



# ACADEMIC CHALLENGE 2019

## ENGAGING STUDENTS IN THE WORLD OF STANDARDS

CSA Group is committed to engaging students and young professionals, the future leaders of our society, in the world of standards development. Standards have an enormous impact on safety and the environment, and they are vital to the global competitiveness of industry. The Academic Challenge connects students across multiple areas of study with the world of standards so they can discover how standards impact everyday life and how participating in standards development can positively impact their careers. In the process, students have the opportunity to bring new perspectives to the standards development community.

### Be Creative & Challenge the Status Quo

This is your chance to have your say on issues that impact the world around us!

Every year, we invite students like you to participate in the Academic Challenge and share their research and perspectives about industry practices or issues that are influenced by standards, and those that should be in future.

Challenge finalists, as selected by our judging panel, are fully sponsored to attend the CSA Group Annual Conference to present their project to our members and conference participants, who will vote on the winning presentation.

If you have a creative idea for a standard or a unique application of a CSA Group standard that can help make the world a safer and more sustainable place to live and work, then submit your application today.

### Eligibility

The Academic Challenge is open to registered, full-time students from:

- University Undergraduate Programs – Any discipline
- Community College Programs – Any discipline
- Private Training or Education Organizations (Post-Secondary) – Any discipline

*Applicants cannot hold a post-secondary degree.* The CSA Group Academic Challenge is open to undergraduate students enrolled in any post-secondary institution in Canada and the United States.

## Educational Institutions & Academics

The theoretical and applied principles of standards and standardization can be applied to an almost endless list of topics including safety, sustainability, technology, healthcare, engineering, design & delivery of services, management, and education.

The results from these projects will help CSA Group to better understand how the principles and practices of standardization are taught at your institution and to more effectively provide you with access to the information you need to keep your programs current and relevant. We believe that awareness of how and why standards are developed will give your students a competitive edge when competing for careers after graduation.

## Schedule – Key Dates

Intent to Submit	April 1, 2019
Submission Deadline	May 1, 2019
Finalists Notified	May 21, 2019
CSA Group Annual Conference	June 17 – 18, 2019

## Project Topics

Topics are limited only by your imagination – as long as the subject matter is relevant to standards development. You can submit a project as an individual or as a team of students (maximum 4).

Projects may take a very specific approach to a technology or standard, or consider broader issues and principles related to standardization. Your project could address questions or issues such as:

- The potential impact of new or modified standards on an established industry or on people working in that industry.
- The potential role of standards or standardization in any emerging industry, technology or other activity.
- The impact of new or established standards on worker or public safety.
- The role of standards or standardization in issues related to sustainability.
- Economic, political, or cultural barriers to development, implementation, or acceptance of standards.
- Strategies for increasing consumer, business, and government awareness of the importance of standards and standardization.
- The influence of standards on international trade and manufacturing.
- The expansion of standards or standardization into novel or even seemingly improbable areas.

## Submissions

An Academic Advisor must support the submission and provide necessary resources and coaching for the student(s) throughout all Challenge activities.

### Submission Requirements

1. An original academic paper with primary and/or secondary research components with specific quantitative and/or qualitative data and analysis, and a recommended course of action or recommendations outlining practical considerations for implementation.
2. A draft presentation deck that effectively addresses the topic, major findings and key recommendations.
3. A video of the student(s), demonstrating their presentation skills and abilities.

Given the broad spectrum of disciplines and range of potential subject areas, and to provide for various approaches in research, the general guideline for academic papers in terms of length (words/pages) is that the paper should be of a length and nature appropriate to the needs of

the topic. Papers should be formatted to provide for an effective review of the content with legible fonts, spacing, and margins. Charts, graphs, and pictures are encouraged where they support the quality of the paper. Papers must cite sources and provide necessary copyright attribution for charts/graphs/pictures.

