INSIDE THIS ISSUE:

Page 2 — Tony Francis FIMMM outgoing Chair of the MP&EM Board provides feedback on the activities of the division.

Page 3 — Update on the Technology Communities Board, TCB

Page 4 — Frances Perry Reports on the Library and Information Services.

Page 5 — Lulea 2019 Mineral Engineering Conference

Page 6 — IOM3 Members Survey

Page 7 — SGA Conference in Glasgow 27—30th August:
“The changing face of metal extraction - geology, biology and geometallurgy”

Page 8 — To Err is Human

Page 9 — Fe150 Conference

Page 10 — The Editor would like to hear from you; where in the world are you?

MP&EM is a technical division of the Institute of Materials, Minerals and Mining, Registered Charity No 269275, 297 Euston Road, London NW1 3AD  www.iom3.org
MP&EM Board Activities Summary, June 2019 for Newsletter Issue #`12

- After 8 years of Chairing the MP&EM Board which I have enjoyed immensely it is time to step down. It has been a privilege to serve the community of Minerals Processors and Extractive Metallurgists and work with such distinguished colleagues from Industry, Consulting and Academia. Professor Hylke Glass of Camborne School of Mines, Exeter University who many of you will know, is assuming the Chair and with his energy, intellect and enthusiasm will be advancing the Board onwards and upwards.

- 2019 is the 150 year anniversary of the founding of IOM3 through the Iron & Steel Society. The Division contributed, with the other Extractive Divisions, by arranging a one day event at 297ER on March 20 2019 called “The Iron Cycle - 150 years of extracting, processing & recycling the material that built the modern world”. There was a varied and topical programme with a very impressive list of distinguished speakers. The event web site is The Iron Cycle. The Conference was a success attracting more than 50 attendees, for a brief write up refer to page 9.

- Your Board is also contributing to the SGA Conference to be held in Glasgow on 27 – 30 August 2019 refer to - https://www.sga2019glasgow.com . This event is proceeding well with a full list of speakers and over 500 registrants so far. If you wish to attend this topical and interesting Conference proceed quickly to registration.

- The Board is in the early stages of organising “Future Prospects in Minerals & Metals” at Trinity Hall, Cambridge in 2020 and Geometallurgy2021 at a venue to be decided.

- The International Extractive Industry database “OneMine” is live and available as part of your membership benefits, this compliments IMMAGE. This is a valuable source of information and is free to members. It is always a surprise to me when I speak to members how many do not use it and in some instances, are even not aware of these resources.

- The Camborne School of Mines, Exeter University M Sc course in Minerals Engineering serving our Industry is underway with the first students, refer to - http://www.uec.ac.uk/csm/postgraduate-study/minerals-engineering/index.htm This is being continually developed and driven by your new chair, Professor Hylke Glass. Without trained engineers our industry has no future.

- Please check your member profile at www.iom3.org/user to make sure that you have the correct preference selected for your technical division. IMMa is no longer available as a preferred technical division, being an umbrella body for the four resources divisions. All members selecting one of the four resources divisions as their preferred technical community automatically become members of IMMa.

- The second Board meeting of 2019, and my last as Chair, was convened at 297 ER on 30 May with 7 members attending.

- The technical journal representing our discipline is IMM, Transactions C published by Taylor & Francis is free to download. The journal publishes high quality refereed papers at the leading edge of MP&EM, MP&EM Trans C

- The MP&EM annual report for 2018 is available to all IOM3 members from the web site.

- The CPD facility on the IOM3 web site is available for members.

Tony Francis MP&EM outgoing Chair.
New Technology Communities Board (TCB) Formation

The Institute is in the process of formally replacing the Industrial Technology Policy Board, ITPB, with the Technical Communities Board, TCB. This is part of the Institute’s strategy to modernise the administrative structure. The TCB will comprise a nominal 8 Strategic Advisors, SAs, in place of the more than 30 members of the ITPB which should result in more effective and communication and administration of the technical divisions of IOM3. This has been fully reported in your magazine, Materials World, and through the Institute’s web site.

It is of course critical that the TCB is representative of the 22 technical divisions, societies, groups and associations of which the MP&EM is one. To achieve this the TCB has been divided into 4 groups namely Life Cycle, Extractives, Materials and Applications. Each group represents a sector of the Materials Cycle and will comprise 2 SAs. The MP&EM is obviously in the Extractives group together with the Applied Earth Science (AES), Mining Technology Division (MTD) and Oil & Gas (O&G) divisions. The Natural Materials Association and the Wood Technology Society were originally included in the Extraction group although this is currently being discussed.

