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COLLABORATE TO INNOVATE

CONNECTING ACADEMICS & INDUSTRY

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A Design Thinking Workshop

February 20, 2025

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BACKGROUND

Downsview Aerospace Innovation & Research (DAIR) held its annual *DAIR To Innovate* conference on October 24, 2024. One of the key recurring themes throughout the day was the need to foster further collaboration between industry, academia and not-for-profit associations within the aerospace sector. We know that collaborative work is taking place with the sector; however, it was clear that a deeper dive was needed to better understand the barriers to achieve the level of collaboration expressed.

An exclusive Design Thinking workshop was held on February 20, 2025, at the Bombardier Pearson facility. DAIR members and partners from the Innovation Network were invited to roll up their sleeves and contribute towards solution roadmaps that would benefit the aerospace ecosystem to reduce the existing constraints when collaborating.

Design Thinking Background

A Design Thinking workshop is a human-centered, collaborative approach to problem-solving that fosters creativity and innovation. It guides participants through stages such as empathy-building, brainstorming, and developing solutions. The workshop emphasizes a user-first mindset, aiming to generate practical and innovative solutions that align with end-users' needs. Through hands-on activities and teamwork, participants develop a deeper understanding of problems and create solutions that are viable, feasible, and desirable from the user's perspective.

Structure of the Workshop

Participants were divided into four multidisciplinary teams, each distinguished by a unique colour (blue, red, yellow, green) and composed of DAIR's Innovation Network participants from academia, industry, and partner organizations. Each team was assigned five sequential activities designed to guide them toward formulating a unique problem statement, with every team tackling a different challenge within the aerospace sector. The ultimate goal was to begin developing potential solutions. Instructions for each activity were only revealed immediately before it began, ensuring spontaneity and real-time collaboration.

The activities were structured to build on one another, with time constraints to maintain focus and to make sure the workshop concluded within a single day. After completing each activity, the groups presented their findings to the larger audience, where everyone in the room was able to ask questions and provide feedback.

The workshop employed the Scan, Focus, Act (S-F-A) methodology, a strategic framework used for decision-making, problem-solving, and business process improvement. This cyclical and iterative approach helped participants manage complexity and make more effective decisions throughout the event.

The Phases & Activities within the Workshop:

The Scan Phase of the workshop ensures everyone has the information needed to engage in more productive idea-sharing. Its goal is to gather insights, identify opportunities, and understand the broader environment by actively observing internal and external factors that influence decision-making. This phase provides a clear picture of the current situation—challenges, opportunities, and possible paths forward.

Activity #1 – Ecosystem Empathy

Participants were given 40 minutes to complete the activity.

This activity plays a critical role in developing innovative solutions that prioritize individual needs and experiences in the aerospace ecosystem. Participants, coming from several different areas of aerospace, were asked to draw from and share their individual experiences in order to better understand the similarities and differences.

Participants were then asked to reflect on various aspects of research, project development and execution within their organizations. They considered the types of research & projects typically undertaken and where the initial beginning ideas originate. The discussion also explored how topics & projects are selected and approved, and whether the time-to-completion plays a significant role in these decisions. Participants examined the research & project funding process, the internal organizational structure supporting these initiatives, and how these factors influence career progression or even regression. Additionally, they shared their views on intellectual property and how it is managed in both academia & industry, as well as the methods used to measure "performance" and determine overall success.

Lastly, participants were asked to summarize their discussions and share with the larger group.

Summary of Results:

Objectives

- *Academia:* Focused on advancing knowledge, publishing research, and educating future professionals.
- *Industry:* Centered on developing products, solving practical problems, and meeting customer needs.

Project Environment

- *Academia:* Offers greater intellectual freedom and self-directed work with more flexible hours, though boundaries between work and personal life may blur.
- *Industry:* Operates on structured schedules with defined deadlines and deliverables, often at a faster pace and aligned closely with market or customer demands.

Funding

- *Academia:* Primarily funded through government grants, fellowships, and research proposals.
- *Industry:* Receives funding through internal budgets, contracts, and occasionally external investors, often tied to business objectives and outcomes.

Measuring Success

- *Academia:* Success is gauged by publications, citations, research impact, and grant acquisition.
- *Industry:* Success is measured by timely project completion, return on investment, product performance, quality standards, and safety compliance.

