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TIMG 5205 Customer Value Creation in Technology Firms
Fall 2025: Technology Innovation Management program, Carleton University

Instructor:

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Class sessions:

Mondays, 2:35 pm – 5:25 pm Eastern time (Ottawa time)
Sept 3, 2023, to Dec 5, 2024
In Person: Nicol Building 5010
Online: <https://brightspace.carleton.ca/d2l/home/292117>

Office hours

The instructor will hold office hours by appointment. You should email the instructor to agree on a meeting time. In addition, the instructor is available via email at any time. Use email to inform the instructor of emergencies and request in-person or virtual appointments. Email is the preferred mode of communication as it keeps a record of the student-instructor exchanges.

Course description

TIMG 5205 Customer Value Creation in Technology Firms [0.5 credits]

Company value architecture and value propositions, design thinking and multiple stakeholder perspectives on value, new product and service design, digital value creation, technology and complementary assets, latent needs, co-design and user innovation, technology and business strategy alignment, user experience, and customer retention.

Prerequisites: TIMG 5001 and TIMG 5002.

Detailed course description

For companies to succeed in today's volatile, uncertain, complex, and ambiguous (VUCA) business environment, they need to manage a portfolio of value propositions as they create value for the customer, their suppliers, investors, employees, and other key stakeholders. This course will look at the value creation process as a system and explore how a firm can manage its portfolio of value propositions effectively. We will look at complementary perspectives on value creation through the commercialization of new technological products and services by new ventures and existing companies dealing with digitalization or focusing on the digital transformation of their businesses.

The first perspective focuses on familiarizing with key practical insights emerging from the latest research on value proposition development and business model design, focusing on shaping the portfolio value propositions to customers and all other relevant business stakeholders. This is a multiple-stakeholder perspective incorporating the contributions of the latest value proposition and business ecosystem research.

The second perspective focuses on value creation enabled by the adoption of quantum technologies by new or existing companies.

The third perspective is based on a value creation approach emerging from the experience of professional designers. Instead of describing entrepreneurs' abilities to generate solutions, it introduces the practices of expert designers who explore new solutions and value propositions by examining problem situations. These practices are structured as a process which is known as “framing.” The course will describe the key steps of the frame creation process and clarify how the principles and practices behind these steps could complement the value proposition development processes of new ventures and young companies interested in scaling early and rapidly.

Objective

The course aims to enable students to acquire the proper competencies (attitudes, knowledge and skills) for adopting a proactive approach to customer value creation and problem-solving in the emerging digital era.

Upon course completion, participants will be able to:

- Summarize key insights from research on the interface of business ecosystems and VP development.
- Apply frameworks to identify and define good opportunities in digitally connected business environments.
- Examine a company's focus on digital assets and transform the challenges associated with VP development.
- Summarize the key insights and main steps of the frame creation design approach.
- Apply the frame creation approach to shape solutions to open, complex, dynamic, and networked problems.
- Articulate the challenges of conceptualizing value in the context of organizations interested in digitally transforming their businesses.
- Articulate business insights for new ventures and young companies interested in developing the upstream and downstream capabilities needed to create and capture value in the current business environment.

Main class readings

The list of references at the end of this course outline provides information about suggested or recommended readings. Articles can be accessed and downloaded through the CU Library Online Catalogue using the student's access privilege. All the materials that are not accessible through the CU library will be provided by the Instructor or by the Guest Speakers.

Administrative details

The instructor expects students to:

- Be prepared for each class and fully participate in all classes.
- Show up to class on time.
- Deliver professional-quality work (i.e., your work should be articulated, influential, organized, and free of spelling errors, poor grammar, inconsistent formatting, and other mistakes).
- Submit assignments that meet requirements on time.
- Comply with the university's [academic integrity standards](#) (e.g., will not plagiarize).