The SAs have been appointed and are:
Life Cycle — Cynthia Adu (Eng D student at Canfield University) and James Goddin (Market Development Manager at Granta Design)
Extractives — Andy Birtles (Mining Consultant at AMB Mining Ltd & MTD), Martin Cox (Director of Business Development at Aberdeen Drilling Management, O&G & Past President of IOM3)
Materials — Simon Hogg (Senior Lecturer in Materials at Loughborough University) and Sophie Parsons (Lecturer in Department of Mechanical Engineering, Bath University)
Applications — Bryon Allcock (CEO TRL9 Ltd) and Graham Ormondroyd (Head of Materials Research at the BioComposites Centre, Bangor University)

A key accountability of the SAs is to represent the communities making up the Materials Cycle in terms of discipline, sector, age and gender which, to a large extent has been achieved. The SAs are all volunteers in common with many other members, essential to the operation of the Institute.

A prime responsibility of the SAs are to stand for the Institute on contemporary significant Materials Cycle related issues in the public interest and will closely work with the Institute’s External Affairs Board. The technical divisions will carry on as before representing the interests of their constituents by, for example, arranging Technical Conferences, disseminating information and ensuring that career stewardship is provided through representation on the Institute’s and the Engineering Council’s professional advancement procedures including interview panels.

There has been lively discussions during this transformative process as it nears completion. One issue the Extractive sector divisions have put forward is renaming our group “Mining, Minerals & Petroleum”.

The final composition and organisation of the TCB will, in due course, be approved by Management Board and Council. This will be incorporated with the Institute’s governance changes awaiting formalisation by the Privy Council. It is hoped that this will coincide with the Institute’s AGM on 2 July at 297 Euston Road London to which all members are invited and encouraged to attend. All these developments in your Institute will be reported in Materials World. Good luck to the SAs and we look forward to news of their work.
Frances Perry Reports on the Library and Information Services of the Institute

Library and information services figured in the 150th anniversary issue of *Materials World* in May with a two-page spread on the early history of the various libraries (mainly Iron and Steel Institute and Institution of Mining and Metallurgy) plus snapshots of what the two library/information staff get up to. It may be worth looking at the online version of the issue, as it probably includes more original text or at least more illustration!

Normal activities continue, except that I’ve cut my working days from five to four per week and hence am only in the library now one day a week. There is still a steady stream of historians requesting photocopies or searches of the member lists, and more importantly there are still photocopy requests for technical literature coming in from overseas. We continue to add current technical references/abstracts to *IMMAGE*, while Katherine Williams is backlogging in entries from the 1949-1980 card catalogue – she’s finished Zambia and Peru and is now starting on Chile, although I haven’t yet authorised all the references as there’s quite a lot of checking to do. I still compile quarterly issues of *IMM Abstracts* from the *IMMAGE* records; March went to the printers in April and June is more or less on target.

Digitising continues, with the new Digital Library now live to members, please remember to look online at [https://iom3.captureweb.co.uk/](https://iom3.captureweb.co.uk/) to search the 1990s issues of *Trans. Instn. Min. Metall. C* that are added from week to week. You will need to register the first time you try, and access to the full papers is currently free to both members and non-members until we get the requisite software in place, so do encourage all your colleagues to take a look. If anyone is interested in early iron ore processing/smelting then you may also want to browse through the early (1869-1874, as well as 1969) issues of *J. Iron Steel Inst.*, for detailed descriptions of historical processes. We’re developing a separate Digital Library page for the IOM3 web site to make it more visible, as the current link is under “Latest News” on the [https://www.iom3.org/national-materials-and-mining-archive](https://www.iom3.org/national-materials-and-mining-archive) page and there’s nothing at all on the drop-down menus under either “Technical Information” or “Publications”.

The scanning of the second batch of publications is almost complete and the third batch has been ready to go to the scanners for a few months now. In MP&EM terms that means that when the IMM 1990s issues are finished I shall be adding keywords and abstracts to scanned entries from *Mining Engineer (Trans. IMinE)* issues from the mid-1980s to mid-1990s and then, when batch 3 is scanned, carrying on with the 1980s issues of *Trans. IMM*. It is important for MP&EM members to remember to check both *IMMAGE* and the Digital Library regularly for your technical information to demonstrate to the Institute its value and usefulness.

