

2015 ANNUAL REPORT

Sustainable Minerals Institute



THE UNIVERSITY
OF QUEENSLAND
AUSTRALIA



Sustainable
Minerals
Institute

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Professor Peter Høj
*President and
Vice-Chancellor,*
The University of Queensland

UQ PRESIDENT AND VICE-CHANCELLOR'S REPORT

In introducing this 2015 annual report of The University of Queensland's Sustainable Minerals Institute, I would like to first congratulate all SMI staff, students, advisory board members and industry partners, who have demonstrated a capacity to not only respond to change, but also to lead it.

By recognising that a scheduled review of the Institute was timely and presented opportunities, you were able to use the panel's advice to inform decisions about the organisation's direction. These decisions were strategic, but at times difficult. Your resulting actions have helped fortify SMI against future external shocks, and placed the institute in a better position to work with the sector to promote sustainable and responsible practices. This will in turn improve the prospects of communities which have fortunes intertwined with the global minerals industry.

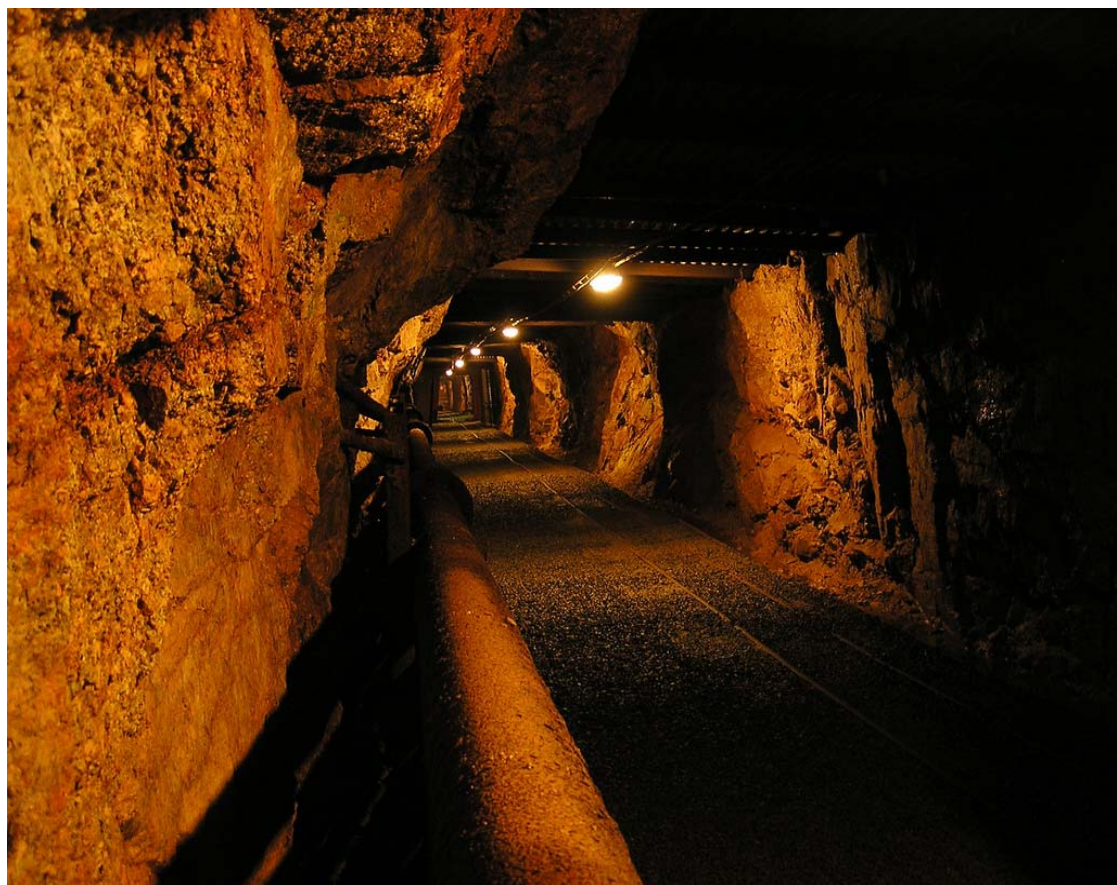
It is a mark of foresight that, during tough times, the SMI and many industry and government partners continued to invest in the long term, and innovate. Indeed both SMI and JKTech have for some years epitomised qualities that our Federal and Queensland governments are now championing as must-haves for a nation adjusting to the new economic realities. Importantly, the Institute and partners have demonstrated that well-designed collaborations between researchers and businesses have mutual benefits, as well as benefits for wider society.

The University of Queensland recognises that, in order to attract and hold outstanding industry partners, we must continually provide evidence that UQ is extremely good at what we do. SMI produced many fine examples of research excellence in 2015, including Dr Antony van der Ent, who received a Discovery Early Career Research Award from the Australian Research Council, and Dr Laura Sonter who was lead author on a paper published in Nature Climate Change. The paper, regarding carbon emissions from the Brazilian steel industry, was a collaboration with CSIRO and the Federal University of Minas Gerais in Brazil; one of the co-authors was SMI's current director, Professor Chris Moran.

SMI has also been working at the edge of innovation in professional and postgraduate education, by teaming up with UQx. UQx, which specialises in Massive Open Online Courses (MOOCs), and the Centre for Social Responsibility in Mining (UQ-CSRMI) developed video resources in English and Spanish, which were first delivered by SMI-CSRMI at a workshop in Peru, and have since been translated into French and used in Madagascar.

This represents an efficient, targeted mode of delivery of UQ's global top-50 expertise to resource operations and professionals, including the many located in remote regions. The SMI is now building internal capacity to design and deliver online programs that can be packaged with onsite teaching, lead into postgraduate studies, or foster professional development.

I have a view that the old academic adage 'publish or perish' must be supplemented with 'partner, deliver and prosper'. Although 'prosperity' is not a word freely associated with the resources sector in recent times, I see that the SMI exemplifies the new maxim. Because nerve has been held during a challenging era, SMI is better equipped to offer solutions to challenges that confront global society - even as change continues at warp speed.





Mr Charlie Sartain
Chair, SMI Advisory Board

SMI ADVISORY BOARD'S REPORT

In his report, Professor Chris Moran has described the “Next SMI” initiative that the Sustainable Minerals Institutes leadership team has been pursuing for well over a year to re-position SMI for a rapidly changing industry environment.

The focused strategy that has emerged is based on key identified, relevant, programs of applied research and innovation in the global mineral resources sector, a stronger emphasis on industry and other stakeholder engagement, and an ongoing commitment to education and learning within SMI as an institute increasingly integrated with other related parts of UQ.

In recent times there seems to have been an overwhelming focus by the minerals industry on drastic cost reductions in response to the sustained collapses in commodity prices. However, important sustainability issues remain for the industry, along with a pressing need for major productivity and efficiency enhancements. We believe that the importance of these factors will continue to drive the collaborative commitments to well-targeted applied research, and the Next SMI strategy is intended to provide a compelling value proposition for SMI's existing and new partners in delivering exciting, innovative solutions to these issues.

The change process at SMI has been demanding on the leadership team, the staff and students of SMI, and I echo Chris' thanks for the involvement and commitment that these people have made over the past year to position us so well for further success. I would also like to extend my thanks to the Executive of UQ, to my colleagues on the SMI Advisory Board and to the members of the other Centre advisory boards who have generously given their time and expertise to support SMI's leadership team over the past year.

Finally, and as a post script to the 2015 report, on behalf of the SMI Advisory Board I would like to extend my sincere thanks to Chris Moran with his mid-2016 departure from SMI and UQ. Chris led the reshaping and transformation of SMI into the recognised global leader in applied research in sustainability in the mining industry. In more recent years he has also courageously led the organisation through a series of necessary, major organisational and strategic changes. He has made such an important contribution to the success of SMI, and deserves our formal acknowledgment and thanks for that. As a result of the efforts of Chris and the SMI leadership team, the organisation is now very well positioned to confidently embark on the implementation of a refreshed, compelling strategy.



Professor Chris Moran
*Director, Sustainable Minerals
Institute*

SMI DIRECTOR'S REPORT

The year 2015 will go down as one of enormous change for SMI as we positioned ourselves to meet the challenge of a rapidly changing resource sector by focusing on thriving, not surviving.

The external environment in which we operate has undergone significant change in the past two years. The majority of our industry partners have gone through radical change in terms of structure, personnel and priorities.

As a highly engaged research institute, SMI recognises and is responding to these changes in our environment. SMI is responding through a change process we are calling Next SMI. Next SMI includes some internal changes as well as important strategic activities to ensure we are working closely with our industry partners and stakeholders and positioned to offer strong value propositions for the next renewal phase.

During this time of significant change we are very pleased to be continuing to work with our industry partners on projects and research that are helping to improve efficiencies and sustainability in the mining and minerals sector.

Our leadership team has worked in consultation with industry partners and stakeholders to transform the Institute from being a successful, large applied research and education Institute, into a mature, collaborative and resilient organisation that meets the industry downturn head on and thrives as a result.

Some of the major changes we have enacted have been the grouping of our Centres to better encourage synergies and cross collaboration. While the Centres still exist, they have now been grouped together to reflect their general research focus:

People Centres - Centre for Social Responsibility in Mining, Minerals Industry Safety & Health Centre

Environment Centres - Centre for Mined Land Rehabilitation, Centre for Water in the Minerals Industry

Production Centres - WH Bryan Mining & Geology Research Centre, Julius Kruttschnitt Mineral Research Centre

Within these groupings we have identified areas of particular research focus that will be coordinated by our leading people. Our programs of research will focus on the following areas:

People Centres

Community and Workplace Health and Safety, led by Professor David Cliff

Development and Governance, led by Professor Saleem Ali

Extractives and Communities, led by Associate Professor Deanna Kemp

Environment Centres

Ecological Engineering of Soil-Plant Systems, led by Associate Professor Longbin Huang

Ecosystem Assessment, Restoration and Resilience, led by Dr Peter Erskine

Life Cycles of Mines and Metals, led by Dr Glen Corder

Regional Water and Land Resources, led by Professor Neil McIntyre

Production Centres

Geology for Mining (leader TBC)

Mass Underground Mining, led by Professor Gideon Chitombo

Next Gen Mine-to-Concentrator, led by Professor Sarma Kanchibotla

Processing: Prediction of Process Performance, led by Dr Kym Runge

Rock: Ore Processability, led by Professor Malcolm Powell

SMI is positioning itself to be the “go to” Institute for minerals industry innovation, research and education. We have recognised, and are responding to, the contraction of the mining and minerals sector by further extending our engagement with the resources sector and driving a culture of innovation to provide great ideas leading to tangible improvements in mining practices and approaches. I see SMI being renowned for delivering timely solutions and value to our industry partners and stakeholders and part of this was to more clearly define our programs of work, both within our Centres and across disciplines.