- Work respectfully and collaboratively with others.
- Interact with peers and the instructor to produce new knowledge.
- Send and respond to emails concisely, reliably, and promptly.
- Complete individual work independently.
- Deliver excellent presentations. An excellent presentation is clear, concise, insightful, and completed within the allotted time.
- Take initiative to complete tasks that contribute to the group's needs related to the group assignments.
- Arrive prepared for team meetings.
- Work through adversity and disagreement while maintaining a positive and respectful mindset (towards others and oneself).
- Deal with uncertainty productively.
- Manage time by scheduling course deliverable due dates and requisite study time into their calendar.
- Not permit (i.e., not allow) or freeloader for team projects or group work.

Assignments

The instructor marks all assignments himself. Late assignments are not acceptable. All assignments are required to complete the course. There is zero tolerance for freeloaders in group work. The best way to deal with freeloaders is to not include their names in the group assignment presentations or reports' first slide ("cover page"). If a student's name does not appear in an assignment submitted by his or her group, the student must submit the assignment on his/her own. A student failing to do so will receive a zero for the assignment.

Assignment	%	Delivery date
<p>Group Assignment # 1. Disruptive vs Sustaining innovation potential of the value propositions of quantum technology companies</p> <p>The objective of this group assignment is to assess the disruptive potential or the type of innovation associated with the value proposition of a quantum technology startup. Each group should select a quantum technology startup preferably from the clients of Quantacet (a Canadian Quantum Venture Firm): https://www.quantacet.com/en/clients/, and:</p> <ul style="list-style-type: none"> • Use all possible public information to provide a description of its type of business, product or service, target customer(s), the key benefits to target customer(s), the status of product development and/or time to market, way of using quantum technology in shaping the market offer, the key partners, activities and resources enabling the delivery of the product/service to the target customer(s), price attractiveness, competitive positioning with respect to alternatives, etc. • Select a VP framework that could best describe the key elements of its value proposition and provide a narrative describing the value proposition • Assess the disruptive potential, the type of innovation and ways of enhancing the attractiveness of the value proposition to target customer(s). • Assess the quality if the information provided on the company website in terms of its capacity to articulate company's VP <p><u>The deliverable of Assignment 1</u> is a ppt presentation demonstrating how well you have appropriated and applied the knowledge acquired in class referring to VP frameworks, types of technological innovations, disruptive innovation theory and ways of enhancing the attractiveness of company value propositions to target customers. The grading of the assignment will be based on the breadth of your analysis, the quality of your analytical</p>	30%	Monday, October 27 th

insights, the visual formatting of the presentation and, finally, your presentation skills. Presentations should take no more than 12 min and no more than 15 slides. Each group is free to decide who of the group will present.		
<p>Group Assignment # 2. A value lab approach to the development of an entrepreneurial strategy.</p> <p>The purpose of this group assignment will be to:</p> <ul style="list-style-type: none"> Get deeply familiarized with the Value Lab approach to the development of an entrepreneurial strategy suggested in the articles (and the references therein): <ul style="list-style-type: none"> Felin, T., & Zenger, T. 2009. Entrepreneurs as theorists: on the origins of collective beliefs and novel strategies. <i>Strategic Entrepreneurship Journal</i>, 3(2), 127-146. https://doi.org/10.1002/sej.67 Felin, T., Gambardella, A., & Zenger, T. 2021. Value Lab: A tool for entrepreneurial strategy. <i>Management and Business Review</i>, 1(2), 68-76. https://mbrijournal.com/2021/11/03/value-lab-a-tool-for-entrepreneurial-strategy/ Apply the Value Lab approach to the company you examined in Assignment 1 or to another technology-driven company of your choice. Formulate key insights about/for the company and articulate the lessons learned from your experience using the Value Lab approach. <p><u>The deliverable of this assignment</u> is a ppt presentation demonstrating how well you have internalized the key elements of the Value Lab approach and applied them to the selected company, highlighting the critical insights about/for the company, and the lessons learned from your experience using the Value Lab approach. The grading of this assignment will be based on your ability to articulate the logic of the Value Lab approach, the value of its application to your company of choice, the quality of your analytical insights, the visual formatting of the presentation and, finally, your presentation skills. Presentations should take no more than 12 min and no more than 15 slides. Each group is free to decide who of the group will present.</p>	25%	Monday, November 10 th
<p>Group Assignment # 3. Frame creation approach</p> <p>Identify an open, complex, dynamic, and networked problem and apply the Frame creation approach (Dorst, 2015, <i>Frame Innovation</i>) to articulate an entrepreneurial opportunity, suggest a solution, formulate a compelling portfolio of value propositions to all relevant stakeholders that could become the basis of a viable business model. The main deliverable is a set of ppt presentation slides and a 5-minute (approximately) video providing a summary of your reflections. The ppt presentation slides should include no more than 20 slides. In your video and ppt slides, you should explain why the problem is open, complex, dynamic, and networked and apply the key steps of the frame creation approach: problem archeology, problem paradox, context, field, themes, frames, and futures. Finally, you should discuss entrepreneurial opportunities, suggest potential solutions, and formulate a compelling portfolio of value propositions to the key players within the minimum viable network of stakeholders. There will be no formal presentation in class. Each group should upload the video and the ppt presentation to the assignment folder on Brightspace.</p>	25%	Friday, Dec. 5 th by 11:59 pm
Take-home exam (individual): Will be provided by the instructor on the last day of class	20%	Saturday, Dec. 20 th by 11:59 pm