The results of the IOM3 member survey are interesting in highlighting the continued requirement by members for both paper and electronic journals and other publications, as well as for technical information services. We were particularly interested to see that the highest percentages ticking the “important” boxes for paper-based journals were the younger age-groups. We hope to see the results of the survey informing future policy on library and information provision. An analysis of the survey will be published in a future edition of *Materials World* and see page 5 of this newsletter.

There was no new edition of IMM Transactions C available when this newsletter was prepared.
Lulea 2019 Minerals Engineering Conference

Lulea Technical University (LTU) organise a conference in Minerals Engineering each year around the first week of February. Held in the City of Lulea, the conference attracts delegates from Scandinavia and farther afield. This year the countries represented were Sweden, Finland, Norway, Germany, Belgium, UK and South Africa. The conference always includes a mix of papers from mining companies/equipment manufacturers/academia and allows the delegates to enjoy the bracing sub zero temperatures and, if you want, a walk over the frozen sea.

The Conference comprised two full days of presentations with Herman Wotruba (RWTH Aachen University) gave the Keynote Address on Sensor Based Sorting and its Application in the Minerals Industry with 5 subsequent sessions themed around Mineral Characterisation and Geometallurgy, recent Projects (2 sessions) and Mineral Processing Technologies (2 sessions).

Papers are published at the Conference as Pre-prints and will be available in an electronic form from LTU after the end of March. The full contents list is provided below. If anybody has an interest in receiving a copy of any of these papers, please contact Chris Broadbent (cbbroadbent@wardell-armstrong.com).

Dr Chris Broadbent (WAI) in his capacity of FAME Coordinator, was invited to the 2019 Conference and presented an overview of the entire FAME Project but with emphasis on the two demonstration activities: the Pilot Plant Production of Lepidolite (Li-Mica) concentrates carried out at LNEG Portugal and the Tellerhäuser Pilot Plant for the mineral processing of Saxore’s Tellerhäuser Ore, work carried out at UVR-FIA in Freiberg, Saxony.

An update of 10 current UK mining projects was given by C Broadbent and C Blackmore in what was effectively a (partial) update of the successful MTD recent developments in the UK Mining Industry Conference held in London in Autumn 2017.

It is well worth attending this annual event, interesting papers given in intimate surroundings with lots of potential to network with the presenters and other delegates. Put first week of February 2020 in your diary to attend the next LTU organised Minerals Engineering Conference.
IOM3 Member Survey 2019 – Summary Results for Technical Divisions

Respondent demographics
78% of respondents were based in the UK, with 22% overseas; 56% of respondents were aged 55 years or more; 28% were 35 to 54. Overall 86% of respondents were male but in the 18 to 24 age group 41% were female. 33% of respondents were FIMMM and 38% MIMMM.

The Questionnaire
The first question on technical information and data achieved the highest aggregate R1/R2 (Very important/Important) score for any question in the survey

Business intelligence was also popular with an increasing aggregate R1/R2 score peaking at 83% for the 45-54 group, although the R1 scores for each group were in the 20 to 28% range.

Political and regulatory information had R1 scores in the teens for all groups, with R2 scores between 30 and 50%, with an aggregate high of 67% in the 45 to 54 group.

The responses to the question on websites had the highest aggregate scores in the Sources of Information section with evenly split R1 and R2 scores, although this tailed off from those 55+ and no R1 score was >48%:

The only media to achieve an aggregate R1/R2 score for any group >50% was LinkedIn, and this sunk below 50% for respondents 55+: Facebook received an aggregate score of 42% for the 18-24 group, reducing exponentially to 7% for those 65+. Likewise YouTube received an aggregate score of 40% for the 18-24 group, again reducing exponentially to 13% for those 65+. Twitter’s highest aggregate score was 24% for the 25-34 group; 56% of the 18-24 group rated it as ‘Not important’, which increased to 65% for the 45-54 group and 89% for those 65+.

The online updating of personal details and secure payment gateways achieved aggregate scores in the range 75 to 80% for groups up to 54. This reduced to 55% then to 45% for those older. Personalised content found favour with those 25 to 54 at 54%, but dipped to 40% for those 55-64 and 30% for those 65+.

Video content peaked at 43% for the 18-24 group, dropping to 16% for those 65+. However webinars on technical subjects grew in popularity from 65% for the 18-24 group, peaking at 75% for those 25-34, before dropping to 60% for those 35-54, and below 50% for those older.

Competent person recognition, (i.e. CEng) more commonly but erroneously known as Chartership, achieved the highest R1 – Very important scores in the entire survey for the 18-54 age groups.