I would like to make special mention of the support we have received from UQ’s Provost, Professor Max Lu and Chair of the SMI Advisory Board, Mr Charlie Sartain. Without their belief and backing of our vision, and that of the UQ Executive and our Advisory Boards, none of this would have been possible.

I close my report by thanking the staff and students of SMI. It has been a period of upheaval and uncertainty for many of our people, but I believe in 2016 we will start to reap the benefits of the hard work and sacrifice they have made to set up SMI for a bright future.





NEXT SMI

As part of The University of Queensland's (UQ) septennial cycle of reviews of academic units, the Sustainable Minerals Institute (SMI) underwent its second formal review in September 2014 with SMIs staff and students invited to participate in the preparation of the Institute's submission.

The Review Panel provided its written report including 23 recommendations. The valuable messages received and interpreted from the review contributed to the SMI embarking on the planning of an important process of change – we have termed this “Next SMI”. Next SMI laid out some high level activity sets to be actioned during 2015. A Project Implementation Group was formed and the underlying principles and high level activities of Next SMI were formed into a detailed implementation plan identifying the key activities and engagement opportunities for the first half of 2015. To guide SMI on the change journey, Dr Leonie Horrigan, from People and Performance Consulting, was engaged to provide project and change management expertise.

A number of workshops were held with the Senior Leadership Group of SMI, as well as all SMI staff and students, with the purpose being to explore and discuss a number of topics around the future of the Institute.

In June 2015, as part of the Next SMI leadership structure changes, Professor David Cliff, Professor Neil McIntyre and Professor Saleem Ali took the opportunity to strengthen their research and education involvement in SMI by taking on Program Leader roles while Professor Margie Scott, former Director of SMI-BRC, made the decision to leave SMI to pursue other opportunities.

Professor David Mulligan took on the role of Director of Environment Centres (SMI-CMLR and SMI-CWiMI); Professor David Brereton became the Director of People Centres (SMI-CSR and SMI-MISHC) and Professor Ben Adair took on the role of Director of Production Centres (SMI-JKMRC and SMI-BRC), thus forming a reduced and rebadged SMI Senior Leadership Team.

SMI's Senior Leadership Team then facilitated a process to determine the Institutes future Programs of Work with the aim being to balance the need to provide SMI staff and students with some certainty, while making sure that Programs of Work reflected both our capabilities and the opportunities and interests of our stakeholders and sponsors.

SMI staff and students were invited to participate in a workshop within their Centres to identify that Centre's growth plan. This information was used by a group that participated in the Positioning for Growth Workshop on 25 and 26 June. This Growth Workshop focused on identifying a viable growth strategy for Centres, Centre Pairs, and SMI as a whole.

A small group of the participants from the Growth Workshop took the material created from the Workshop and in consultation with staff and students generated a consolidated capability plan for SMI. The Capability Document was a foundation for conversations with Sponsors and Stakeholders and was also an excellent resource for SMI to understand the strengths and skills of the Institute.

Programs of Work and their respective Program Leaders were announced in December 2015.



In 2016 work will continue on finalising SMI's Strategic Plan 2016-2020; formalisation of a Business Development and Engagement Strategy; the implementation of SMI's new Project Lifecycle project management methodology; embedding of the abovementioned Programs of Work and implementation of the centralised model of professional services.



SMI LEADERSHIP



Professor Chris Moran
Director
Sustainable Minerals
Institute



Professor Ben Adair
Director Production
Centres (Jan – Sep 2015)



Professor David Brereton
Director People Centres



Victoria Anderson
Deputy Director —
Operations
Sustainable Minerals
Institute



Professor Alice Clark
Director Production
Centres (Sep – Dec 2015)



Professor David Mulligan
Director Environment
Centres





MISHC is an internationally recognised provider of risk, health and safety research and education for the global minerals industry. Researchers focus on leading practice systems and procedures to solve existing health and safety challenges. The Centre is working on a number of strategic research initiatives to facilitate resource sector growth and optimise safety. Further, education programs are instilling health and safety management practices as the guiding principle for industry professionals.

2015 Report

It continues to be a challenging environment for the resources sector, many industry experts have remained committed to sharing their knowledge and expertise to improve mine site health and safety through research.

MISHC staff have continued their deployment widely across the globe. Danellie Lynas focused her attention on the health and safety of artisanal miners and their communities in Ghana and Papua New Guinea. Associate Professor Carmel Bofinger travelled to Suva as part of a United Nations Development Program aid program to improve the health and safety of quarry and stone miners. The International Mining for Development Centre (IM4DC) funded occupational health and safety research and training had Professor David Cliff visiting Peru to deliver a course on occupational health and safety in conjunction with the University of Western Australia leadership experts.

The novel method of using iOS devices to measure whole body vibration (WBV) developed by Professor Robin Burgess-Limerick has been deployed to several Australian coal mines allowing large datasets of WBV to be collected across a range of equipment. Ms Lynas has been active in carrying out the field studies at surface and underground mines. This project has been funded by Australian Coal Association Research Program (ACARP) and the Coal Services Health and Safety Trust. Professor Burgess-Limerick is also evaluating proximity detection interfaces using a haul truck simulator, funded by ACARP.

Professor Burgess-Limerick continues his research partnership with the National Institute for Occupational Safety and Health (USA), analysing mining fatalities using Bow Tie techniques, and preparing human centred design best practice case-studies in conjunction with Professor Horberry (Monash University).

MISHC is exploring the future of risk management research and education in partnership with UQRisk! led by Associate Professor Maureen Hassall.

Professor Cliff provided expert testimony to the Linc Energy Inquiry in Dalby, Queensland.

Professor Cliff co-chaired the 3rd International Conference on Mine Geology Safety and the Environment in Xi'an China, hosted by the Xi'an University of Science and Technology, College of Geology and the Environment, in November 2015.

He also attended the 36th International Conference of Safety in Mines Research Institutes, an event enabling discussion on the challenges and achievements in the field of mines safety and disaster management, that was held in Sudbury, Ontario, from October 25 to 27, 2015 and presented two papers.

The Global Minerals Industry Risk Management program risk management training courses continue to be well attended and have been updated to include the latest thinking on critical controls and control effectiveness.

MISHC was commissioned by the Department of Industry, Innovation and Science, to develop a Leading Practice in Sustainable Development Handbook on Community Health and Safety. The bulk of the work was carried out by Dr Jill Harris with support from Associate Professor Carmel Bofinger.

Professor Cliff managed the completion of two major ACARP funded research projects – one on the potential impacts of lightning on underground coal mines and the other a rewrite and update on the textbook on spontaneous combustion in underground coal mines.

The final phase of the ACARP RISKGATE project has been initiated with the review of the current topic areas. The Alpha Foundation RISKGATE model project lead by Virginia Technical University has been completed. Mr Philipp Kirsch and Dr Jill Harris were heavily involved in both these projects.





SMI BRC

WH Bryan Mining &
Geology Research Centre

BRC is an applied research centre which continues to build on its existing reputation for practical innovation in mass mining and a demonstrated global leadership in deep mine development and operation. The Centre is focused on industrial research solutions for active and future mines and has a mandate to advance total deposit knowledge (ore and waste; geological and geotechnical).

2015 Report

SMI-BRC Adjunct Professor and Board member Dan Wood was recognised with the Order of Australia in 2015 Australia Day awards. Mr Wood was honoured for his distinguished service to the mining and resource industry, particularly mineral exploration, through contributions as a geologist, academic and in executive roles.

Professor Gideon Chitombo sat on a panel discussion at the Austmine 2015: Transforming Mining on 19-20 May 2015. Other panelists included Chairmen and senior people of Northparkes, Austmine and Mine Site Technologies.

In September 2015 Professor Alice Clark took on the role of the Director of Production Centres, providing leadership across SMI-BRC and SMI-JKMRC. In 2015, Professor Clark was honoured with the Australasian Institute of Mining and Metallurgy (AusIMM) Beryl Jacka Award in recognition of extraordinary and sustained service to the AusIMM.

SMI-BRC was a sponsor of the 2015 Society of Economic Geologists (SEG) Conference held on 27-30 September in Hobart, Tasmania. The theme of the conference was 'World-Class Deposits: Discovery to Recovery'. The Conference included key presentations from industry and research leaders from across the world on the geology and discovery of world-class ore deposits, through to the recovery of metals. SMI-BRC organised and chaired two sessions on the key theme of Mining Geology.

In December 2015 Dr Tony Webster was elected as the Chair of the Queensland Division of the Geological Society of Australia. He has also been elected as one of three new members of the AusIMM Geoscience Society Committee for the period 2016-2018.

STUDENTS

In March Zhenyu Han was awarded the SMI RHD Student Travel Award, to attend the 13th International Congress on Rock Mechanics in Montreal, Canada in May 2015. The following month, Zhenyu was a recipient of the SMI RHD Student Research Support Scholarship. Another BRC recipient of the SMI RHD Student Travel Award was Kwasi Ampofo, who attended the 19th Annual International Conference 'Real Options: Theory Meets Practice', in Athens, Greece in June 2015. In December Matthias Klawitter was awarded the SMI RHD Student Award: Spirited Award for demonstrating initiative, perseverance and the ability to overcome significant obstacles on the path to attaining his degree.

APPLIED GEOLOGY PROGRAM

Deep Mining Queensland Project (DMQ): The project commenced in April 2015 with funding from the Geological Survey of Queensland (DNRM) and in-kind support from Chinova Resources through access to data and logistical, and site support. The aim of the DMQ project is to reduce the risk profile of exploring at depth in the Cloncurry terrane (Mt Isa Inlier).

Geology and Mass Mining Project (GMM): The project has been ongoing since 2012 and is currently in the final phase of completion. The technical report was delivered to industry sponsors and government in November 2015. Some work is still in progress to finalise strategy for technology transfer through workshops and courses. Work also continues on finalising the numerical modelling work to help quantify some of the qualitative conclusions on the impact of geology on cave propagation.

Improved Blast Outcomes By Integrating Structural And Blast Modelling Project: This two year project was funded by ACARP. A sophisticated, but easy to use, blast design and analysis tool have been developed to combine BRC's blast energy distribution and Fragmentation software with CSIRO structural modelling software. The aim is to deliver more accurate predictions of blast performance in heterogeneous rock.

Metamove Project: Over a number of years, the JKMRC and BRC have been working on several blast modelling techniques to predict muckpile movement and shape. MetaMove, as implemented for metalliferous mines, is the most recent version. New features include Buffered Blasting; Grade Distribution; Vector Definition; Flitch Emulation; and Calibration.