Class schedule

Session	Date	Topic	Assigned readings & class activities
1	Monday, Sept 8	<ul style="list-style-type: none"> Course introduction and review of assignments Value creation as a system – a portfolio view Group formation 	<ul style="list-style-type: none"> Course outline Kelly, S., Johnston, P. & Danheiser, S. (2017). <i>Value-ology: Aligning Sales and Marketing to Shape and Deliver Profitable Customer Value Propositions</i>. Ch1: What is value? Almquist, E., Senior, J., & Bloch, N. (2016). The Elements of value: Measuring—and delivering—what consumers really want. <i>Harvard Business Review</i>, September 2016, 46-53. Lessons from design, Ch. 1 in Dorst (2015). <i>Frame Innovation</i>. Interview with Michael J. Lanning on Value Proposition (& Value Delivery), (2019). <i>Journal of Creating Value</i>, 5(2), 237-241. https://doi.org/10.1177/2394964319890508 Bova, F., Goldfarb, A., & Melko, R. (2023). The Business Case for Quantum Computing. <i>MIT Sloan Management Review</i>
2	Monday, Sept 15	<ul style="list-style-type: none"> Finalizing group formation Value proposition frameworks Deconstructing the value proposition of an exemplar firm 	<ul style="list-style-type: none"> Payne, Frow & Eggert (2017). The customer value proposition: evolution, development, and application in marketing. <i>Journal of the Academy of Marketing Science</i>, 45(4): 467–489. Eggert, Ulaga, Frow & Payne (2018). Conceptualizing and communicating value in business markets: From value in exchange to value in use. <i>Industrial Marketing Management</i>, 69: 80–90. Payne, A., & Frow, P. (2014). Deconstructing the value proposition of an innovation exemplar. <i>European Journal of Marketing</i>, 48(1/2): pp. 237–270. Payne, A., Frow, P., & Tanev, S. 2021. Interview: Discussing Value Proposition Research in the Context of New Companies Committed to Scaling Early and Rapidly. <i>Technology Innovation Management Review</i>, 11(4): 6-12.
3	Monday, Sept 22	<ul style="list-style-type: none"> Introduction to the fundamentals of quantum technologies Value creation potential of quantum technologies The Quantum economic advantage 	<ul style="list-style-type: none"> Bova et al. (2023). The Business Case for Quantum Computing. <i>MIT Sloan Management Review</i>. Groenland, Koen (2025). <i>Introduction to Quantum Computing for Business</i>. Müller & Greinert (2024). <i>Quantum Technologies for Engineers</i>. Polkinghorne (2002). <i>Quantum Theory: A Very Short Introduction</i>. Purohit et al. (2024). Building a quantum-ready ecosystem. <i>IET Quantum Comm</i>. 5(1): 1-18
4	Monday, Sept 29	<ul style="list-style-type: none"> Disruptive innovation theory Classifications of technological innovations Value propositions for disruptive technologies 	<ul style="list-style-type: none"> Antonio et al. (2024). Enacting disruption. <i>Int. J. Entrep. Behavior & Research</i> 30 (4): 885–915. Christensen et al. (2018). Disruptive innovation: an intellectual history and directions for future research. <i>Journal of Management Studies</i>, 55(7), pp. 1043-1078, Gans J. (2020). To disrupt or not to disrupt? <i>MIT Sloan Management Review</i> 61(3): 40-45.