The Academic Paper must be original and not previously submitted for a previous CSA Group Academic Challenge. If the paper is a substantial revision of a previously submitted paper, it may be submitted as long as notification of that fact is provided to CSA Group in the Notice of Intent for the current Challenge Program and describes the changes that have been made. CSA Group will determine whether the submission is considered eligible as an original paper.

Papers may be submitted in English or French.

The draft presentation (e.g. Powerpoint) is a supporting component. Finalists selected for the 2019 CSA Group Academic Challenge will have a maximum of 12 minutes to deliver their presentation. The presentation should demonstrate that the topic, major findings, and key recommendations can be effectively addressed within that time limit.

The video is a supporting component and is intended to demonstrate the student's speaking and presenting skills. The format and duration of the video clip(s) need only provide for a reasonable demonstration of these skills.

#### Intent to Submit

An Intent to Submit must be forwarded to CSA Group by April 1, 2019. The Notice of Intent form is available at [www.csagroup.org/challenge](http://www.csagroup.org/challenge), upon request by email [AC@csagroup.org](mailto:AC@csagroup.org), or through the CSA Communities Academic Challenge space <https://community.csagroup.org>

The following information is required:

<b>Student(s)</b>	Name(s) of students <ul style="list-style-type: none"> <li>• <b>Maximum of 4 students on a submission team.</b></li> <li>• Students commit to attend the CSA Annual Conference in Ottawa if their submission is selected as a finalist.</li> </ul>
<b>Academic Advisor(s)</b>	Name of Academic Advisor(s) <ul style="list-style-type: none"> <li>• An Academic Advisor must be identified.</li> <li>• Academic Advisor commits to coaching students throughout the Challenge activities.</li> <li>• Academic Advisor commits to attending the CSA Annual Conference if the student/student team submission is selected as a finalist.</li> </ul>
<b>Institution</b>	Name of academic institution
<b>Project Title &amp; Abstract</b>	<ul style="list-style-type: none"> <li>• Title and abstract that clearly indicate topic and focus of the project.</li> <li>• Examples of abstracts from previous Academic Challenge submissions are included with this package.</li> </ul>

Upon receipt of a Notice of Intent, detailed instructions for submission packages will be forwarded.

#### Submission Package

Submission packages must be forwarded to CSA Group by May 1, 2019. The package must include the following components:

1. Academic paper
2. Draft presentation – expected to be delivered within 12 minutes.
3. Video(s) demonstrating presentation skills of student/team members.

### Judging – Selection of Finalists

Submissions meeting all necessary requirements will be reviewed by a judging panel consisting of representatives from academia, government, and not-for-profit organizations. Three finalists will be selected by the judging panel based on criteria which particularly focus on the quality of the academic paper submitted.

Academic Challenge Finalists will be notified by May 21, 2019. Student(s) selected as Finalists are expected to present at the CSA Group Annual Conference in Ottawa and will receive detailed information about the presentation requirements and event. Costs are covered by CSA Group for all Academic Challenge Finalists and their Academic Advisor(s).

### Annual Conference & Challenge Champion

Finalists will present their projects during the CSA Annual Conference, June 17-18, 2019, in Ottawa, Ontario. The winning submission or Challenge Champion, is determined through the combined scores of the judging panel and voting results from conference participants based on the criteria noted below.

#### Conference Participants – Judging Criteria

- The value and relevance of standardization are evident in the paper and supporting presentation.
- The speaker(s) clearly present(s) and explain(s) their methodology and results.
- The conclusions and recommendations made are justified by their findings.
- The speaker(s) convince(s) the audience that the topic is interesting and relevant.

## Contact Us

For more information on the Academic Challenge, contact us today.  
Additional resources and communications are posted regularly in the Academic Challenge space in our CSA Communities.