DEEP MASS MINING PROGRAM

Next Generation Cave Mining Phase 1 Project (NGCM1): This project served as a consultation process with sponsors and provided a pathway for the new Cave Mining 2040 initiative that Professor Gideon Chitombo is developing. A Draft Industry Brief on Cave Mining has been prepared and distributed to the industry for comment. The Cave Mining Collaboration Consortium (Cave Mining 2040) marks the start of a series of development activities needed to transform the cave mining industry. The intent is to start the first series of Cave Mining 2040 project in October 2016, with the intention for the project to span over a number of years.

Effective Mining for Future Deep Deposit Project: In May 2015 BRC was awarded a SMI Category 1 Collaborative Grant Scheme for Professor Gideon Chitombo and Dr Ruslan Puscasu's project titled *Effective Mining for Future Deep Deposit*. The research project aims to make significant advances in the understanding the fundamentals of rock mass response to mining at depths greater than past and current experience. The ultimate purpose of the research is to enable the effective mining of future deep ore bodies that otherwise would not be mined economically and safely using current methods.



The JKMRC was established at the UQ in 1970 and is renowned for its plant-based applied research projects that have significantly advanced industry characterisation, modelling and simulation in mineral processing circuits as well as pioneering the discipline of geometallurgy. The Centre also has a strong tradition for its post-graduate students to conduct significant portions of their work in operating plants.

2015 Report

2015 saw a number of significant changes for the SMI-JKMRC. These changes reflected the difficulties faced by the minerals industry and were coupled with the outcomes of the SMI review and Next SMI. Efforts to position the JKMRC and broader SMI resulted in the non-renewal of several research and professional staff positions.

Dr Chris Fountain continued as acting director until August when Professor Ben Adair took over as acting Director of Production Centres. In September 2015 Professor Adair left the SMI to take up the role of Director of CRC Ore. At that time Professor Alice Clark was appointed Director of Production Centres.

Research progressed on several major projects, including the current extension of the P9 project and the Anglo American Centre for Sustainable Comminution. Work proposals were prepared for a number of new projects including the next phase of the P9 project. However, it was recognised that the likelihood of securing funding for many new projects was remote given the continuing slump in the mining sector.

Notable achievements during the year included JKMRC's founding director Alban Lynch publishing a Comminution Handbook, which was launched by AusIMM at the MetPlant Conference, held in Perth. Present and former JKMRC staff and students were major contributors: Bianca Foggatto with Marcos Bueno contributed to Chapter 12 on Milling Circuit Calculations as well as to Chapter 16, entitled "Circuit Design", which includes basic guidelines for appropriate process development and comminution flow sheet selection. In addition, detailed procedures for selecting and sizing comminution equipment are provided. Co-authors of this chapter included: Eddie McLean, Greg Lane and Chris Morley. Dr Cathy Evans provided Chapter 2 on Mineral Liberation. Former student and staff member Steve Morrell contributed to Chapter 4 Ore Comminution Measurement Techniques. Former student and staff member Walter Valery contributed to Chapter 11 Comminution circuits for Ores, Cement and Coal. Diana Drinkwater of JKTech was a member of the Steering Committee and many of the reviewers were past and present JK staff. Overall a strong contribution to a book useful to students and to practitioners.

JKMRC won funding for a new Mineral Liberation Analyser (MLA) through the 2015 UQ Major Equipment and Infrastructure & 2014 NHMRC Equipment Grant scheme. The funding allowed the JKMRC to purchase an FEI Quanta 600 Mk2 MLA with SDD detectors which has later generation, faster hardware than our current systems. This will enable continuation of service of this essential tool for use in research and teaching and to also provide additional measurement capacity. The faster measurement times will also provide greater opportunities for under-

graduate and postgraduate students to benefit from hands-on access to a system. JKMRC is internationally recognised for the development of the MLA, an automated mineralogical characterisation tool based on a Scanning Electron Microscope (SEM) platform. Since its development in the late 1990s and commercialisation by FEI Company the MLA has gone on to become a mature technology that is routinely used to quantify ore mineral characteristics in both research environments and in industrial applications.

A delegation of Turkish Government mining officials visited JKMRC mid-year. The delegates were given presentations about SMI, MISHC, JKTech and CRC Ore as well as a tour of the facilities. The group also visited UQ's School of Mining and Mechanical Engineering.

SMI's work in Turkey was featured in UQ's Alumni magazine *Contact*. The article focuses on JKMRC's RHD student Baris Yildirim as well as SMI's work with Turkey's newly established International Mining Centre.

JKMRC welcomed back one of its first students to present a special seminar titled: From Thesis to Thesis. Fifty-three years ago David Moore was a foundation post-graduate student, supervised by Professor Alban Lynch, in the inaugural Mineral Processing research project, which became a highly successful long-term core project for the JKMRC. He completed his thesis, A Mathematical Analysis of Mineral Breakage, in 1964 and soon after he entered Oxford University as the Queensland Rhodes scholar. After he retired in 2009 following a diverse career in the minerals industry he embarked upon a very different second PhD through Swinburne University of Technology. Fifty years after his first thesis he submitted Three Queensland Premiers and the Mungana Scandal, focusing on the Chillagoe-Mungana story which holds a unique place in Queensland's mining and political history. The presentation, From Thesis to Thesis, firstly contrasts David Moore's unusual experiences with both theses. It then uses conclusions from the second thesis as a reminder of the major impact of cycles in the minerals industry and the unusual situation the industry now faces.

Dr Jeffrey Dawes, a former JKMRC PhD student who now heads up Komatsu Latin America, presented a special seminar event at JKMRC in October.

The JKMRC Students Technical Presentation 2015 was successfully held in October in the JKMRC Lecture Theatre. Nineteen postgraduate students presented their thesis topics in mineral processing with a focus on mining, comminution and flotation. The seminar, organised by the JKMRC students, was a full day program and was well-attended by the alumni, staff, external visitors and students.

During the year, three students were awarded MPhil degrees for their research theses, and a further five were awarded PhDs.

Bianca Foggiatto received the 26th Ian Morley prize awarded for the two best theses in Geosciences and in Mining or Extractive Metallurgy in Queensland. The presentation was attended by several past recipients of the award.

The JKMRC hosted a METS Ignited event in December. METS Ignited is an industry led government funded initiative aiming to strengthen Australia's position in mining innovation. Guests included the Lord Mayor of Brisbane, Cr Graham Quirk, senior government officials and industry leaders.



SMI CWiMI

Centre for Water in the
Minerals Industry

CWiMI conducts research on the measurement, monitoring and modelling of water in the context of resource extraction, their surrounding environments and regional communities to direct sustainable water management. Its four research themes are: water management; hydrology and hydrogeology; society and water; and hydrochemistry and aquatic ecology.

2015 Report

In 2015, CWiMI has continued to participate in developing guidelines for national and international best practice in water management. Neil McIntyre represents SMI on the Department of Industry's panel overseeing the revision of the Leading Practice Sustainable Development Program guides for the mining industry, and co-authored the new water management guide. Greg Keir is leading CWiMI's continuing work with Minerals Council of Australia (MCA) members and the International Council on Mining and Metals (ICMM) to provide expert advice on water accounting and footprint metrics.

The CSRM-led project "Managing the impacts of minerals development on women and men and their traditional livelihoods in Mongolia" was successfully completed in 2015 with a series of workshops in Mongolia to launch the handbook "Responsible Mining in Mongolia: Enhancing Positive Engagement". CWiMI staff contributed the water management chapter of the handbook and participated in the workshops.

CWiMI marked the end of the International Mining for Development Centre (IM4DC) by publishing a paper on lessons learnt about water capacity building needs, in collaboration with the University of Western Australia. The paper "Water management capacity building to support rapidly developing mining economies" was published in the Water Policy journal.

Staff continue to publish in top international journals. A major publication success arose from the research conducted by Dr Laura Sonter, a former RHD student with CWiMI, which was published by Nature Climate Change. Her co-authors include Professor Chris Moran, Damian Barrett (formerly from CWiMI and now at CSIRO), and Britaldo Soares-Filho (from UFMG in Brazil). The paper describes how Brazilian steel industry strategies to reduce carbon dioxide emissions have failed spectacularly, actually resulting in a doubling of emissions.

South America continues as the main focus for international collaboration. CWiMI staff have undertaken three engagement and project development trips to Chile in 2015. Sue Vink and Greg Keir spoke at the Water Week Latin America 2015 conference as part of a delegation of Australian researchers and industry representatives. The UQ delegation also hosted a well-received workshop on 'Water for security and development: addressing the water-energy and food nexus', featuring a keynote address from Sue Vink.

Neil McIntyre spent two weeks in Chile as a member of the Scientific Advisory Board of the Water Resources Centre of Excellence led by the University of Concepción, and establishing support from Codelco and Anglo American for projects under the SMI-ICE-Chile. Neil McIntyre travelled to Bogota, Colombia

where he was joined by CSRM researcher Diana Arbelaez-Ruiz to take part in a workshop at Los Andes University aiming to establish a new partnership starting with six collaborative research projects in 2016. Sue Vink was part of the UQ delegation to Argentina and Uruguay to establish new business and collaboration opportunities there.

CWiMI appointed a new Research Manager, Ian Callow, to lead industry engagement, funded partly by strategic support from UQ, in view of the increasing recognition of the importance of good practice water management in the mining industry. Ian has focused on engaging with potential partners in Queensland. Natasha Danoucaras, a long-standing member of SMI, left CWiMI to follow other opportunities within UQ. Following the departure of Dr Lucy Reading at the end of 2014, Dr Sven Arnold joined CWiMI from CMLR to lead the Groundwater Recharge research areas. Dr Jason Dunlop of the Queensland Government's DSITIA has joined as an Adjunct Academic.

International consultant KCB has established a new partnership with CWiMI and CMLR to increase engagement and knowledge exchange between practitioners and researchers in particular on tailings water management. The first stage in the partnership will be research into long-term changes in hydrogeochemical behaviour of tailings.

CWiMI's major research effort continues to be associated with UQ's Centre for Coal Seam Gas (CCSG), with CWiMI leading three water related projects: Recharge estimation in the Surat Basin, Characterisation of current groundwater uses in the Surat and Bowen Basins, and Water Chemistry Atlas. These projects are in their second stages and will continue into 2016. In November, five CWiMI staff presented current groundwater research at the biennial Australian Groundwater Conference held in Canberra, Australia's premier groundwater conference. Greg Keir, Alexandra Wolhuter, Sue Vink, Neil McIntyre and Nena Bulovic presented research from the three CCSG funded projects.

