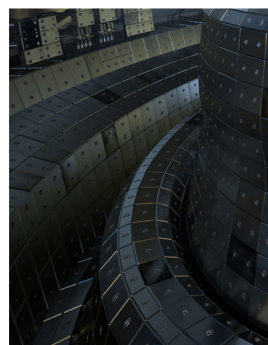
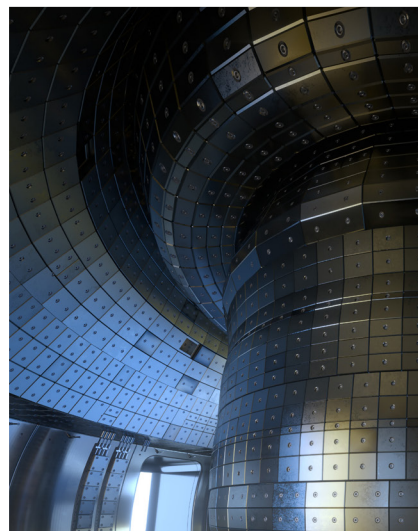
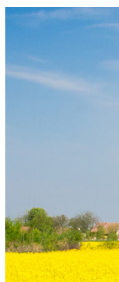


Learned Society Priority Topics

Update March 2022



Foreword

The Institution of Chemical Engineers (IChemE) is a not-for-profit, member-led learned society and qualifying body that advances chemical engineering's contribution worldwide for the benefit of society.

In 2020, we established our three learned society priority topics to provide direction for the learned society strategy, policy and activities. I'm excited to present the reviewed version – this update recognises achievements up to 2021, has been updated to reflect new trends, and will guide our work in 2022 and 2023.

Alexandra Meldrum, Vice President Learned Society

Background

One of the four aims in IChemE's Strategy is to be a vibrant learned society that materially impacts on the UN's *Sustainable Development Goals*¹ and the *Grand Challenges for Engineering*².

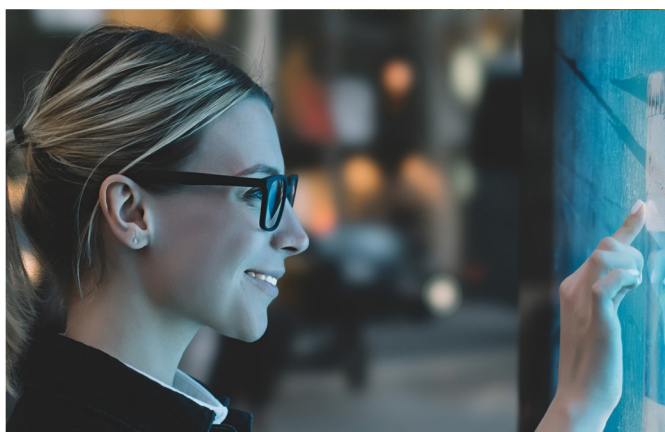
The Learned Society Committee has identified three priority topics for IChemE to focus on. This document sets out more detail of what the areas are, what we have delivered so far, and what we hope to achieve in the short term and within the context of *Strategy 2024*.

Delivery on all three priority topics is framed by *Chemical Engineering Matters*, IChemE's technical strategy, which will be reviewed and updated during 2022.

Our goals

We aim to be a peer group leader in:

- supporting responsible production across all areas in which chemical engineers are active – promoting good practices to deliver sustainable and ethical outcomes aligned with climate goals;
- advancing the understanding and application of major hazards management to contribute worldwide for the benefit of society;
- promoting the adoption and advancement of digital tools in processes, for economic and societal benefit.



Responsible production




As leaders, innovators and practitioners in essential industries including energy, water, food, health, resources, education and research, chemical engineers have a critical role in developing and promoting improved technologies for a just transition to a society which exists sustainably within recognised planetary boundaries. IChemE will share information and stimulate discussion to equip members to meet these challenges and enable policymakers and decision makers to make informed decisions based on sound engineering knowledge.

Major hazards management

We will continue to develop major hazards management knowledge and professional skills and promote the application of lessons learned and good practices to respond to both current and emerging challenges as industry, technology and society evolves.

Digitalisation

We will help members understand how digital tools affect chemical engineering professionals. The profession must adapt to digitalisation and capitalise on the widespread application opportunities in chemical engineering design, operations, process control and management. These tools include data analytics, machine learning, artificial intelligence, process control, automation, visualisation, digital twins and internet of things. We will build member awareness and understanding of the new tools, develop the next generation of chemical engineers at universities, and support members in lifelong learning for reskilling and upskilling. We will seek to develop member capabilities in the critical enablers for use of these tools including systems thinking, ethical and responsible leadership, and cyber security.

	2021	2022	2023
 Responsible Production	Climate change plans	Climate change action	Climate change action
	COVID-19 response	Sustainability Hub	Tools for delivering the circular economy
 Major Hazards Management	Student process safety diary	Full career process safety competence start	Full career process safety competence finish
	Incident database and LPB free to members	Lessons learned project	Cross-sector incident learning
 Digitalisation	Accreditation guidance input	Learning resources for all	Learning resources for all
	Digital Chemical Engineering journal	Digitalisation communications	Ethical use of digitalisation tools

Responsible Production means producing goods and services in an ethical and sustainable manner. For IChemE, it means promoting improved technologies which will minimise the societal and environmental impact of production and consumption cycles, particularly with regards to climate change, while improving the sustainability of the processes used.

Why is this important?

Chemical engineering is a major driver in advancing society. Climate change is a global threat that people around the world are urgently rallying to address.