☎ 416 747 4059

✉ [AC@csagroup.org](mailto:AC@csagroup.org)

🌐 [csagroup.org/challenge](http://csagroup.org/challenge)

## Examples of Submission Abstracts

### **The Salt of the Earth... Not Quite for our Sidewalks: Working towards a Sensible Salting Strategy and Standards**

Finalist(s): Erika Rodrigues  
Isabella Croft Richmond

Representing: University of Ottawa

We explore the economic efficiency and environmental sustainability of several rock salt alternatives and compare these to current de-icing methods implemented by the University of Ottawa. Using a cost-benefit analysis (CBA) to guide our suggested standards, the implementation of salt alternatives including beet juice, calcium magnesium acetate (CMA), magnesium chloride, and calcium chloride, which are mixtures that have been applied by several Canadian municipalities, are compared to current university practices using data on salt usage and costs, collected from previously published literature.

After estimating the direct costs and benefits of applying salt and the alternatives, as well as the indirect costs and benefits considering levels of environmental degradation and infrastructure corrosion associated with each product, we will show that the University of Ottawa stands to benefit from the implementation of standards on its winter de-icing practices. Through comprehensive research and analysis of our CBA, we propose that the University standardize the application rate of such products at a given average temperature, as well as standardize the type of equipment used to apply the product, as there are currently no standards on these factors of winter maintenance. In doing so, the University of Ottawa can benefit through cost-saving realizations that also fit within its long-term goals as an academic and community driven institution.

---

### **A Case for the Standardization of Preservative-Free Multidose Ophthalmic Drug Delivery Systems**

Finalist(s): Jack Song  
Yihan Shao  
Yihan Yao

Representing: McGill University

Keratoconjunctivitis sicca (KCS), also known as dry eye syndrome (DES), affects millions worldwide. Preserved artificial tears and corticosteroids remain as the basis of DES treatment, but little systematic work has been performed to understand the side effects of such preservatives. Fifteen papers were chosen for content and quality. Performance was compared using seven common indicators of patient comfort and ocular health. Statistically significant evidence on the harmful effects of BAC was found in virtually all studies. BAC-preserved medications were found to underperform compared to unpreserved forms. The authors recommend standardization of multi-dose delivery systems to eliminate the need for preservatives altogether.

---

### **Health Data Standards for Public Health Surveillance and Remote Monitoring Using Smart Home Technologies**

Finalist(s): Arlene Oetomo

Representing: University of Waterloo

As new technologies are developed and innovators dictate the standards for their innovations to follow, the result is a chaotic mix of poor inter-platform device integration. This project will explore the challenges in sharing health data information and explore how Smart Home technology data may be used for public health monitoring. One of the biggest issues relating to interoperability of devices is security; can the communications between different technologies be encrypted to avoid increasing the risks? We need to create standards that enable researchers to access data from multiple technologies for remote public health surveillance. The proposed standards must also comply with data privacy standards and make it easier for researchers to not only access, but to also integrate data from different sources.

### Facilitating CSA Z767 Compliance for a Small Business

Finalist(s): Andrew Kostruba  
Katie Marie Dritsas  
Kayla Musalem  
Kenny Wei

Representing: University of Toronto

This project was designed to support the rollout of the CSA Z767 Process Safety Management Standard in hopes of reducing the number of workplace incidents and fatalities in small businesses. According to Ministry of Labour studies and reports, most workplace fatalities occur in small businesses, and many of these incidents can be prevented by establishing proper process safety management systems. This project was created to enable small businesses in demonstrating compliance without requiring additional time, resources, or support.

This project includes an example CSA Z767 compliance document for a mock small business, "Basic Bleach Co.". This exemplar first started with the creation of a small business. Then, company documents, procedures, and structures were developed and subsequently organized in accordance with sections outlined in the standard. Finally, this exemplar was reviewed by academics and industry professionals and recommendations were implemented. The exemplar demonstrates that a simple, organized, framework provides small business with a starting point to tackle standard compliance. By encouraging companies to analyze their current structure, small businesses can identify points of improvement in their current processes. This may prevent workplace injuries, fatalities, and devastating financial losses for small businesses. By demonstrating explicit compliance and CSA certification, a company can also improve its reputation and attract additional customers.