CWiMI continues to grow its international academic collaborations. In 2015, Professor Howard Wheeler from The University of Saskatchewan visited to discuss collaborative research proposals on basin scale water resources, and Dr Bethanna Jackson from the University of Victoria, Wellington visited to establish joint research into land use planning tools. Ian Callow was invited to an international workshop in Columbia University, New York, to maintain our engagement with the Columbia Water Centre, and Neil McIntyre was invited to speak at Columbia's Water in Mining workshop in Santiago. CWiMI continues to collaborate with Witwatersrand University in South Africa, with a 2-year project on water footprinting starting late in 2015. Neil McIntyre spent one week at Imperial College London in his Visiting Professor capacity.

CWiMI increased in numbers during 2015 due to the arrival of five new RHD students: Sholto Maud, Warren Finch, Celso Isidro, Juan Ossa Moreno and Shirley Shi. RHD students who completed their research were Vinitha Nanjappa, Ruolin Wu and Angela Werner.





SMI **CSR**M

Centre for Social
Responsibility in Mining

CSR M works with industry, communities and governments to improve social performance and deliver better outcomes for all mining stakeholders. CSR M has developed a unique team of anthropologists, sociologists, economists, natural resource specialists, political scientists, systems engineers and technical specialists who are committed to bridging the divide between technical, physical and social sciences.

2015 Report

2015 was a year of consolidation and redefinition of our core competencies, given the industry downturn as well as a major decline in Australian Commonwealth funding for research. We have streamlined our program delivery according to needs priorities within the funding environment. The Centre has developed two programs that are now part of the new SMI structure in the areas of Development and Governance; and Extractives and Communities

This year, we turned our attention to European Development donors and were successful in getting three major grants from the German Development Agency (GIZ). Our ongoing work on the efficacy of certification systems in the extractive industries with the Tiffany & Co. Foundation helped in securing confidence for these funds.

We were able to renew our engagement with Vale Corporation's Malaysia operation to manage and monitor the social investment of their operations. This project is an ongoing partnership with UQ International Development and positions us well in the field of socioeconomic diagnosis of infrastructure projects and their community development planning.

Numerous other industry engagement projects continued, including through the production of Rio Tinto's *Why Agreements Matter* guide, the fourth in the series. CSR M also conducted an independent third party review of the Porgera Joint Venture's pilot resettlement project, which included an historical review and an opinion of the 'do-ability' of the resettlement project itself. CSR M's *Mining, Resettlement and Livelihoods* initiative has continued, with collaborative research funds again being provided by Newcrest, Rio Tinto, Anglo American and Newmont Mining. This initiative aims to build knowledge and capacity in the involuntary resettlement and livelihood restoration arena. One of the major activities was a global study of resettlement practitioners, the results of which will be released in 2015.

We completed a landmark study on infrastructure corridors in Indonesia under the Australian Indonesian Infrastructure Research Award (AIIRA). This has allowed us to extend our expertise in socio-ecological toolkit development using Geographic Information Systems (GIS). Our publication record continued to show positive development with Professor Saleem Ali publishing a new co-authored book *Environmental Diplomacy* (with MIT's Larry Susskind, Oxford University Press) and an anthology *Diplomacy on Ice* (coedited with Rebecca Pincus, Yale University Press).

Associate Professor Deanna Kemp won the SMI award for most rapid rise in research publications for a second year in a row. Doctoral student activity continues to flourish with three doctoral graduates in 2015 with excellent job placements. Thus despite the challenges in funding, CSRM continues to reinvent itself to remain a high quality competitive research centre.





SMI CMLR

Centre for Mined Land Rehabilitation

CMLR addresses the minerals industry's environmental challenges with quality science, and translates research outcomes into practices that lead to continual improvement of rehabilitation and protection of environmental values. CMLR's focus is preventing, minimising and remediating mining environmental impacts by providing research, education and professional development in the sustainability area, and engaging with community, government and industry globally.

2015 Report

2015 was a challenging year given the industry downturn and trend to reduce the level and longevity of investment in environmental research. However, from a research output and impact perspective, the CMLR continued to excel. Through identifying and investing in new opportunities and innovations, the Centre has created strengths and capabilities that meet the research needs required to ensure future recovery and sustainability of disturbed land.

There were two new projects linked to mine closure launched in 2015 that use the CMLR's capabilities in remote sensing and image capture and analysis. The first is developing a set of process tools using remote sensing technology to understand the risk associated with fire to rehabilitation and to assess the expected recovery response. The second uses converged monitoring involving the concurrent collection and analysis of spatially-explicit field-based assessments and remote sensing to provide comprehensive datasets. These datasets can be assessed with high confidence in overall accuracy and risk capture. The factors being assessed in this latter study include pyritic oxidation of waste rock and the change in surfaces due to slumping, batter slope erosion and stability, native vegetation establishment and growth, and the spread (and hence approaches to the control) of weeds.

With the signing of the UQ-MMG research collaboration agreement, the CMLR commenced developing a program of work that focuses on the building of robust mine waste management and monitoring protocols to reduce uncertainty as a part of the closure strategy for the Century Mine.

The CMLR was awarded two new ACARP projects for commencement in 2016, the first a collaborative project with CWiMI on the "Prediction of long-term salt generation from coal spoils" and the second a project to develop "A rigorous framework package for change detection in complex vegetation communities", jointly with the Auckland University of Technology and Buckinghamshire New University in the UK.

In collaboration with Professor Neil McIntyre from CWiMI, Dr Mansour Edraki led the Centre's CORFO-funded activities through SMI-ICE-Chile and worked closely with colleagues at La Universidad de Concepción on developing programs of tailings and water research at Codelco's El Teniente and Chuquicamata copper mines.

Relationships with the Université de Lorraine (UL) in France and Sabah Parks in Malaysia were strengthened through the work program and expanding developments in the phytomining area led by Dr Antony van der Ent and Dr Peter Erskine. The UL collaboration has provided access to EU funds that contributed to the support of both Antony van Ent in 2015 but also PhD students working in the area. Research projects at Eramet's Weda Bay nickel operations in Indonesia and copper operations in northern Zambia led to the discovery of new metal tolerant and hyperaccumulator plant species.

New international MoU agreements were finalised with the Geological Survey of Finland (GTK) and Tadulako University in Central Sulawesi, Indonesia, and a delegation from the Land Consolidation and Rehabilitation Centre, Chinese Ministry of Land and Resources, led by the Vice Minister, the Honorable Mr Zhang Delin, visited SMI and signed a 5-year renewal of the MoU.

CMLR's China engagement continued to be active in 2015 through Assoc. Prof. Longbin Huang's networks and collaborators in academe, research organisations, government and industry and a number of visits were undertaken to develop new opportunities. The Centre remains an attractive research destination for Chinese students and staff with many funded by the Chinese Scholarship Council. German and French students supported by their national government schemes also continued to be a feature of CMLR's research diversity in 2015.

Building from the relationship initiated with an MoU signing with the Korea Institute of Geoscience and Mineral Resources (KIGAM) in 2014, Dr Mansour Edraki hosted a Korean delegation that included collaborators from KIGAM, the Green Technology Centre and various companies. This relationship building led to a research project during the year and the invitation for partnership in a 5-year collaborative multi-national project.

With the support of the Australian Government through Austrade, the CMLR was invited to deliver a workshop in Vietnam to assist government agencies develop a sustainable mining development policy and leading practices framework. CMLR staff also convened and delivered workshops at venues including the European Geosciences Union in Vienna and the Spatial Ecology and Conservation Conference in Birmingham and presented numerous other papers at conferences around the world.

In 2015 the CMLR co-chaired the 4th International Enviromine Conference in Lima, Peru, and commenced planning for the 3rd Life-of-Mine conference co-hosted with AusIMM to be held in Brisbane in 2016.

As a part of the contribution to the International Mining for Development Centre program, and building from the program that commenced in 2014, the CMLR again hosted 21 participants from 12 developing countries for a month-long course on Environmental Management in Mining.

One of CMLR's 2014 PhD graduates, Dr Bronwen Forsyth was awarded the "Dean's Award for Outstanding Research Higher Degree Theses". Among the acknowledgements awarded to current PhD students, Tamar Cohen was rewarded with a Berndt Research Foundation Postgraduate Scholarship that supports research focusing on Aboriginal Australia, and Amelia Hine and Miguel Alvarado both received support for their research from Japan Coal Development Australia

(JCDA). Two students also commenced on fully-funded industry scholarships during the year - Bevan Emmerton with support from ACARP and Phill McKenna with support from the Coal Minesite Rehabilitation Trust Fund.

Another of CMLR's 2014 PhD graduates, Dr Antony van der Ent was awarded an ARC Discovery Early Career Researcher Award (DECRA) commencing in 2016 to unravel the ways in which metal hyperaccumulator plants work. The Global Hyperaccumulator Database hosted by CMLR went live in 2015, as did the CMLR Online Herbarium.

The CMLR's impact through research publications and the progress and quality of the work conducted by research higher degree students during the year made 2015 another year of academic success and we were delighted to welcome another 5 PhD graduates to the Centre's alumni.





2015 Report

The International Mining for Development Centre was the \$31 million centre-piece of the Australian Government's \$127 million Mining for Development Initiative.

After almost four years of intensive activity coordinated by the IM4DC partners The University of Queensland and The University of Western Australia, the Centre completed its program on 30 June 2015, comfortably exceeding most of the targets set in the Centre's Grant Agreement with Department of Foreign Affairs and Trade (DFAT). Following an administrative wind-down and reporting phase, the IM4DC Board and Management presented the final program report to DFAT in September in Canberra, meeting all commitments and closing accounts with a \$70k surplus and no significant outstanding issues.

The Centre's purpose was to engage, develop and empower individuals and partners in resource-rich developing countries to transform their extractive resource endowment into inclusive and sustainable economic growth and social development. The integrated program of activities was designed to leverage Australia's global footprint of mining experience and capability.

During the life of the program, IM4DC supported over 2,700 participants from almost 800 different institutions in 65 countries across the Asia-Pacific, Africa and Latin America. Program activities showcased Australia's expertise in resource governance, with over 300 delivery partners including universities, government and industry bodies, NGOs, mining and services companies engaged in activities. This collaboration delivered 105 short courses and workshops, 90 research and institutional capacity building projects, and supported 27 fellowships. More than 1,800 alumni are now registered with the unique M4DLink on-line community of practice, and the alumni network will continue to be supported by both University partners and the Australian Government until August 2016.

The outcomes built by the program form the foundation for the higher level transformational change envisaged by IM4DC. Evaluations of alumni impact were commissioned in 2014 and 2015, focusing on the experience of participants in implementing change following their initial engagement in the program. The research confirmed that there was clear evidence that participants have developed leadership capability, and initiated innovative activities and changes in their own contexts. A substantial amount of change was reported at the organisational level and beyond, suggesting positive and broad impact being created across the alumni's work environment.