5	Monday, Oct 6	<ul style="list-style-type: none"> Guest speaker: Martin Laforest, Quantacet Ecosystem view of value creation and capture 	<ul style="list-style-type: none"> Materials provided by Guest Speaker Bailetti, T., Tanev, S., & Keen, C. (2020) What Makes Value Propositions Distinct and Valuable? <i>Technology Innovation Management Review</i>, 10(6): 14-27. Adner, R. (2017). Ecosystem as structure: An actionable construct for strategy. <i>Journal of Management</i>, 43(1), 39-58. Adner, R. (2012). Ch. 4 in: <i>The Wide Lens</i>: https://ronadner.com/book/the-wide-lens/ Adner, R. (2021). <i>Winning the Right Game</i>: https://ronadner.com/book/winning-the-right-game/
	Monday, Oct 13	No classes	Thanksgiving
	Monday, Oct 20	No classes	Fall break
6	Monday, Oct 27	<ul style="list-style-type: none"> Group presentations of Assignment 1 	<ul style="list-style-type: none"> Group presentations of Assignment #1
7	Monday, Nov 3	<ul style="list-style-type: none"> Group work on Assignment 2 	<ul style="list-style-type: none"> Q & A about Assignment 2
8	Monday, Nov 10	<ul style="list-style-type: none"> Group presentations for assignment 2 	<ul style="list-style-type: none"> Group presentations of Assignment #2
9	Monday, Nov 17	<ul style="list-style-type: none"> The Frame creation approach to value proposition development Q&A about Assignment 3 	<ul style="list-style-type: none"> The Frame Creation Model, Ch. 4 in Dorst (2015). <i>Frame Innovation</i>. The Principles and Practices of Frame creation, Ch. 5 in Dorst (2015). <i>Frame Innovation</i>. The Three Challenges of Frame Innovation, Ch. 7 in Dorst (2015). <i>Frame Innovation</i>. The Art of Frame Innovation, Ch. 8 in Dorst (2015). <i>Frame Innovation</i>. Dorst, K. (2015). Frame Creation and Design in the Expanded Field. <i>She ji The Journal of Design, Economics, and Innovation</i> 1 (Autumn): 22-33.
10	Monday, Nov 24	<ul style="list-style-type: none"> Guest speaker: Nilufer Erdebil, CEO of Spring2 Innovation Q&A about Assignment # 3 	<ul style="list-style-type: none"> Materials will be provided by the Guest Speaker
11	Monday, Dec 1	<ul style="list-style-type: none"> Frame creation case study Assignment # 3 group work 	<ul style="list-style-type: none"> Video recording provided by the instructor Group work on Assignment # 3
12	Friday, Dec 5	<ul style="list-style-type: none"> Finalizing Assignment # 3 	<ul style="list-style-type: none"> Delivery of Assignment # 3

Delivery of Take-home exam on Brightspace: Saturday, Dec. 20th by 11:59 pm.

References

Recommended books

Adner, R. (2012). *The Wide Lens. What Successful Innovators See That Others Miss*. Portfolio.

Adner, R. (2021). *Winning the Right Game: How to Disrupt, Defend, and Deliver in a Changing World*. MIT Press.
<https://ronadner.com/book/winning-the-right-game/>

Bock, A. & George, G. (2018). *The Business Model Book. Design, Build and Adapt Business Ideas that Drive Business Growth*. Pearson Education: <http://www.bizmodelbook.com/>.

Dorst, K. (2015). *Frame Innovation: Create New Thinking by Design*. MIT Press

Dorst, K., Kaldor, L., Klippan, L., & Watson, R. (2016). *Designing for the Common Good. A Handbook for Innovators, Designers and Other People*. BIS Publishers.