Local societies achieved aggregate scores of 63% from the 18-24 group, 60% from the 25-34 group, and 55% from the 35-44 group. Thereafter, aggregate scores of 45% for both the 45-54 and 55-64 groups and 39% from those 65+.

Technical events held locally were scored most highly by the 18-24 group with an aggregate of 78%, similarly for the 25-34 group at 76% and 73% for those 35-44. Thereafter the aggregates dropped significantly to 65%, 51% and 41% for those 45-54, 55-64 and 65+ respectively.

Professional indemnity and other professional services found favour with 64% of the 18-24 group, but falling below 50% for those 45-54 (42%), reducing to 29% for those 65+.

Two activities stand out as being most frequently mentioned in the Free Responses section by all age groups:
• Industry site visits.
• Technical events of greater depth
15th Biennial Meeting of the Society for Geology Applied to Mineral Deposits
27 - 30 August, 2019

One of the biggest international mineral deposit conferences—~500 attendees

26th August, 2019 – Ice Breaker and Civic Reception from Glasgow City Council in the Hunterian Museum, University of Glasgow
27th August, 2019 – Plenary Session and Awards Ceremony in the Bute Hall, University of Glasgow
27 – 30th August, 2019 – Programme of talks and posters throughout the Victorian Gothic centre of the University of Glasgow
27th August, 2019 – Student-Industry Networking Event
29th August, 2019 – Gala Dinner, The Kelvingrove Art Gallery and Museum

The MP&EM Session — The changing face of metal extraction - geology, biology and geometallurgy
Keynote: Barrie Johnson, Julie Hunt
Conveners: Gawen Jenkin, Chris Broadbent, Chris Bryan, Shaun Graham

Grades and tonnages alone do not make a mineral deposit – to have mineable reserve requires inter alia that the target metals can be extracted from the ore economically. Thus the metallurgical processing of the ore is a key factor, yet historically has often been downplayed or even neglected by exploration geologists and geochemists. There is a growing trend that smaller deposits, lower grades, more complex ore mineralogies and a wider range of elements are being targeted at the same time that environmental concerns as to water and energy usage and environmental contamination are coming to the fore. This session seeks to bring ore geochemists, mineralogists and geologists together with ore metallurgists to explore new developments in metal extraction and ore metallurgy that will impact on the economics and environmental footprint of a deposit. We welcome contributions that address new approaches including solvometallurgy, bio-processing and geometallurgical characterisation of ore deposits, as well as developments in ore mineralogy and metallurgy.

Other Sessions:
Co-evolution of Life and Ore Deposits
Mineral resources for green growth
Advances in understanding hydrothermal processes
New Techniques for ore discovery
New discoveries – new views - Advances in the science of mineral exploration
Magmatic-hydrothermal systems: from Porphyry to Epithermal
Magmatic sulfide and oxide systems
Gold – from orogenesis to alluvial
Economics of ore deposits
Sustainable development of ore deposits
Supergene deposits, gems and non-metallic ores
Letter to the Editor:

Your editor has received a letter from one of our readers, Mr. Michael Walton, pointing out an error in the March issue of Materials’ World in which an article about Cobalt on pages 46-49 has data that is three orders of magnitude higher than reality, in the table Top of p47. This was duly passed on to the editorial staff who issued a correction in the next issue.

Figures obtained from an alternative source show significantly different data, see the Table below:

**Top 10 Cobalt producing Countries for 2017, from the Statista web site**

<table>
<thead>
<tr>
<th>Country</th>
<th>Annual Co Mine Production for 2017, Thousand Metric Tonnes</th>
</tr>
</thead>
<tbody>
<tr>
<td>DRC</td>
<td>73</td>
</tr>
<tr>
<td>Russia</td>
<td>5.9</td>
</tr>
<tr>
<td>Cuba</td>
<td>5.0</td>
</tr>
<tr>
<td>Australia</td>
<td>5.03</td>
</tr>
<tr>
<td>Philippines</td>
<td>4.6</td>
</tr>
<tr>
<td>Canada</td>
<td>3.87</td>
</tr>
<tr>
<td>Madagascar</td>
<td>3.5</td>
</tr>
<tr>
<td>Papua New Guinea</td>
<td>3.31</td>
</tr>
<tr>
<td>China</td>
<td>3.1</td>
</tr>
<tr>
<td>Zambia</td>
<td>2.9</td>
</tr>
<tr>
<td>Total</td>
<td>110.21</td>
</tr>
</tbody>
</table>

The Statista web page is [Statista Co Stats](https://www.statista.com)

Many technical and other specialist journals, books and news media make typographical and factual errors in their reporting, this is certainly not unique to Materials World, one refers to an edition of the King James Bible, The Wicked Bible, of 1631 which missed out a word in the 7th commandment and rather erroneously printed “Thou shalt commit adultery”!