The International Mining for Development Centre (IM4DC) supported developing nations to transform their extractive resource endowments into inclusive and sustainable economic and social development. The IM4DC was established as a joint venture between The University of Western Australia and The University of Queensland in October 2011, and was funded by the Australian Government through an Australian Aid initiative administered by the Department of Foreign Affairs and Trade.

In the absence of a continued integrated DFAT program in this space, UQ and UWA have agreed to continue to work together under the banner of the Minerals and Energy for Development Alliance (MEfDA). The continued support of the alumni network has been implemented under this banner, and a number of other activities have been supported through other funding avenues. The flagship 'Emerging Leaders in African Mining' program, which was delivered by IM4DC for two years alongside the African Mining Indaba conference in Cape Town, was recently repeated using funds provided by the African Minerals Development Centre and the UNDP Development Minerals Programme. A number of other SMI research and education activities have benefited from the contacts made during the IM4DC program, and we will continue to develop these linkages in an area of significant importance to the global minerals industry and the Australian Government.



SMI-ICE-CHILE

SMIICEChile

The aim of the project is to establish an International Centre of Excellence in Chile that delivers demonstrable benefit to the Chilean people and its economy. The Centre will be at the forefront of innovative research and technology transfer to address several of the major challenges and competitive pressures faced by the Chilean Minerals sector. It will make significant and auditable improvements for its industry in the areas of productivity and environmental management and will build local capacity in both research and technology transfer.

With the foundations laid in 2015, 2016 will see SMI-ICE-Chile progressively achieve its objectives of fundamentally improving the productivity and environmental signatures of Chilean mining operations by creating a new collaborative global mining knowledge force in Chile that builds human capital, provides innovative research outcomes and realises effective technology transfer to Industry.

The following activities, carried out in 2015, have placed SMI-ICE-Chile in a strong position to capitalise on the investment made by CORFO and the Chilean mining industry:

- Recruitment of the SMI-ICE-Chile Director;
- Focusing on engaging with industry;
- Realigning activities in response to CORFO requirements in terms of the “industrial ecosystem”. This included a focus on engagement with supplier networks within Chile;
- The assessment and sanctioning of seed projects in line with the three Research and Development lines.

Seed projects, developed in consultation with industry, include:

- Tailings and Water – Diagnosis of Issues and Identification of Potential Points of Intervention;
- Spectral Characterization and Image Analysis in Phases and Reaction of Interest in Copper Pyrometallurgy for the Design of New Sensors for Process Control;
- Development of Protocol Procedures to Detect the Critical Blending Restrictions in Order to Optimize the Flotation Process of Low Copper Grade Ores; and
- Design and Implementation of an On-Line Rheometer for Mineral Slurries
- Frother Roles Characterization in a Laboratory Mechanical Cell.

SMI-ICE-Chile must respond to a set of significant challenges facing the Chilean mining industry. SMI-ICE-Chile aims to make a significant and lasting contribution to address one or all of these issues over the course of its initial eight-year life.

The primary tasks for SMI-ICE-Chile in 2016 is to embed the organisation in the mining industry innovation landscape by establishing a physical office in Chile, recruiting administrative staff for the office in Santiago, implementing the governance structure, continuing to gather industry support and funding, building on the seed projects already underway, commencing capability and knowledge transfer activities and developing a communication plan.



TECHNOLOGY TRANSFER AND COMMERCIALISATION



JKTech Pty Ltd is wholly owned by UQ and is the technology transfer company for SMI, commercialising research outcomes from the Centres of the SMI.

Commercialisation is conducted via spin-off companies, sales of IP and technology licensing, as well as through JKTech's suite of products and services that are delivered to the global resources industry. Often, SMI IP is incubated within JKTech's products and services, thereby enhancing its value prior to commercialisation by external parties. JKTech works closely with researchers to determine the optimum commercialisation pathway for research outcomes that have commercial potential.

JKTech delivers economic and social value to the global resources industry via innovative technology products and services. Our expertise in technology based consulting, laboratory services, software, specialist equipment and professional development, is implemented to improve the profitability, sustainability, and safety culture of resource operations across the globe.

In response to suppressed activity in the global resources industry, JKTech re-structured its business model in 2015. The cornerstone of its revised approach is to maintain a core group of people who are the real assets of our company, and who retain the knowledge, expertise and wide range of industry experience in minerals-related disciplines.

Despite the challenging market conditions, JKTech and SMI continued to collaborate strategically and operationally to deliver world-class capability that is aligned with The University of Queensland's core purposes of Learning, Discovery and Engagement.

During 2015, JKTech's operations continued throughout the world, with activities undertaken in South America, Africa, the Middle East, Asia, and of course Australia. In the second half of 2015, JKTech participated in a successful trade-mission to Kazakhstan, which led to follow on business development opportunities in Russia.

JKTech's consulting arm, which encompasses mining and processing specialists in the areas of ore fragmentation, ore pre-concentration, comminution circuit optimisation, retreatment of waste streams, continued to have a profound impact on the operations of our clients. For a large gold producing client, the clients senior management team acknowledged that JKTech successfully increased gold production by approximately 25% in the 1st phase of work at two operating sites without the need for capital investment.

Our processing and mining specialists played integral roles in Rio Tinto's Processing and Mining Excellence Centre's that were announced in 2014, through the immersion of two full-time resources for a period of six months whilst the Centre's were established.

JKTech continues to capitalise on our long history in software development, and has signed up as a participant with the Australian federal government CRCORE based in Brisbane. JKTech will play an integral role in the development and commercialisation of CRCORE's IES product.

JKTech's Chilean subsidiary (JKTech South America SpA) continued to play an integral role in the establishment and management of the SMI led International Centre of Excellence in Chile. The Centre has been founded following the

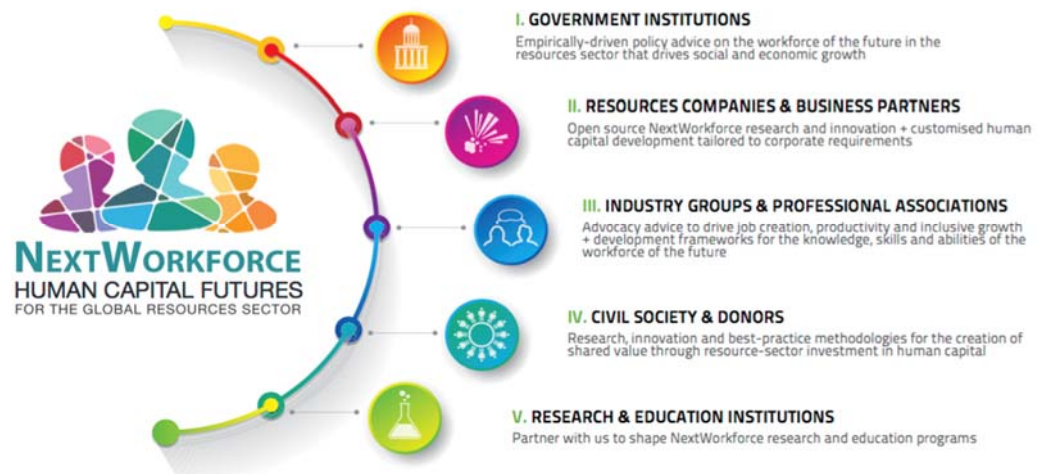
successful award of grant funding from InnovaChile Corfo ('CORFO'). The Centre's objective is to carry out research and development, technology transfer and commercialisation activities that will have a high national and international impact for Chile, and that strengthen Chile's research and development capabilities.

In January 2015, Ok Tedi Mining Limited (OTML) and JKTech entered into a strategic partnership agreement to train and develop the OTML workforce.



The foundational pillar of the partnership was the "Ok Tedi Way", which included the translation of the OTML vision, mission, and values into a transformational lever to embed change, and support integrated operational performance at OTML as a result of training and education. JKTech and SMI staff delivered the operational and leadership programs on-site at the mine in Papua New Guinea.

JKTech and SMI commenced collaboration on the NextWorkforce Research & Innovation project, which is a research and innovation program focused on human capital innovation in the global resources sector. The project team plans to bring together a global consortium of resource companies, governments, and donors who are committed to developing the human capital of the global resources sector, with a view to creating financial returns and shared value for companies, communities and nations alike.



We understand that the resources industry remains strategically important for The University's industry engagement programme, so as one of UQ's two commercialisation companies, JKTech will continue to work with SMI researchers and industry alike, to identify the best commercialisation pathways for thought-leading, cutting edge breakthroughs as well as enhancements to processes, technologies and methodologies for the global resources industry.



STUDENTS

Research Higher Degree Graduates

Education programs offered through SMI are recognised internationally for their rigorousness and relevance for mining professionals. In 2015, 21 SMI Research Higher Degree students graduated, with 18 PhD and 3 MPhil being awarded.

Dr Snezana Bajic, PhD, JKMRC, *Characterization of the liberation kernel*

Dr Janina Beyer, PhD, CWiMI, *Microbial Communities in an Ephemeral Stream System and the Implications of Saline Mine Discharge*

Dr Alex Catalan, PhD, BRC, *Implementation and assessment of intensive preconditioning for cave mining applications*

Dr Xumeng Chen, PhD, JKMRC, *The effect of regrinding chemistry and particle breakage mechanisms on subsequent cleaner flotation*

Dr Tristan Cooke, PhD, MISHC, *Human Factors Methods to Design Safer Mobile Mining Equipment*

Dr Anand Datar, PhD, CMLR, *Quantification of landform heterogeneity and its relationship with ecological patterns in broad-scale post-mine rehabilitation*

Dr Ruth Fuller, PhD, MISHC, *The impact of non-technical issues on decision-making by coal mining incident management teams*

Dr Mirella Gavidia, PhD, CSRM, *Exploring the dynamics of fairness in the relationships between mining companies and affected communities: A case in the Brazilian Amazon*

Dr Geordan Graetz, PhD, CSRM, *Uranium Companies and Traditional Owners: Negotiating the intersection of risk and rights*

Dr Gerardo Castillo Guzman, PhD, CSRM, *Transforming Andean Space: Local experiences of mining development in Peru*

Dr Imad Haidar, PhD, BRC, *Multi-step forecasts of complex dynamical systems using soft-computing tools, with application to crude oil returns*

Dr Garry Marling, PhD, MISHC, *Optimising risk management team processes*

Mr Carl Masuret, MPhil, JKMRC, *Developing an abrasion characterisation test for measuring superficial breakage in comminution*

Mr Daniel Mitchell, MPhil, JKMRC, *Improved relationships for discharge in SAG/AG mills*

Ms Vinitha Nanjappa, MPhil, CWiMI, *Influence of calcium proportion on the toxicity of a saline solution to Ephemeroptera Austrophlebioides sp. AV1*

Dr Yuni Rusdinar, PhD, CMLR, *Geochemical Processes Controlling the Distribution and Long Term Stability of Heavy Metals in Mine Tailings Deposited in Rivers; the case study of ModADA, Papua, Indonesia*

Dr Qi Shao, PhD, CMLR, *Surface Hydrological Modelling for Rehabilitated Landforms*

Dr Ruolin Wu, PhD, CWiMI, *Understanding salt transport in the hyporheic zone of ephemeral streams*

Dr Mingrui Yuan, PhD, CMLR, *Role of organic and inorganic amendments in aggregation of base metal mine tailings*

Dr Fang You, PhD, CMLR, *Rehabilitation of Organic Carbon and Microbial Community Structure and Functions in Cu-Pb-Zn Mine Tailings for in situ Engineering Technosols*

Dr Weiran Zuo, PhD, JKMRC, *A study of the applications and modelling of high voltage pulse comminution for mineral ores*

STUDENT AWARDS

Ian Morley Award 2015

The 26th Ian Morley prize was awarded to Bianca Foggatto. The Ian Morley prize is greatly valued by JKMRC students, and acknowledges the best overall performance by an RHD student, not only in their research work, but in their contributions to the cultural life of the JKMRC.