Eben, Jeff (2022). *Value Creation Technology: A Process for Minimizing Risk & Maximizing Return on Emerging Technology*. Jeff Eiben.

Kelly, S., Johnston, P. & Danheiser, S. (2017). *Value-ology: Aligning Sales and Marketing to Shape and Deliver Profitable Customer Value Propositions*. Palgrave Macmillan.

Rogers, D. (2023). *The Digital Transformation Roadmap. Rebuild Your Organization for Continuous Change*. Columbia University Press.

Ross, J., Beath, C., & Mocker, M. 2019. *Designed for Digital. How to Architect Your Business for Sustained Success*. Cambridge, Massachusetts: The MIT Press.

Weill, P., & Woerner, S. (2018). *What's Your Digital Business Model? Six Questions to Help You Build the Next-Generation Enterprise*. Cambridge: Harvard Business Review Press.

Quantum technologies

Bova, F., Goldfarb, A. & Melko, R. (2021). Commercial applications of quantum computing. *EPI Quantum Technology* 8, 2 (2021). <https://doi.org/10.1140/epjqt/s40507-021-00091-1>

Bova, F., Goldfarb, A., & Melko, R. (2023). The Business Case for Quantum Computing. *MIT Sloan Management Review*: <https://sloanreview.mit.edu/article/the-business-case-for-quantum-computing/>

Bova, F. & Melko, R. (2025). The Economics of an Open-Source Quantum Computer.
<https://arxiv.org/abs/2501.13315>

Bova, F., Goldfarb, A., & Melko, R. (2023) Quantum Economic Advantage. *Management Science* 69(2): 1116-1126. <https://doi.org/10.1287/mnsc.2022.4578>

Groenland, Koen (2025). *Introduction to Quantum Computing for Business*. Amsterdam University Press. Open Access: <https://introtoquantum.org/about>

Hughes, Ciaran, Joshua Isaacson, Anastasia Perry, Ranbel F. Sun & Jessica Turner (2024). *Quantum Computing for the Quantum Curious*. Springer Nature.

Müller, Rainer & Greinert, Franziska (2024). *Quantum Technologies for Engineers*. Walter de Gruyter.

Polkinghorne, John (2002). *Quantum Theory: A Very Short Introduction*. Oxford University Press.

Purohit, A., Kaur, M., Seskir, Z., Posner, M., Venegas-Gomez, A. (2024). Building a quantum-ready ecosystem. *IET Quantum Communication* 5(1): 1-18. <https://doi-org.proxy.library.carleton.ca/10.1049/qtc2.12072>

Articles on value propositions

- Adner, R. (2017). Ecosystem as structure: An actionable construct for strategy. *Journal of Management*, 43(1), 39-58.
- Almquist, E., Senior, J., & Bloch, N. (2016). The Elements of value: Measuring—and delivering—what consumers really want. *Harvard Business Review*, September 2016, 46-53.
- Bailetti, T., Tanev, S., & Keen, C. (2020). What Makes Value Propositions Distinct and Valuable to New Companies Committed to Scale Rapidly? *Technology Innovation Management Review*, 10(6): <https://timreview.ca/article/1365>.
- Dattée, B., Alexy, O., & Autio, E. (2018). Maneuvering in poor visibility: How firms play the ecosystem game when uncertainty is high. *Academy of Management Journal*, 61(2), 466-498.
- Eggert, Ulaga, Frow & Payne (2018). Conceptualizing and communicating value in business markets: From value in exchange to value in use. *Industrial Marketing Management*, 69: 80–90.
- Eggert, A. Kleinaltenkamp, M., & Kashyap, V. (2019). Mapping value in business markets: An integrative framework. *Industrial Marketing Management*, 79, May: 13-20.
- Holttinen, H. (2014). Contextualizing value propositions: Examining how consumers experience value propositions in their practices. *Australasian Marketing Journal*, 22: 103–110.
- Jacobides, M. G., Cennamo, C., & Gawer, A. (2018). Towards a theory of ecosystems. *Strategic Management Journal*, 39(8), 2255-2276.
- Interview with Michael J. Lanning on Value Proposition (& Value Delivery), (2019). *Journal of Creating Value*, 5(2), 237-241. <https://doi.org/10.1177/2394964319890508>
- Michael J. Lanning, (2020). Try taking your value proposition seriously - Why delivering winning value propositions should be but usually is not the core strategy for B2B (and other businesses), *Industrial Marketing Management*, 87: 306-308. <https://doi.org/10.1016/j.indmarman.2019.10.011>
- Payne, A., & Frow, P. (2014). Deconstructing the value proposition of an innovation exemplar. *European Journal of Marketing*, 48(1/2): pp. 237–270.
- Payne, Frow & Eggert (2017). The customer value proposition: evolution, development, and application in marketing. *Journal of the Academy of Marketing Science*, 45(4): 467–489.