Future recommendations for this project include making the exemplar available online with the CSA Z767 Standard to ensure more businesses are engaged. Future directions for this project are to create similar exemplar documents for other standards in various industries.

---

### The Role of the CSA A3000 Compendium in the Context of Sustainable Development

Finalist(s): Antoine Lamontagne Dalphond  
Hugo Houde Brouillette  
Anthony Côté  
Raphael Gosselin

Representing: Université de Sherbrooke

Although today's industries mainly care about the profitability of their projects, the concept of sustainable development and reduction of environmental impact is becoming more and more important to them. Cement and concrete industries don't make exceptions. Nearly 4.1 billion tons of cement are produced annually and they generate about 7% of global greenhouse gas emissions (GHG). Cement consumption is therefore at the center of socio-economic and environmental issues. This can be reduced by the CSA A3000 compendium and the use of standardized supplementary cementing materials.

However, the limited availability of these cementitious materials lead to new environmental considerations because of the large transport distances required. The CSA A3004.E1 appendix allows the update of new alternative supplementary cementing materials that can be produced and consumed locally such as glass powder, biomass ashes, etc. It contributes greatly to the reduction of GHG and sustainable development.

To regulate the use of supplementary cementing materials, several recommendations can be considered. First, the standard method should be performance-oriented rather than being restricted to a prescriptive standard. In addition, to encourage the use of alternative supplementary cementing materials, their good performances and positive influence on the environment should be valued more with ecolabels, for example. Finally, adequate awareness and education also need to be made to future engineers and actors in the field of engineering.

### **The Need for a Canadian Standard for the Design of Emergency Response Vehicles and Equipment**

Finalist(s): Michelle Boileau  
Kayla Wierst

Representing: Centre of Research Expertise for the Prevention of Musculoskeletal Disorders (CRE-MSD), University of Waterloo

Paramedics play a crucial role in the healthcare system, providing an invaluable service to the public by providing timely pre-hospital emergency care. However, due to various adverse working conditions, paramedics have disproportionately higher rates of death, Musculoskeletal Disorders (MSD), fatigue, and mental health problems compared to other working sectors.

Many efforts have been put forth to improve the health, safety, and performance of paramedics; however, results have been suboptimal due to the lack of coordination between stakeholders. The lack of integration has resulted in paramedic work evolving over time with little consideration for whole system functionality. Although challenges vary daily, standardization of ground emergency response vehicles and equipment with ergonomic considerations could reduce injuries and errors, and improve workflow. To develop this standard, our research team is using a systems-based approach from the human-machine-environment systems model from an international standard (ISO 26800, 2011) as a guiding framework. Developing a CSA standard for emergency transport vehicles and equipment design will not only improve paramedic safety and patient care, but will also affect all levels of the paramedic system including the public, manufacturing, and procurement.

---

### **The Influence of Material Compliance on the Dynamic Response of a Hybrid III Headform**

Finalist(s): Lauren Dawson

Representing: University of Ottawa

The purpose of this study was to define the relationship of impactor compliance on the dynamic response of a Hybrid III headform. A monorail drop rig system was used to impact a Hybrid III headform using three different material anvils of Vinyl Nitrile (VN), Steel, and a Modular Elastomer Programmer pad (MEP) at a velocity of 3m/s and 4m/s where peak resultant linear and rotational accelerations were measured at the side impact location. The results showed that each anvil of differing material compliance created significantly different dynamic responses of the headform. Understanding the importance of anvil compliance in measuring the risk of concussive injuries requires a full understanding of the materials involved in head impacts. In some cases, increasing the compliance of the environment may result in an increase in the risk of concussion. Therefore, it is important to consider the compliance of the impact anvil when developing test standards to measure the ability of a helmet and other sports equipment to mitigate the risk of concussions. This is important as differing environments have an effect on compliance of the event and mechanism of injury for concussion.