SMI Research Higher Degree Conference

Carlos Espejel (JKMRC) won the award for best presentation, and Rebekah Ramsay (CSRM) won both the runner up for best presentation and the people's choice award.

SMI 3 Minute Thesis

Philippa Dodshon was the winner of the 2015 SMI 3MT competition with her presentation "What's the definition of insanity?" The two runners up were Erica Avelar with "The Gold Baker" and Ceit Wilson with "Steering Social Outcomes in Energy Resource Communities".



AWARDS

RISKGATE honoured with ACARP Excellence Award

RISKGATE, an online risk management system designed by researchers from SMI's Minerals Industry Safety & Health Centre, was recognised in Brisbane on September 17 at the 2015 ACARP Research and Industry Excellence Awards. The ACARP awards are given to people who have advanced an area of importance to the Australian coal industry. An important criteria is the likelihood of the results from the project being applied on mines.

Vice-Chancellor's Alumni Excellence Award

Dr Jeffrey Dawes, a former JKMRC PhD student who now heads up Komatsu Latin America, was honoured by The University of Queensland with a Vice-Chancellor's Alumni Excellence Award. Dr Dawes, whose 1987 thesis looked at the study of blast performance and design through the analysis of ground vibrations, has occupied increasingly senior positions with several companies during his career. These positions have culminated in his appointment as President and CEO of Komatsu Latin America where he is responsible for the Komatsu owned distributors in Latin America, as well as the Komatsu regional entity.

Australia Day Awards

BRC Adjunct Professor and Board member Dan Wood was recognised with the Order of Australia in 2015 Australia Day awards. Mr Wood was honoured for his distinguished service to the mining and resource industry, particularly mineral exploration, through contributions as a geologist, academic and in executive roles.

JKMRC's original international student honoured

JKMRC's first international student, and third ever graduate, Professor TC Rao, who is also known as the 'father of Indian mineral processing', was honoured with the Award for Outstanding Achievement in Science & Technology at the 2015 Australian Alumni Excellence Awards – India.



PROFESSIONAL SERVICE

Associate Professor Thomas Baumgartl

Applied Clay Science, *Editorial Board*

International Soil and Water Conservation Research, *Editorial Board Member*

Soil and Tillage Research, *Editorial Advisory Board*

European Journal of Soil Science, *Associate Editor*

Environmental Geochemistry and Health, *Associate Editor*

Soils, *Editorial Board*

Professor Robin Burgess-Limerick

Applied Ergonomics, *Editorial Board*

Ergonomics Open Journal, *Editorial Advisory Board*

International Ergonomics Association, *Mining Technical Committee Chair*

International Ergonomics Association Melbourne 2015 Congress, *Organising Committee Member*

Professor Gideon Chitombo

Innovative Technologies and Concepts for the Intelligent Deep Mine of the Future, *Advisory Board Member*

Networks of Centres of Excellence on Ultra Deep Mining Network, *Expert Panel Member*

Professor David Cliff

Australian Occupational Health and Safety Education Accreditation Board, *Academic Representative*

National Research Council Board on Human Systems Integration's Mine Safety: Essential Components of Self-Escape, *Member*

OHSSc Program Advisory, *Committee Member*

Queensland Underground Coal Mines, *Organising Committee Member for level one emergency simulation exercises*

Safety in Mines Testing and Research Station Advisory Board, *External Board Member*

Technical Steering Committee for the Coal Mining Abatement Technology Support Program, *Alternate Member*

Advisory Group for Coal Workers Health Scheme, *Independent chairman*

Dr Glen Corder

IChemE in Australia Board, *Technical Policy Director*
AusIMM Community and Environment Society, *Committee Member*
AusIMM Continuing Professional Development, *Committee Member*

Dr Jo-Anne Everingham

Australian Evaluation Society (*member*)
International Association of Impact Assessment (*member*)
International Rural Sociology Association (*member*)

Dr Mansour Edraki

Organising committee, Australian Acid and Metalliferous Drainage Workshops, *Chair*

Associate Professor Longbin Huang

Asia Pacific Biochar Conference 2016, Oct 19-23, 2016, Gangwon Province, Korea, *Co-chairperson*
Key Research Laboratory, Land Consolidation and Rehabilitation Centre, Ministry of Land and Resources, China, *Member of Academy Committee*

Associate Professor Deanna Kemp

Expert Panel for the International Council of Mining and Metals New Member Review Process, *Member*
Advisory Board, Institute of Human Rights and Business (IHRB), *Member*
Journal of Impact Assessment and Project Appraisal, *Editorial Board Member*
Journal of Corporate Social Responsibility and Environmental Management, *Editorial Board Member*
Journal of Development Studies Research, *Editorial Board Member*
Journal of Extractive Industries and Society, *Editorial Board Member*

Professor Chris Moran

Journal for Cleaner Production, *Subject Editor: Sustainability in the Resources Sector*
Centre for International Minerals and Energy Law Advisory Board, *Member*

Professor David Mulligan

Alligator Rivers Region Technical Committee, *Independent Member*
Bathurst Resources Escarpment Mine, New Zealand, *Independent Peer Review Panel Member*
International Affiliation of Land Reclamationists, *Australian representative*
Fourth International Seminar on Environmental Issues in Mining (Enviromine), Lima, Peru 2015, *Co-chair*
Life-of-Mine International Conference, Brisbane, Australia 2016, *Organising Committee Chair*
First International Congress on Planning for Closure of Mining Operations, Santiago, Chile 2016, *Co-chair*
Greening Australia, *Advisory Councillor*

Associate Professor Barry Noller

National Association of Testing Authorities, *Technical Expert (Environmental Testing)* of the Chemical Accreditation Advisory Committee. Appointed 25 November 2014 for 5 years.

Professor Malcolm Powell

Australian Institute of Mining and Metallurgy, *Fellow*
South African Institute of Mining and Metallurgy, *Fellow*

Associate Professor Will Rifkin

Commonwealth Office of Learning and Teaching, *National Assessor for Teaching Awards*
Science and Mathematics Network of Australian University Educators, *Steering Committee Member*
University of Sydney, School of Physics, *Honorary Associate Professor*
Rural Sociology Journal, *Editorial board*

Professor Margaretha Scott

Australian Institute of Mining and Metallurgy, *Member*
International Symposium on Mineral Exploration, Division of Exploration Technology in Mining and Materials Processing Institute of Japan, *Organising Committee Member*
Queensland Exploration Council, *Academic Working Group – Member*
Society of Economic Geologists, *Member*

Professor Jim Underschultz

Australian National Low Emissions Coal, *Research and Development Science Leader*
International Standards Carbon Capture and Storage Committee, *Working Group Member*
Standards Australia Carbon Capture and Storage Mirror Committee, *Member*
The Peter Cook Centre for Carbon Capture and Storage Research (University of Melbourne)
Science Advisory Committee, *Member*
Geotechnical Reference Group for the CTSCo Surat CCS Project, *Chair*

Corinne Unger

AusIMM Community and Environment Society, *Immediate Past Chair*
AusIMM Board of Chartered Professionals, *Board Member*

Associate Professor Sue Vink

Coal Seam Gas water use proposals in the Queensland Murray-Darling Basin: Impacts on aquatic ecosystems, *Steering Committee Member*
Fitzroy Basin Association Partnership for River Health Science Panel, *Member*
Healthy Headwater Coal Seam Gas Water Feasibility Study, *Advisor*
Queensland Resources Council Water Group, *Science Advisor*
Water in Mining Conference, *Organising Committee Member*

Dr Tony Webster

AusIMM Heritage Committee, *Corresponding Member*
Australian Journal of Earth Sciences, *Associate Editor* Queensland
Division of the Geological Society of Australia, *Chair* Geoscience
Society Committee of the AusIMM, *Member*

The Reverend Professor Rodney Wolff

Applied Stochastic Models in Business and Industry, *Editorial Board*
Computational Statistics, *Editorial Board*

PUBLICATIONS

SMIBRC

WH Bryan Mining &
Geology Research Centre

Lechner, Alex Mark, McIntyre, Neil, Bulovic, Nena, Kujala, Heini, Whitehead, Amy, Webster, Anthony, Wintle, Brendan, Rifkin, Will and Scott, Margaretha (2015). A GIS tool for land and water use planning in mining regions. In: T. Weber, M. J. McPhee and R. S. Anderssen, MODSIM2015: 21st International Congress on Modelling and Simulation. Modelling and Simulation Society of Australia and New Zealand. International Congress on Modelling and Simulation, Gold Coast, QLD, Australia, (1359-1365). 29 November to 4 December 2015.

Pal, Mahendra K and Porwal, Alok (2015) A Local Brightness Normalization (LBN) algorithm for destriping Hyperion images. International Journal of Remote Sensing, 36 10: 2674-2696. doi:10.1080/01431161.2015.1043761

Shen, Leo and Wolff, Rodney C. (2015) On p-confidence intervals for g-expectations. Communications on Stochastic Analysis, 9 2: 205-212.

Singer, Donald A. and Menzie, W.David (2015) Comment on “metallic mineral resources in the twenty-first century: I. historical Extraction trends and expected demand” by Alberto E. Patino Douce, in natural resources research DOI: 10.1007/s11053-015-9266-z. Natural Resources Research. doi:10.1007/s11053-015-9272-1

Webster, Anthony and Braniff, Victoria (2015). The Savage River Magnetite Orebodies: Structural and Textural Clues to the Origin of Tasmania's Largest Metal Deposit. In: Online Conference Publications. SEG 2015: World Class Ore Deposits: Discovery to Recovery, Hobart, TAS, Australia, 27-30 September 2015.

