FEATURE

Collecting reaction incident information: Engaging the community in sharing safety learnings☆

Q1 Every day unexpected incidents happen in the laboratory and each such incident provides experience that support the learning process. The basic premise of the Chemical Safety Library (CSL) project, undertaken by Q1 the Pistoia Alliance, is that these learnings should be shared with the wider community so that everyone who Q6 works in a lab has an opportunity to learn from those unexpected reaction outcomes. In this paper, we will discuss the importance of community sharing to promote safety, the conceptualization and implementation of the CSL project, the results since the launch of the CSL service, next steps, and some thoughts on how this data collection could be leveraged in the future.

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INTRODUCTION

Q1 Creating and maintaining a positive safety culture is challenging. When things go wrong we tend to blame the individual closest to the event, who is often the victim of the event. In reality, as described in the Chemical Q6 Safety Board's report on the Texas Tech event,[1] systemic process and organizational weaknesses also contribute to failure. Cultivating safety culture is a multifaceted process. To effectively catalyze cultural change, one must consider prevention, risk assessment, systems and processes continuous improvement, management of change, and engagement across the enterprise, from the individual practitioner to the most senior managers. Key to all efforts is promoting institutional knowledge, especially in environments with high turnover such as academia. To that end, we must start fostering and reward sharing of information Q1 and experiences.

THE ORIGINS OF THE CHEMICAL SAFETY LIBRARY PROJECT

It is this belief in the importance of sharing misadventures that drove the start of the Chemical Safety Library project.[2] We believe that incidents and near-misses happen every day, that prevention depends on knowledge of what has happened before, and that our colleagues are often our best teachers. However, it is difficult to find real-life insights because data is scattered in silos, lessons learned are easily forgotten, and even reported incidents are not readily discoverable in searches of the literature. But how to begin?

The originator of this safety data project idea decided to bring this challenge to the Pistoia Alliance,[3] a global, not-for-profit 501(c)(6) alliance of life science companies, technology vendors, publishers, and academic groups dedicated to improving life sciences R&D innovation and effectiveness through pre-competitive collaborative projects and other innovation activities. When presented with the project

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proposal, the Pistoia Alliance members felt this was an ideal opportunity for cross-industry collaboration and cooperation, and consequently established a project team to find a solution to this challenge.

THE CHEMICAL SAFETY LIBRARY MISSION AND PROJECT DEVELOPMENT

To start, the Pistoia Alliance *Chemical Safety Library (CSL)* project team reviewed the existing safety resources being used by their colleagues. An informal survey of the project team member companies found that their scientists were consulting a variety of sources, including reagent-based or literature based systems such as Material Safety Data Sheets, Bretherick's Handbook of Reactive Chemical Hazards, the Merck Index, and the ACS Chemical Abstracts Service Scifinder, as well as fellow colleagues. But they had little to no information on actual reaction incidents beyond their immediate group, a gap that was perceived to be significant and fillable through collaboration. The project team set itself the mission to capture and share such previously inaccessible reaction incident information, with the expectation that, if successful, such a collection would allow organizations to learn and avoid reaction incidents experienced by the wider community, enhancing overall laboratory safety.

The CSL is a real community experiment, because the team needed to validate: (1) that the wider community in fact is searching for experiential reaction incident information, and (2) that individuals in the community are willing and able to share such incident information. To that end, the team first needed a way to capture and disseminate the desired data.

PROTOTYPE DESIGNED AND DELIVERED

The team set about defining a simple data structure to capture the most important and relevant data elements describing a reaction incident. They also set down requirements for a prototype data entry and dissemination tool, focusing on creating a minimal viable product that would allow us to test the community readiness for such a resource.

Given the limited resources for the project building new code in a timely way was out of the project's scope, so the team looked to implement a system that preferably could be configured rather than built from scratch. Specifications included:

1. Offering online hosted access
2. Requiring user registration from public users, to support curation and validation efforts
3. Making key fields mandatory, to insure adequate incident description
4. Allowing for the collected data to be readily downloaded, moved and reused
5. Making curation and oversight straightforward
6. Allowing basic search
7. Leveraging existing reagent information during the data entry process

The team issued an RFP and selected the Biovia CISPro product. Over a couple of months, the tool was configured and tested by the team. The completed system was delivered as an online service, allowing users to enter an incident as well as download the entire collected data in a CSV file for further processing and use. A limited search functionality was also included upon release.

THE LAUNCH

The launch of the free Chemical Safety Library prototype service was announced via a press release on March 14, 2017.[4] The event was picked up by a number of publications, most relevantly *Chemical and Engineering News*[5] and *Chemistry World*.[6] Within 36 hours of launch over 300 account requests were received. By April 4th, when the authors presented this work at the 253rd American Chemical Society National Meeting and Exposition, there were over 600 registered users. By August 13, 2017 there were 852 registered users. The registrants spanned the globe and came from various institution types, primarily academia and corporate, but with some government and associations (Figure 1).

INCIDENT SUBMISSIONS

When the CSL service launched, the team had seeded it with 27 incidents. As of August 14, 2017, there were over 100 entered incident records. 89% of the data entered has come from Pistoia Alliance member companies. This is not surprising, since this project was initiated by this group, and internal outreach to members through regular newsletters, project updates, and member networking was sustained and frequent. 11% of the contributions are coming from non-member companies (Figure 2).

IS THE COMMUNITY READY?

The CSL experiment was meant to determine if the community needs and wants reaction incident information and if it is willing to share safety experiences to create that collection To date the broad interest in the prototype, across institutions and geographies, suggests that individuals around the world are in fact searching for such data sources. This suggests that the need is real. The jury remains out on the second: is the community ready to share its learning? The non-member contributions are encouraging, because it means we have been able to engage with individuals beyond our original member community. But we have also received feedback at conferences and through personal communication that indicates that some are uneasy about sharing such information.

Our ongoing informal survey of registrants suggest a variety of reasons people are hesitant. Some are simply embarrassed to expose their involvement in an incident. To that end, we have removed the names of the individual and company from the publicly available database, although we maintain the information internally for data integrity and validation

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