Activity #2 – Where We Are

Participants were given 55 minutes to complete the activity.

Now we get into more of the specifics with regards to an existing process. Participants were asked to put together a general process map for how industry-academic collaborations work today, preparing a brief presentation for the larger group.

Participants were asked to consider several key aspects of the process, including identifying who is involved, such as specific departments and roles, and outlining the tasks each group or individual is responsible for. They were also prompted to examine what occurs before and after each step, paying close attention to the hand-off points where responsibilities shift between teams or systems. Additionally, they were asked to think about the types of software and systems used throughout the process, as well as how these technologies interact and integrate with one another to support workflow and ensure continuity.

Summary of Results:

The goal of this exercise wasn't to outline an actual detailed process – since that will vary by each individual and organization – but to prompt the group to reflect on current players and their interactions, based on personal experiences and perspectives within the activity's limited time frame.

The **Focus Phase** of the workshop helps narrow down gathered information from the Scan Phase to what's most critical. The groups are then able to identify key issues or opportunities that require attention. This results in a clear set of priorities or a defined area of action, enabling better resource allocation and a more targeted approach to problem-solving or decision-making.

Activity #3 – Pain Points & Assorted Frictions

Participants were given only 20 minutes to complete the activity.

In this activity, participants were tasked with identifying five key pain points within the process they had developed in the preceding activity. For each of these pain points, they were required to craft a clear and concise problem statement, ensuring it addressed essential investigative questions such as: What is the problem? Why is it a problem? Who experiences this problem? When and where does it occur? And how is it currently being addressed, if at all? These prompts guided participants to think critically about the root causes and broader implications of each issue, rather than just surface-level frustrations.

Problem Statement Format: "How might we (re-)design… (WHAT) … for (WHOM) …so that… (THEIR NEED is satisfied)."

Once all five problem statements were developed, participants ranked them in order of most to least "offensive." This ranking helped prioritize which challenges posed the greatest barrier to an effective or efficient collaboration process, guiding future discussions in the next activity toward potential redesign or intervention. The exercise not only encouraged a deeper understanding of the issues the industry faces but also fostered empathy by centering on the individuals affected and the real-world contexts in which these problems arise.

Summary of Results:

This is the list of the problem statements that were developed by the four teams during this activity:

1. How might we re-design the current funding paradigm for organizations or individuals navigating it so that its utility is maximized? (Blue Team)
2. "How might we re-design collaboration among government, industry, and academia for the aerospace sector so that shared goals and priorities are better aligned?" (Green Team)
3. How might we re-design the discovery and engagement process between industry and academia for both parties, so that the right connections are made more quickly? (Red Team)
4. How might we design a standard IP agreement for industry and academia so that their mutual benefit is satisfied? (Yellow Team)

Activity #4 – No Constraints

If time, money and staffing were NOT a consideration

Participants were given 40 minutes to complete the Activity.

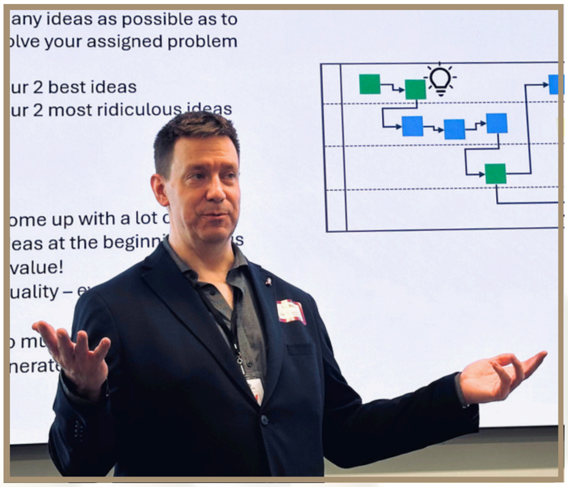
Each group worked on their unique problem statement as per their own ranking. While key pain points and frictions in collaborative innovation were relatively consistent across the board, no two groups prioritized them the same way—resulting in each group addressing a different challenge.