Webster, Anthony and Murphy, Travis (2015). Challenges of Accurately Characterizing the Ore and Host Rocks of Deep Mineral Discoveries. In: Online Conference Publications. SEG 2015: World Class Ore Deposits: Discovery to Recovery, Hobart, TAS, Australia, 27-30 September 2015.

SMICMLR

Centre for Mined Land
Rehabilitation

Alvarado, Miguel, Gonzalez, Felipe, Fletcher, Andrew and Doshi, Ashray (2015) Towards the development of a low cost airborne sensing system to monitor dust particles after blasting at open-pit mine sites. Sensors (Switzerland), 15 8: 19703-19723. doi:10.3390/s150819667

Amin, R., Edraki, M., Mulligan, D. R. and Gultom, T. H. (2015) Chromium and nickel accumulation in the macrophytes of the Kawasi wetland on Obi Island, North Maluku Province, Indonesia. Australian Journal of Botany, 63 7: 549-553. doi:10.1071/BT15066

Baumgartl, Thomas, Farioli, Andrea and Arnold, Sven (2015). Integration of climate analysis into a framework for cover design. In: Adrian Brown, Linda Figueroa, Jacques Wiertz, Charles Bucknam, Joanna Burgess, Manuel Carballo, Devin Castendyk, Lisa Kirk, Virginia McLemore, James McPhee, Mike O'Kane, Robert Seal, David Williams, Ward Wilson and Christian Wolkersdorfer, 10th ICARD | IMWA 2015 Conference – Agreeing on solutions for more sustainable mine water management. 10th International Conference on Acid Rock Drainage and Annual IMWA Conference, Santiago, Chile, (1-9). 21-24 April 2015.

Bergstrom, Dana M, Bricher, Philippa K, Raymond, Ben, Terauds, Aleks, Doley, David, McGeoch, Melodie, Whinam, Jennie, Glen, Morag, Yuan, Ziqing, Kiefer, Kate, Shaw, Justine D, Bramely-Alves, Jessica, Rudman, Tim, Mohammed, Caroline, Lucieer, Arko, Visoiu, Micah, Jansen van Vuuren, Bettine and Ball, Marilyn C (2015) Rapid collapse of a sub-Antarctic alpine ecosystem: The role of climate and pathogens. Journal of Applied Ecology, 52 3: 774-783. doi:10.1111/1365-2664.12436

Brownstein, G., Johns, C., Fletcher, A., Pritchard, D. and Erskine, P.D. (2015) Ecotones as indicators: Boundary properties in wetland-woodland transition zones. Community Ecology, 16 2: 235-243. doi:10.1556/168.2015.16.2.11

De Silva, Shamali, Ball, Andrew S., Huynh, Trang and Reichman, Suzie M. (2015) Metal accumulation in roadside soil in Melbourne, Australia: effect of road age, traffic density and vehicular speed. Environmental Pollution, 208 102-109. doi:10.1016/j.envpol.2015.09.032

Diacomanolis, V., Noller, B.*, Taga, R.*, Harris, H., Aitken, J. \$ Ng, J. (2015) Relationship of arsenic speciation and bioavailability in mine wastes for human health risk assessment. Environmental Chemistry

Doley, David and Audet, Patrick (2015). Identifying natural and novel ecosystem goals for rehabilitation of postmining landscapes. In Michelle E. Jarvie-Eggart (Ed.), *Responsible mining: case studies in managing social and environmental risks in the developed world* (pp. 609-638) Englewood, CO, United States: Society for Mining, Metallurgy and Exploration.

Doshi, Ashray A., Postula, Adam J., Fletcher, Andrew and Singh, Surya P. N. (2015) Development of micro-UAV with integrated motion planning for open-cut mining surveillance. *Microprocessors and Microsystems*, 1-7. doi:10.1016/j.micpro.2015.07.008

Du, Yumei, Kopittke, Peter M., Noller, Barry N., James, Simon A., Harris, Hugh H., Xu, Zhi Ping, Li, Peng, Mulligan, David R. and Huang, Longbin (2015) In situ analysis of foliar zinc absorption and short-distance movement in fresh and hydrated leaves of tomato and citrus using synchrotron-based X-ray fluorescence microscopy. *Annals of Botany*, 115 1: 41-53. doi:10.1093/aob/mcu212

Du, Yumei, Li, Peng, Nguyen, Anh V., Xu, Zhi Ping, Mulligan, David and Huang, Longbin (2015) Zinc uptake and distribution in tomato plants in response to foliar supply of Zn hydroxide-nitrate nanocrystal suspension with controlled Zn solubility. *Journal of Plant Nutrition and Soil Science*, 178 5: 722-731. doi:10.1002/jpln.201400213

Echevarria, Guillaume, Baker, Alan J. M., Benizri, Emile, Houzelot, Vivian, Laubie, Baptiste, Kidd, Petra S., Morel, Jean Louis, Pons, Marie-Noelle, Simonnot, Marie-Odile, Zhang, Xun and van der Ent, Antony (2015). Agromining for nickel: a complete chain that optimizes ecosystem services rendered by ultramafic landscapes. In: 13th International Conference on the Biogeochemistry of Trace Elements (ICOBTE). 13th International Conference on the Biogeochemistry of Trace Elements (ICOBTE), Fukuoka, Japan, 12–16 July 2015.

Ellis, W.* , Fitzgibbon, S.* , Pye, G., Whipple, B., Barth, B., Johnston, S. et al. (2015) The role of bioacoustics signals in koala sexual selection: Insights from seasonal patterns of associations revealed with GPSProximity units. *PLoS ONE*, 10(7).

Fan, Junliang, Baumgartl, Thomas, Scheuermann, Alexander and Lockington, David A. (2015) Modeling effects of canopy and roots on soil moisture and deep drainage. *Vadose Zone Journal*, 14 2. doi:10.2136/vzj2014.09.0131

Fan, Junliang, Scheuermann, Alexander, Guyot, Adrien, Baumgartl, Thomas and Lockington, David A. (2015) Quantifying spatiotemporal dynamics of root-zone soil water in a mixed forest on subtropical coastal sand dune using surface ERT and spatial TDR. *Journal of Hydrology*, 523 475-488. doi:10.1016/j.jhydrol.2015.01.064

Fitzgibbon, S.* (2015) Reproductive ecology of the northern brown bandicoot (*Isodon macrourus*) in habitat fragments of urban Brisbane. *Australian Mammalogy*, 37(2): 253-259.

Forsyth, Bronwen, Edraki, Mansour and Baumgartl, Thomas (2015). The evolution of tailings seepage chemistry at one of Australia's largest and longest operating mines. In: Adrian Brown, Charles Bucknam, Joanna Burgess, Manuel Carballo, Devin Castendyk, Linda Figueroa, Lisa Kirk, Virginia McLemore, James McPhee, Mike O'Kane, Robert Seal, Jacques Wiertz, David Williams, Ward Wilson and Christian Walkersdorfer, 10th ICARD, IMWA 2015 Conference – Agreeing on solutions for more sustainable mine water management. 10th International Conference on Acid Rock Drainage and Annual IMWA Conference, Santiago, Chile, (1-11). 21-24 April 2015.

Gillespie, Melina, Glenn, Vanessa and Doley, David (2015) Reconciling waste rock rehabilitation goals and practice for a phosphate mine in a semi-arid environment. *Ecological Engineering*, 85 1-12. doi:10.1016/j.ecoleng.2015.09.063

Halwatura, D., Lechner, A. M. and Arnold, S. (2015) Drought severity–duration–frequency curves: a foundation for risk assessment and planning tool for ecosystem establishment in post-mining landscapes. *Hydrology and Earth System Sciences*, 19 2: 1069-1091. doi:10.5194/hess-19-1069-2015

Halwatura, Devanmini, Lechner, Alex and Arnold, Sven (2015) Design droughts: a new planning tool for ecosystem rehabilitation. *International Journal of GEOMATE*, 8 1: 1138-1142.

Huang, Longbin, Li, Xiaofang and Nguyen, Tuan A. H. (2015) Extremely high phosphate sorption capacity in Cu-Pb-Zn mine tailings. *PLoS One*, 10 8: 1-15. doi:10.1371/journal.pone.0135364

Huynh, Trang, Harris, Hugh, Zhang, Hao and Noller, Barry (2015) Measurement of labile arsenic speciation in water and soil using Diffusive Gradients in Thin-films (DGT) and X-ray Absorption Near Edge Spectroscopy (XANES). *Environmental Chemistry*, 12 2: 102-111. doi:10.1071/EN14047

Jiang, Shasha, Huang, Longbin, Nguyen, Tuan A. H., Ok, Yong Sik, Rudolph, Victor, Yang, Hong and Zhang, Dongke (2015) Copper and zinc adsorption by softwood and hardwood biochars under elevated sulphate- induced salinity and acidic pH conditions. *Chemosphere*, 142 64-71. doi:10.1016/j.chemosphere.2015.06.079

Johns, C. V., Brownstein, G., Fletcher, A., Blick, R. A. J. and Erskine, P. D. (2015) Detecting the effects of water regime on wetland plant communities: which plant indicator groups perform best?. *Aquatic Botany*, 123 54-63. doi:http://dx.doi.org/10.1016/j.aquabot.2015.02.002

Johns, Caitlin V., Brownstein, Gretchen, Blick, Raymond A. J., Erskine, Peter D. and Fletcher, Andrew T. (2015) Testing the power of a wetland vegetation monitoring survey design to detect change based on visual cover estimates. *Wetlands*, 35 6:1055-1064. doi:10.1007/s13157-015-0694-7

Kuchel, L., Wilson, R. & Ellis, W.* (2015) Cameras, competition and creativity: assessing 1st year ecology in the field. *International Journal of innovation in Science and Mathematics Education*, 23(2): 34-35.