Vladimirova, D. (2019). Building Sustainable Value Propositions for Multiple Stakeholders: A Practical Tool. *Journal of Business Models*, 7(1): 1-8.

Wouters, M., Anderson, J., & Kirchberger, M. (2018). New-Technology Startups Seeking Pilot Customers: Crafting a Pair of VPs. *California Management Review*, 60(4): 101–124.

Value propositions for disruptive technologies

Antonio, J., Schmidt, A., Kanbach, D., Meyer, N. (2024). Enacting disruption: how entrepreneurial ventures innovate value propositions to increase the attractiveness of their technologies. *International Journal of Entrepreneurial Behavior & Research* 30 (4): 885–915. <https://doi-org.proxy.library.carleton.ca/10.1108/IJEBR-07-2023-0688>

Bohnsack, R., & Pinkse, J. (2017). Value Propositions for Disruptive Technologies: Reconfiguration Tactics in the Case of Electric Vehicles. *California Management Review*, 59(4), 79-96.
<https://doi.org/10.1177/0008125617717711>

Khan, S. & Bohnsack, R. (2020). Influencing the disruptive potential of sustainable technologies through value proposition design: The case of vehicle-to-grid technology. *Journal of Cleaner Production*, 254, 120018:
<https://doi.org/10.1016/j.jclepro.2020.120018>

Disruptive innovation theory

Antonio, J. & Kanbach, D. (2023). Contextual factors of disruptive innovation: A systematic review and framework, *Technological Forecasting and Social Change*, 188, 2023, 122274:
<https://doi.org/10.1016/j.techfore.2022.122274>

Christensen, C.M., Raynor, M. and McDonald, R. (2015), “What is disruptive innovation?”, *Harvard Business Review*, Vol. 93 No. 12 (December), pp. 44-53.

Christensen, C.M., McDonald, R., Altman, E.J. and Palmer, J.E. (2018), “Disruptive innovation: an intellectual history and directions for future research”, *Journal of Management Studies*, 55(7), pp. 1043-1078, doi: 10.1111/joms.12349

Gans J. (2020). To disrupt or not to disrupt? *MIT Sloan Management Review* 61(3): 40-45.
<https://mitsmr.com/39NynT7>

Articles on entrepreneurial value creation

Boudreau, K. 2017. A Short Guide to Strategy for Entrepreneurs. *Harvard Business Review*, Oct. 17, 2017:
<https://hbr.org/2017/10/a-short-guide-to-strategy-for-entrepreneurs>.

Davidsson, P. 2015. Entrepreneurial opportunities and the entrepreneurship nexus: A re-conceptualization. *Journal of Business Venturing*, 30(5), 674-695. <https://doi.org/10.1016/j.jbusvent.2015.01.002>

Davidsson, P. 2015. Youtube video “Entrepreneurial opportunities and the entrepreneurship nexus: A re-conceptualization”: <https://www.youtube.com/watch?v=dAmJWz2uKic>

Felin, T., & Zenger, T. 2009. Entrepreneurs as theorists: on the origins of collective beliefs and novel strategies. *Strategic Entrepreneurship Journal*, 3(2), 127-146. <https://doi.org/10.1002/sej.67>

Felin, T., Gambardella, A., & Zenger, T. 2021. Value Lab: A tool for entrepreneurial strategy. *Management and Business Review*, 1(2), 68-76. <https://mbrjournal.com/2021/11/03/value-lab-a-tool-for-entrepreneurial-strategy/>

Ketonen-Oksi, S., & Valkokari, K. (2019). Innovation Ecosystems as Structures for Value Co-Creation. *Technology Innovation Management Review*, 9(2), 25–35.