Participants were then tasked with generating as many ideas as possible to solve their assigned problem. Upon completion of the activity, each group was asked to share their two strongest ideas, as well as two of their most outlandish or unconventional ideas.
This activity is often more difficult than it sounds. Participants are used to working in an environment WITH constraints so working with a completely blue sky and blank canvas can make it deceptively challenging.

Summary of Results:

This activity was purely about idea generation – not idea evaluation. Clarifying questions were welcome, but discussion or critique was intentionally frowned upon.

The emphasis was on quantity over quality—every idea has potential. An "outlandish" idea may spark a "strong" idea.



The Act Phase involves putting the results of the Focus Phase into practice. The objective of this final phase is to determine what decisive action should be taken, based on the what's been learned, understood and developed in the previous phase. It's about implementing solutions or strategies to address the identified issues or seize opportunities. Tangible results or improvements based on actions taken that should be taken, along with feedback that can inform future scanning and focusing.

Activity #5 – Constraints!

Time, money and staffing are ALWAYS a consideration

Participants were given 20 minutes to complete the activity.

Each group was asked to select their two strongest ideas from the previous activity and identify actionable steps to implement them — including what needs to be done, who is responsible, and a timeline for completion.

Summary of Results:

How might we re-design the current funding paradigm for organizations or individuals navigating it so that its utility is maximized? (Blue Team)

- A database software platform will be developed to connect industry partners with appropriate funding opportunities. This initiative would involve collaboration between DAIR and NGen to create a centralized landing page, which would be maintained by students. The site will feature a concierge-style tool designed to guide users toward the most relevant funding options. With proper coordination, this project is expected to be completed within a year.

- A dedicated program website will be launched to provide live links to active funding programs from both industry and academia, such as MITACS. To further support applicants, the site will incorporate an AI-powered tool that assists in writing grant or funding applications. This resource aims to streamline the application process and improve access to funding opportunities, with a projected completion timeline of one year.

"How might we re-design collaboration among government, industry, and academia for the aerospace sector so that shared goals and priorities are better aligned?" (Green Team)

This eager group of rogues (seems there's at least one in every workshop) were able to combine two of their ideas into a single one during their deliberation.

- Each partner would maintain a physical presence at the other's site – industry representatives on campus and faculty/students at company locations, creating their own centres of innovation within. This could be implemented quickly, as space is typically easy to accommodate.

How might we re-design the discovery and engagement process between industry and academia for both parties, so that the right connections are made more quickly? (Red Team)

- A library of solved problems and past failures could be developed and made easily accessible to all participants. This resource would serve as a valuable knowledge base, helping teams avoid repeating previous mistakes and enabling them to build on existing solutions. The DAIR team – focused on industry and academic liaison – along with Media & Communication, would be responsible for curating and maintaining this ongoing initiative. This could be accomplished within 12 months.
- The current proposal process could be eliminated and replaced with a token-based system. Each applicant would receive 10 tokens to initiate up to 10 projects. If a project is unsuccessful, a token is lost; if successful, additional tokens would be awarded, creating an incentive-driven framework. Oversight would be provided by an auditor from the "central bank of tokens," ensuring transparency and accountability. This transformation would be expected to roll out over a two-year period.

How might we design a standard intellectual property (IP) agreement for industry and academia so that their mutual benefit is satisfied? (Yellow Team)

- To promote consistency and clarity in IP management across academic institutions and industry, a standardized template using uniform language for all IP models should be developed and adopted. This template would provide clear definitions, ownership terms, commercialization pathways, and licensing guidelines to reduce ambiguity and streamline collaborations between academia and external partners. The responsibility for drafting, reviewing, and approving this standard template would rest with a centralized academia committee composed of representatives from various institutions. The implementation of this initiative is expected to take approximately 2-3 years, accounting for stakeholder consultations, legal review, and institutional alignment.
- In parallel, a standardized collaboration agreement modeled after the CRIAQ framework should be developed to facilitate smoother partnerships among academic institutions, industry players, and government agencies. This model agreement would define roles, responsibilities, data sharing protocols, and IP terms in a way that supports efficient and mutually beneficial collaborations. National or regional associations would lead the development and deployment of this agreement, leveraging the proven structure of the CRIAQ model. With focused coordination, this standardized agreement could be implemented within 2 years.

