 The Airbus Lessons Learnt and Recommendations

5.1. Process Management

By opening up its boundaries, i.e. integrating external knowledge from beyond both the company's and industry's limits, 'Cabin Innovation & Design' had to adapt to certain challenges and changes. The challenges include an increased complexity in coordinating all activities. A viable business model has to be developed [8], followed by a strategic partner selection and assessment process. Finding the right partners with adequate knowledge, willing to participate and involve their resources requires thorough research and acquisition efforts. Developing and organising the open innovation tools to integrate and exchange knowledge, e.g. product creation and expert workshops, is time consuming and needs intensive advance planning.

Prior to the engagement in an innovation partnership, the parties have to agree on the ownership and exploitation rights of any development, especially if jointly created. On the one hand this is important, as sensitive information and knowledge may be disclosed and partners have to cope with the risk of the intellectual property (IP) being used in inappropriate ways. On the other hand the regulations have to ensure that each party captures an appropriate share of the value resulting from the joint innovation according to the business and technical needs of the partners [9]. This implies that the parties not only surrender exclusive control over the development process but also surrender a share of the expected benefit, e.g. financially or in the form of knowledge, experience, etc. This balance of giving and receiving has to be reflected in the regulations on intellectual property, usage and exploitation rights. It represents the basis for cooperative value creation and value capture – the win-win-relationship. A one-sided appropriation of the benefit from an innovation will never work in an open innovation context.

5.2. Intellectual Property Model

Based on experience, Airbus Cabin Innovation & Design recommends preparing a situational adaptable IP-policy model. It should, categorize potential partners according to various criteria. For example, for each partner category a basic IP-model should be assigned that is suitable to the risk level and which can be further detailed by appropriate IP exploitation rights. Preparing such a model allows to significantly shorten preparation and negotiation time prior to collaborative activities.

5.3. Win-Win Business Model

Not limited to the issues of Intellectual Property Rights, creating a mutual benefit between partners is of high importance to create a viable and sustainable business model. Generally the participating companies intend to benefit from the aforementioned benefits that the open innovation approach brings with it. They aspire to access valuable knowledge, information, competence or technology that they do not possess in order to exploit or combine with its own resources. In order to reap these benefits, Airbus offers an adequate win-win partnership for potential partners. This win-win is highly dependent on the commercial context and the kind of partners selected. In an Open Innovation arrangement, win-win elements may range from knowledge gain, profiting from a different perspectives, prestige, brand popularisation or sales increase to gaining access to new markets.

Here lays a major distinction compared to typical arrangements in traditional commercial relationships, in which one party provides a service to the other and is being paid accordingly. Open Innovation tries to expand one's own knowledge base and profit commercially, but at the same time externalising knowledge to the advantage of others.

6 Summary and Conclusion

This paper describes the Airbus Cabin approach to Open Innovation. The department 'Cabin Innovation and Design' is systematically and regularly integrating ideas generated both internally and externally to the company's perimeter. By employing various methods and tools, ideas from suppliers, airline customers, passengers (e.g. lead users) and experts from related non-aerospace industries are gathered and ingested into the permeable Airbus Cabin innovation pipeline. Ideas generated internally or externally will either be pursued in-house or together with risk-share partners by combining Airbus know-how and partner's specific know-how to create a win-win situation for the participating parties. Moreover, opportunities for integrating existing products and solutions into the cabin from open innovation partners exist; with cross-branding supplementing the opportunities available. Vice versa, licensing to outside companies could provide additional opportunities for revenue generation. These two latter issues are still not fully exploited and there will be additional focus on these issues in the coming years.

In order to ensure a successful implementation of the open innovation approach, certain preconditions have to be met to facilitate its introduction into an organisation and to fully reap the benefits of the approach. The organisation must be willing to relinquish some control over the development process. However, most crucial for success is the creation of a win-win scenario for all participants.

To summarise, the open innovation method is an opportunity to improve the innovation efficiency by delivering new products to customers in shortened time and with reduce costs and risks. Airbus Cabin Innovation & Design will strengthen this approach and is working in partnerships with universities, suppliers, customers, passengers and other industries to continuously develop the best cabin products for the market.

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8 Author Email Address

Mr. Ingo Wuggetzer,
Ingo.Wuggetzer@airbus.com
Mr. Tobias Tamm,
Tobias.Tamm@airbus.com
Mr. Michael Janz,
Michael.Janz@airbus.com

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