I think the lesson here is check your sources, check and recheck the text and data and define your units.

To quote Ben Jonson “Success produces confidence; confidence relaxes industry, and negligence ruins the reputation which accuracy had raised”.

Please send in your news for the next edition of this Newsletter#13 (after the MPEM Board on 29th September 2019).

It does not have to be work related, news of your travels would be great whether

- Malaysia
- Portugal &
- England
- Morocco
The Institute is celebrating the 150-year anniversary of its foundation through the Iron and Steel Society, I&SS. The I&SS are leading the celebrations and a very full and fascinating series of events are planned which are being coordinated by the Institute. The extraction divisions contributed to the anniversary which included arranging this one-day Conference – “The Iron Cycle - Fe 150” which was held at the Institute’s London HQ on March 20th. The theme was “150 years of extracting, processing & recycling the material that built the modern world.” The Conference was hosted by Tony Francis, (left), Chair of the MP&EM Board and the programme included 14 high quality and fascinating presentations from distinguished authors representing the entire Iron Cycle from Exploration to final product disposal.

The Conference was sponsored by Behre Dolbear and Anglo American.

Iron and steel were the foundation of the Industrial Revolution with one of the major pathfinders being Sir Henry Bessemer and the process he invented for the mass production of steel in 1856 which remained the dominant technology for the next century. Steel alloys continue to be an essential material for modern life. The industrial revolution resulted in a colossal demand for iron ore. Initially the iron ore mines of the UK such as those in Northamptonshire met demand but domestic production was never going to be enough and this need was, and is, met by exploration geologists travelling the world to discover deposits some of which would become producing mines.

The extractive disciplines work together throughout the development of a mining project and not in isolation, indeed this collaboration is essential for a successful outcome of any project. Viable deposits have to be mined which require developing the mine plan, deciding on the mine type, the mining method, and the scale of operation. It is becoming common in today's world that economics are not the main deciding factor but that restrictions on obtaining permits and the “right to mine” can be overriding considerations.

Once the deposit has been discovered and mined the ore then has to be processed. Iron ore mines are usually very high tonnage operations treating millions of tonnes of material per year. The minerals processing unit operations in iron ore plants are based on 2 main properties of iron ore, its relatively high specific gravity compared to the waste material and magnetism. This has led to the development of separation methods such as hydro-cyclones, dense media separators and magnetic devices. The upgraded product from the minerals processing plant may then have to be dried and pelletised before being shipped to the steel works. Clearly the method of alloying and heat treatment are defined by the required properties of the innumerable products in terms of mechanical strength, corrosion resistance and application specified by the metallurgists. The three talks in the Conference covering the Minerals Processing and Extractive Metallurgy of iron ore were given by MP&EM Board members Dr Arun Vathavooran, Professor Vasant Kumar and Dr Christopher Broadbent.

The Oil and Gas Division of IOM3 is the fourth in the extraction group. This division represents those engineers who are dedicated to providing the world with oil and gas. This division provided three speakers who focussed on the use of steel in the onshore and offshore structures required for extraction and the environmentally responsible reclamation and recycling following the depletion of the corresponding reserves.

The finished production and use of the steel products was described by the I&SS. Dr Graham Couchman, CEO of the Steel Construction Institute covered the present status of steel in construction. Dr Jeremy Ramsden, Research & Technology Director, Henge Precision Materials gave a presentation focussing on the tremendous role of iron in the living world.

The very nature and versatility of steel imposed some overlap in the presentations and the Conference provided a great forum for sharing knowledge about the discovery, extraction, application and recycling of iron and steel in the modern era and on life itself, in fact the entire iron cycle. The Conference web site can be reached at Fe150.
We would like to hear from you!

We’re always interested in hearing from our members! If you would like to share a story, publish an article or just provide some feedback on the newsletter, please get in touch! All enquiries can be sent to our editor:

Mike Cave

Email: mikecavepyro@gmail.com

How do I join?

Individual membership of the MP&EM Division is achieved by joining the Institute of Materials, Minerals and Mining. You can join IOM3 online at www.iom3.org/join to get immediate access to member benefits, or you can complete our printed membership application form. For details of membership grades and professional qualifications visit: www.iom3.org/membership

Company membership: More information about Industry Affiliate membership and an application form are available at: www.iom3.org/ias