Conclusion

DAIR brought together their members and partners from the Innovation Network to embark on an exclusive Design Thinking Workshop to better understand the barriers to further collaboration and innovation within the aerospace sector. The workshop participants represented industry (companies of all sizes), academia (colleges and universities), and not-for-profit organizations.

The open discussions, sharing of processes and a collective willingness to collaborate in rolling up the sleeves was incredible to see. The entire day provided everyone with many insights and enabled the groups to move further forward in finding those solution roadmaps for the next steps as we continue to ease the ability for all within the aerospace industry to collaborate.

Thank you to the participants

DAIR would like to thank all the individuals who came to the Design Thinking Workshop for their passion and willingness to openly share their knowledge and experience during the discussions. Your commitment to the process contributed to solution roadmaps that can be explored and actioned to further enable collaboration within the aerospace ecosystem.

Industry	SME	Academia	Associations	Ecosystem Contributor
Collins Aerospace	A. Berger Precision Ltd.	Centennial College	Canadian Council for Aviation & Aerospace	Federal Economic Development Agency for Southern Ontario
De Havilland Aircraft of Canada	Avion Technologies Inc.	Humber Polytechnic	Ontario Aerospace Council	Mitacs
Héroux-Devtek	BMP Metals	McMaster University	Trillium Network for Advanced Manufacturing	Murisphere Solutions
MHI Canada Aerospace	Coordinate Industries Ltd.	Toronto Metropolitan University	Women in Aerospace Canada	Next Generation Manufacturing Canada
Siemens	HEBE Hydrogen	University of Toronto		
	NWI Precision	University of Waterloo		
	RAMPF Composite Solutions, Inc.			
	Shimco			
	Solid UltraBattery			
	Vac Aero International Inc.			

If you would like to participate in future workshops and are not yet an Innovation Network partner, please click here for further details.

APPENDIX

Summary of Workshop Discovery

Collaboration between aerospace industry and academia is key for accelerating innovation, solving complex engineering problems, advancing technology, and preparing a skilled workforce for the future:

- **Innovation and Research Advancements**: Academic institutions are hubs for cutting-edge research, often exploring foundational concepts that industry may overlook. Collaboration with academia enables the aerospace sector to access breakthroughs in areas like materials science, propulsion systems, alternative fuels, and data analytics, driving technological and design innovations.
- **Training and Talent Pipeline:** Universities and colleges educate and prepare the next generation of engineers, scientists, and professionals for the aerospace industry. Collaborative efforts offer students practical experience while providing the sector with a well-trained workforce familiar with the latest academic research and developments.
- **Access to Specialized Expertise:** Academic researchers possess deep expertise in niche areas that may not be available within the broader aerospace industry. By partnering with academia, the aerospace sector can leverage this specialized knowledge to address complex, high-level challenges.
- **Testing and Simulation Facilities:** Many academic institutions boast state-of-the-art laboratories, simulation environments, and testing facilities, enabling the testing of aerospace concepts without the need for costly, large-scale industry investments.
- **Long-Term Research and Development:** While the aerospace industry often focuses on short-term product development due to market demands, academia is better suited for high-risk, long-term research, such as next-generation materials or propulsion technologies. These may not be immediately commercially viable but are crucial for the industry's future.
- **Funding and Resources:** Collaborations can open doors to government and private sector funding aimed at fostering aerospace innovation. Academia's expertise in securing grants and other funding opportunities, combined with industry investment, accelerates progress in aerospace technology.
- **Problem-Solving and Real-World Applications:** Theoretical academic research can be applied to real-world aerospace challenges, ensuring practical relevance. At the same time, industry collaboration provides the context needed to ground academic research in the sector's specific needs.
- **Cross-Disciplinary Approaches:** Aerospace challenges require a multidisciplinary approach, integrating knowledge from fields like engineering, physics, materials science, and computer science. Academia often specializes in these disciplines, while industry offers a holistic view of how they intersect in practice. Collaboration fosters cross-pollination, resulting in integrated solutions.
- **Enhanced Problem-Solving and Innovation Ecosystem:** Collaborative efforts between academia and industry create a dynamic innovation ecosystem, where diverse perspectives generate novel solutions that might not emerge in isolation.