Latour, B. 2020. What protective measures can you think of so we don't go back to the pre-crisis production model? <https://www.versopolis.com/festival-of-hope/festival-of-hope/846/what-protective-measures-can-you-think-of-so-we-don-t-go-back-to-the-pre-crisis-production-model>

Payne, A., Frow, P., & Tanev, S. 2021. Interview: Discussing Value Proposition Research in the Context of New Companies Committed to Scaling Early and Rapidly. *Technology Innovation Management Review*, 11(4): 6-12. <http://doi.org/10.22215/timreview/1432>

Pinelli, M., Lechner, C., Kraus, S. and Liguori, E. 2022. Entrepreneurial value creation: conceptualizing an exchange-based view of entrepreneurship. *Journal of Small Business and Enterprise Development*, 29(2), 261-278. <https://doi.org/10.1108/JSBED-04-2021-0155>.

Pushpanathan, G., & Elmquist, M. (2022). Joining forces to create value: The emergence of an innovation ecosystem. *Technovation*, 115, 102453-.

Articles on frame creation

Dorst, K. (2015). Frame Creation and Design in the Expanded Field. *she ji The Journal of Design, Economics, and Innovation* 1 (Autumn): 22-33. <http://dx.doi.org/10.1016/j.sheji.2015.07.003>

Van Leeuwen, J., Rijken, D., Bloothoofd, I., Cobussen, E., Reurings, B., & Ruts, R. (2016). Thematic Research in the Frame Creation Process. Published in: *Service Design Geographies. Proceedings of the ServDes.2016 Conference*. Linköping Electronic Conference Proceedings 125 (2016) 352-364: https://ep.liu.se/en/conference-article.aspx?series=ecp&issue=125&Article_No=29.

Examples of Lists of Quantum Companies

<https://thequantuminsider.com/2023/12/29/quantum-computing-companies/>

<https://explodingtopics.com/blog/quantum-computing-startups>

<https://app.dealroom.co/lists/36190>

<https://www.seedtable.com/best-quantum-technology-startups>

<https://www.quantacet.com/en/clients/>

APPENDIX: ADDITIONAL INFORMATION

Course Sharing Websites

Materials created for this course (including presentations and posted notes, labs, case studies, assignments and exams) remain the intellectual property of the author(s). They are intended for personal use and may not be reproduced or redistributed without prior written consent of the author(s).

Group work

The Sprott School of Business encourages group assignments in the school for several reasons. They provide you with opportunities to develop and enhance interpersonal, communication, leadership, follower-ship and other group skills. Group assignments are also good for learning integrative skills for putting together a complex task. Your professor may assign one or more group tasks/assignments/projects in this course. Before embarking on a specific problem as a group, it is your responsibility to ensure that the problem is meant to be a group assignment and not an individual one.

In accordance with the Carleton University Undergraduate Calendar (p. 34), the letter grades assigned in this course will have the following percentage equivalents:

A+ = 90-100	B+ = 77-79	C+ = 67-69	D+ = 57-59	
A = 85-89	B = 73-76	C = 63-66	D = 53-56	
A - = 80-84	B - = 70-72	C - = 60-62	D - = 50-52	F = Below 50

Grades entered by Registrar: WDN = Withdrawn from the course; DEF = Deferred

Academic Regulations

University rules regarding registration, withdrawal, appealing marks, and most anything else you might need to know can be found on the university's website, here:

<http://calendar.carleton.ca/undergrad/regulations/academicregulationsoftheuniversity/>

Requests for Academic Accommodation

You may need special arrangements to meet your academic obligations during the term. For an accommodation request, the processes are as follows:

Pregnancy obligation

Please contact your instructor with any requests for academic accommodation during the first two weeks of class, or as soon as possible after the need for accommodation is known to exist. For more details, visit the Equity Services website: carleton.ca/equity/wp-content/uploads/Student-Guide-to-Academic-Accommodation.pdf

Religious obligation

Please contact your instructor with any requests for academic accommodation during the first two weeks of class, or as soon as possible after the need for accommodation is known to exist. For more details, visit the Equity Services website: carleton.ca/equity/wp-content/uploads/Student-Guide-to-Academic-Accommodation.pdf

Academic Accommodations for Students with Disabilities

If you have a documented disability requiring academic accommodations in this course, please contact the Paul Menton Centre for Students with Disabilities (PMC) at 613-520-6608 or pmc@carleton.ca for a formal evaluation or contact your PMC coordinator to send your instructor your Letter of Accommodation at the beginning of the term. You must also contact the PMC no later than two weeks before the first in-class scheduled test or exam requiring accommodation (if applicable). After requesting accommodation from PMC, meet with your instructor as soon as possible to ensure accommodation arrangements are made. carleton.ca/pmc

Survivors of Sexual Violence

As a community, Carleton University is committed to maintaining a positive learning, working and living environment where sexual violence will not be tolerated, and is survivors are supported through academic accommodations as per Carleton's Sexual Violence Policy. For more information about the services available at the university and to obtain information about sexual violence and/or support, visit: carleton.ca/sexual-violence-support

Accommodation for Student Activities

Carleton University recognizes the substantial benefits, both to the individual student and for the university, that result from a student participating in activities beyond the classroom experience. Reasonable accommodation must be provided to students who compete or perform at the national or international level. Please contact your instructor with any requests for academic accommodation during the first two weeks of class, or as soon as possible after the need for accommodation is known to exist. <https://carleton.ca/senate/wp-content/uploads/Accommodation-for-Student-Activities-1.pdf>

For more information on academic accommodation, please contact the departmental administrator or visit: students.carleton.ca/course-outline

Academic Integrity

Violations of academic integrity are a serious academic offence. Violations of academic integrity – presenting another's ideas, arguments, words or images as your own, using unauthorized material, misrepresentation, fabricating or misrepresenting research data, unauthorized co-operation or collaboration or completing work for another student – weaken the quality of the degree and will not be tolerated. Penalties may include; a grade of Failure on the submitted work and/or course; academic probation; a refusal of permission to continue or to register in a specific degree program; suspension from full-time studies; suspension from all studies at Carleton; expulsion from Carleton, amongst others. Students are expected to familiarize themselves with and follow the Carleton University Student Academic Integrity Policy which is available, along with resources for compliance at: <https://carleton.ca/registrar/academic-integrity/>.

Sprott Student Services

The Sprott student services office, located in 710 Dunton Tower, offers academic advising, study skills advising, and overall academic success support. If you are having a difficult time with this course or others, or just need some guidance on how to successfully complete your Sprott degree, please drop in any weekday between 8:30am and 4:30pm. Our advisors are happy to discuss grades, course selection, tutoring, concentrations, and will ensure that you get connected with the resources you need to succeed!

<http://sprott.carleton.ca/students/undergraduate/learning-support/>

Centre for Student Academic Support

The Centre for Student Academic Support (CSAS) is a centralized collection of learning support services designed to help students achieve their goals and improve their learning both inside and outside the classroom. CSAS offers academic assistance with course content, academic writing and skills development. Visit CSAS on the 4th floor of MacOdrum Library or online at: <https://carleton.ca/csas/>

Important Information:

- Students must always retain a hard copy of all work that is submitted.
 - All final grades are subject to the Dean's approval.
 - For us to respond to your emails, we need to see your full name, CU ID, and the email must be written from your valid CARLETON address. Therefore, in order to respond to your inquiries, please send all email from your Carleton CMail account. If you do not have or have yet to activate this account, you may wish to do so by visiting <http://carleton.ca/ccs/students/>
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