Although chemical engineering has contributed to many of the most pressing problems of the day, it holds the key to addressing the same problems, through advancement and systems thinking that chemical engineering has at its core. The concept of responsible production drives an improved use of chemical engineering for the benefit of society. It recognises all forms of impact and detriments, and the need to avoid them, in a sustainable way, locally and worldwide when developing or adapting processes, products and activities undertaken.

Detriments include not only the technical aspects of challenges such as waste, climate change, economic and environmental damage, but also the societal impacts highlighted directly or indirectly by the majority of the UN's 17 *Sustainable Development Goals*.

The UN *Sustainable Development Goals* also highlight the need, within the role of responsible production, to consider consumption, security of supply, product safety and ethical engineering that encompass sustainability, action on climate change and supporting a move to net zero, systems thinking and life cycle assessment, process intensification/efficiency gains and the circular economy.

Achievements

- consulted with members and groups to formulate IChemE *Climate Change Position Statement*;
- engaged with special interest groups and other member groups to develop *Climate Change Action Plans*;
- attended and presented at COP 26;
- supported the launch of the journal, *Carbon Capture Science & Technology*;
- helped to identify suitable training materials on sustainability for reskilling and upskilling chemical engineers (available via the *Sustainability Hub* from 2022);
- enabled chemical engineers to work with other engineers, and advise policy and decision makers, to address COVID-19.

Plans for 2022 and 2023

- support and align the delivery of *Climate Change Action Plans* by IChemE groups;
- track and support the delivery of commitments under the IChemE *Climate Change Position Statement*;
- identify and enable the delivery of overarching themes from *Climate Change Action Plans*;
- support education and spread of good practice on sustainability through the *Sustainability Hub*;
- share good practice and practical advice on tools for responsible production and the circular economy;
- engage with others to support and deliver engineering input on the energy transition;
- continue to encourage delivery of projects aligned with responsible production through the communities of practice.



We seek to advance the understanding and application of major hazards management techniques to contribute worldwide for the benefit of society. We aim to be an acknowledged leader and influencer among professional institutions and beyond, recognised for enhancing and promoting process safety and risk management practices and skills.

We will deliver this by focusing on three areas:

People

Developing full lifecycle professional and technical competence, and leadership skills for both institution members and across relevant areas of industry, education and society in response to the challenges of today and into the future.

Practices

Establishing and applying tools and good practices for major hazards management, and promoting sharing and learning, to drive continual improvement.

Emerging challenges

Supporting members, industry and society in responding to current and emerging safety challenges for a sustainable future from the evolving technological and industrial landscape by adapting and developing knowledge, skills and tools.

Why is this important?

Management of major hazards has always been at the core of chemical engineering for both industrial activities and professional requirements. Although industry is evolving and new technologies are emerging, the fundamental principles of managing risk, and learning and improving, are enduring.

Achievements

- **People** – having established professional safety requirements, qualifications, and world class training courses, IChemE has now released a *Student Process Safety Diary* to capture practical experience, and developed a process safety workshop to support chemical engineering university students;
- **Practices** – to promote learning from incidents and application of good practices the *Loss Prevention Bulletin* is now available to all IChemE members, free of charge. The IChemE Safety Centre has also developed new guidance for application of process safety indicators and enhancements to HAZOP;
- **Emerging challenges** – potential hazards from emerging technologies and the energy transition have been incorporated into webinar programmes and IChemE volunteers are now working with several external institutions and other organisations on collaborative projects.

Plans for 2022 and 2023

- **People** – a project has been initiated to establish process safety competencies that chemical engineers require through the course of their careers, to be completed by 2023;
- **Practices** – a project to enhance the application of learning from incidents has been established, that aims to make better use of available information. Having identified key resources, the team will look at good practices for application in 2022 and cross sector learning in 2023;
- **Emerging challenges** – having established collaboration with various institutions and relevant cross-sector organisations, projects in the next two years will include natural hazards, new technologies and consistent application of good practices.



By raising awareness of digital technologies and improving members' capabilities in their responsible application, we will benefit IChemE members, the profession and society.

Why is this important?

Digital technologies are impacting how we do work and what we work on, and this change affects all of us.

The profession is changing due to the widespread application of new technologies previously mentioned, including, but not limited to technologies such as big data, machine learning, artificial intelligence, automation, process control, visualisation, and cyber security.

On top of that, the impact of using these new capabilities is leading to new digital ways of working. Examples include digital twins for process design, visualisation for remote assistance, big data for automatically detecting abnormalities and diagnosing causes.

Achievements

- established the Digitalisation Technical Advisory Group, an international, diverse group of IChemE members with digitalisation expertise, to provide leadership and advice;
- raised awareness of digitalisation across IChemE membership with articles in *The Chemical Engineer*;
- promoted the inclusion of systems thinking, artificial intelligence, security, and ethical leadership of digital technologies in IChemE accredited chemical engineering degrees;
- commenced engagement with member groups to raise awareness of digitalisation, encourage activity and align mutual strategy and activities;
- supported the launch of a new open access academic journal, *Digital Chemical Engineering*;
- published peer-reviewed interdisciplinary research across the domains of chemical engineering and digital sciences and technologies;
- supported the delivery of the 2021 virtual conference *Advances in the Digitalisation of the Process Industries*.

Plans for 2022 and 2023

- ongoing communications for growing member awareness and knowledge via IChemE publications, conferences, webinars and other digital resources;
- collaborate with key like-minded stakeholders to develop a suite of resources for university academics and students;
- identify and generate lifelong learning resources for all IChemE members to up-skill and re-skill for digitalisation, and make these available on our website;
- build awareness of cyber security and responsible and ethical use of digital technologies;
- ongoing dialogue and engagement with other relevant groups within IChemE such as special interest groups and communities of practice to drive the digitalisation agenda and collaborate to produce and share digitalisation content.

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