Lamb, David and McDonald, Tein (2015) Harnessing reforestation to achieve greater biodiversity gains: Interview with David Lamb. *Ecological Management and Restoration*, 16 1: 2-13. doi:10.1111/emr.12147

Lamb, David, Erskine, Peter D and Fletcher, Andrew (2015) Widening gap between expectations and practice in Australian minesite rehabilitation. *Ecological Management and Restoration*, 16 3: 186-195. doi:10.1111/emr.12179

Li, Xiaofang, Bond, Philip L., Van Nostrand, Joy D., Zhou, Jizhong and Huang, Longbin (2015) From lithotroph- to organotrophdominant: directional shift of microbial community in sulphidic tailings during phytostabilization. *Scientific Reports*, 5 Art No.: 12978. doi:10.1038/srep12978

Li, Xiaofang, You, Fang, Bond, Philip L. and Huang, Longbin (2015) Establishing microbial diversity and functions in weathered and neutral Cu–Pb–Zn tailings with native soil addition. *Geoderma*, 247-248 108-116. doi:10.1016/j.geoderma.2015.02.010

Li, Xiaofang, Zhu, Yong-Guan, Shaban, Babak, Bruxner, Timothy J. C., Bond, Philip L. and Huang, Longbin (2015) Assessing the genetic diversity of Cu resistance in mine tailings through high-throughput recovery of full-length copA genes. *Scientific Reports*, 5 1-11. doi:10.1038/srep13258

McAlpine, Clive, Lunney, Daniel, Melzer, Alistair, Menkhorst, Peter, Phillips, Stephen, Phalen, David, Ellis, William, Foley, William, Baxter, Greg, de Villiers, Deidre, Kavanagh, Rodney, Adams-Hosking, Christine, Todd, Charles, Whisson, Desley, Molsher, Robyn, Walter, Michele, Lawler, Ivan and Close, Robert (2015) Conserving koalas: a review of the contrasting regional trends, outlooks and policy challenges. *Biological Conservation*, 192 226-236. doi:10.1016/j.biocon.2015.09.020

McCaffrey, Nic, Fletcher, Andrew, Erskine, Peter, Mulligan, David and Giddens, Michael (2015) Democratisation of biological collections: developing an online image herbarium for mine rehabilitation sites in Queensland. *Australasian Plant Conservation*, 24 1: 9-11.

Mesjasz-Przybyłowicz, Jolanta, Przybyłowicz, Wojciech, Barnabas, Alban and van der Ent, Antony (2015) Extreme nickel hyperaccumulation in the vascular tracts of the tree *Phyllanthus balgooyi* from Borneo. *New Phytologist*. doi:10.1111/nph.13712

Ngugi, Michael R., Doley, David, Cant, Mark and Botkin, Daniel B. (2015) Growth rates of Eucalyptus and other Australian native tree species derived from seven decades of growth monitoring. *Journal of Forestry Research*, 26 4: 811-826. doi:10.1007/s11676-015-0095-z

Ngugi, Michael R., Neldner, Victor J., Doley, David, Kusy, Brano, Moore, Darren and Richter, Christian (2015) Soil moisture dynamics and restoration of self-sustaining native vegetation ecosystem on an open-cut coal mine. *Restoration Ecology*, 23 5: 615-624. doi:10.1111/rec.12221

Nguyen, Huong, Herbohn, John, Clendenning, Jessica, Lamb, David, Dressler, Wolfram, Vanclay, Jerry and Firn, Jennifer (2015) What is the available evidence concerning relative performance of different designs of mixed-species plantings for smallholder and community forestry in the tropics? A systematic map protocol. *Environmental Evidence*, 4 15. doi:10.1186/s13750-015-0041-8

Park, J.*, Edraki, M.* & Baumgartl, T.* (2015) A practical testing approach to predict the geochemical hazards of in-pit coal mine tailings and rejects. *Catena* doi:10.1016/j.catena.2015.10.027

Reading, L. P., Lockington, D. A., Bristow, K.L. and Baumgartl, T. (2015) Are we getting accurate measurements of Ksat for sodic clay soils?. *Agricultural Water Management*, 158 120-125. doi:10.1016/j.agwat.2015.04.015

Santini, Talitha C. (2015) Application of the Rietveld refinement method for quantification of mineral concentrations in bauxite residues (alumina refining tailings). *International Journal of Mineral Processing*, 139 10 June 2015: 1-10. doi:10.1016/j.minpro.2015.04.004

Santini, Talitha C. and Fey, Martin V. (2015) Assessment of Technosol formation and in situ remediation in capped alkaline tailings. *Catena*, 136 17-29. doi:10.1016/j.catena.2015.08.006

Santini, Talitha C., Fey, Martin V. and Gilkes, Robert J. (2015) Experimental simulation of long term weathering in alkaline bauxite residue tailings. *Metals*, 5 3:1241-1261. doi:10.3390/met5031241

Santini, Talitha C., Kerr, Janice L. and Warren, Lesley A. (2015) Microbially-driven strategies for bioremediation of bauxite residue. *Journal of Hazardous Materials*, 293 131-157. doi:10.1016/j.jhazmat.2015.03.024

Santini, Talitha C., Warren, Lesley A. and Kendra, Kathryn E. (2015) Microbial diversity in engineered haloalkaline environments shaped by shared geochemical rivers observed in natural analogues. *Applied and Environmental Microbiology*, 81:5026-5036. doi:10.1128/AEM.01238-15

Shao, Qi, Weatherley, Dion, Huang, Longbin and Baumgartl, Thomas (2015) RunCA: a cellular automata model for simulating surface runoff at different scales. *Journal of Hydrology*, 529 P3: 816-829. doi:10.1016/j.jhydrol.2015.09.003

- Somparn, A., Iwai, C. B. and Noller, B. (2015) Potential use of acetylcholinesterase, glutathione-S-transferase and metallothionein for assessment of contaminated sediment in tropical chironomid, *Chironomus javanus*. *Journal of Environmental Biology*, 36 6: 1355-1359.
- Tierney, D. A., Fletcher, A. T. and Erskine, P. D. (2015) Standard survey designs drive bias in the mapping of upland swamp communities. *Austral Ecology*, 40 7:782-793. doi:10.1111/aec.12253
- van der Ent, Antony (2015) Growing nickel from trees. *The AusIMM Bulletin*, February: 80-82. van der Ent, Antony (2015) Heavy Metal Farming. *Australasian Science*, 36 4: 26-27.
- van der Ent, Antony (2015). Key values of metallophytes for the minerals industry in Australasia. In Mark Tibbett (Ed.), *Mining in ecologically sensitive landscapes* (pp.231-249) Collingwood, VIC, Australia: CSIRO Publishing.
- van der Ent, Antony and Mulligan, David (2015) Multi-element concentrations in plant parts and fluids of Malaysian nickel hyperaccumulator plants and some economic and ecological considerations. *Journal of Chemical Ecology*, 41 4: 396-408. doi:10.1007/s10886-015-0573-y
- van der Ent, Antony and Reeves, Roger D. (2015) Foliar metal accumulation in plants from copper-rich ultramafic outcrops: case studies from Malaysia and Brazil. *Plant and Soil*, 1-2 389: 401-418. doi:10.1007/s11104-015-2385-9
- van der Ent, Antony and Wong, K. M. (2015) Range extension of *Christisonia scortechinii* from mainland Southeast Asia into Borneo, and notes on the distinction between *Aeginetia* and *Christisonia* (Orobanchaceae). *Botanical Studies*, 56 1:28.1-28.10. doi:10.1186/s40529-015-0109-3
- van der Ent, Antony, Baker, Alan J. M., Reeves, Roger D., Chaney, Rufus L., Anderson, Christopher W. N., Meech, John A., Erskine, Peter D., Simonnot, Marie-Odile, Vaughan, James, Morel, Jean Louis, Echevarria, Guillaume, Fogliani, Bruno, Rongliang, Qiu and Mulligan, David R. (2015) Agromining: farming for metals in the future?. *Environmental Science and Technology*, 49 8: 4773-4780. doi:10.1021/es506031u
- van der Ent, Antony, Baker, Alan J.M., Reeves, Roger D., Pollard, A. Joseph and Schat, Henk (2015) A Commentary on "Toward a more physiologically and evolutionarily relevant definition of metal hyperaccumulation in plants". *Frontiers in Plant Science*, 6 JULY: 1-3. doi:10.3389/fpls.2015.00554
- van der Ent, Antony, Echevarria, Guillaume, Morel, Jean Louis, Simonnot, Marie-Odile, Benizri, Emile, Baker, Alan and Erskine, Peter (2015). Current developments in agromining and phytomining. In: *Mineral Resources in a Sustainable World*. 13th Society for Geology Applied to Mineral Deposits, Nancy, France, 24-27 August, 2015.
- van der Ent, Antony, Erskine, Peter and Sumail, Sukaibin (2015) Ecology of nickel hyperaccumulator plants from ultramafic soils in Sabah (Malaysia). *Chemoecology*, 25 5: 243-259. doi:10.1007/s00049-015-0192-7
- van der Ent, Antony, Harris, Hugh H., Erskine, Peter D. and Echevarria, Guillaume (2015). Synchrotron X-ray fluorescence imaging elucidates fine-scale elemental distribution in *Rinorea bengalensis* and *R. javanica* (Violaceae). In: 13th International Conference on the Biogeochemistry of Trace Elements (ICOBTE). 13th International Conference on the Biogeochemistry of Trace Elements (ICOBTE), Fukuoka, Japan, 12–16 July 2015.
- van der Ent, Antony, Jaffre, Tanguy, L'Huillier, Laurent, Gibson, Neil and Reeves, Roger D. (2015) The flora of ultramafic soils in the Australia-Pacific Region: state of knowledge and research priorities. *Australian Journal of Botany*, 63 3-4: 173-190. doi:10.1071/BT15038
- van der Ent, Antony, Mesjasz-Przybylowicz, Jolanta, Przybylowicz, Wojciech and Barnabas, Alban (2015). Micro-PIXE study of *Phyllanthus balgooyi*, nickel hyperaccumulating tree from Sabah (Malaysia). In: 14th International Conference on Particle Induced X-Ray Emission: PIXE in outreach research. 14th International Conference on Particle Induced X-Ray Emission, Cape Town, South Africa, (58-58). 25 February– 3 March 2015.
- van der Ent, Antony, Rajakaruna, Nishanta, Boyd, Robert, Echevarria, Guillaume, Repin, Rimi and Williams, Dick (2015) Global research on ultramafic (serpentine) ecosystems (8th International Conference on Serpentine Ecology in Sabah, Malaysia): a summary and synthesis. *Australian Journal of Botany*, 63 2: iii-iv. doi:10.1071/BT15060
- van der Ent, Antony, Repin, Rimi, Sugau, John and Wong, Khoon Meng (2015) Plant diversity and ecology of ultramafic outcrops in Sabah (Malaysia). *Australian Journal of Botany*, 63 3-4: 204-215. doi:10.1071/BT14214
- van der Ent, Antony, Sumail, Sukaibin and Clarke, Charles (2015) Habitat differentiation of obligate ultramafic *Nepenthes* endemic to Mount Kinabalu and Mount Tambuyukon (Sabah, Malaysia). *Plant Ecology*, 216 6: 789-807. doi:10.1007/s11258-015-0468-6
- van der Ent, Antony, van Vugt, Rogier and Wellinga, Simon (2015) Ecology of *Paphiopedilum rothschildianum* at the type locality in Kinabalu Park (Sabah, Malaysia). *Biodiversity and Conservation*, 24 7: 1641-1656. doi:10.1007/s10531-015-0881-0
- Williams, Elizabeth R. and Thomson, Bruce (2015) Improving population estimates of Glossy Black-Cockatoos (*Calyptorhynchus lathami*) using photo-identification. *Emu*, 115 4: 360-367. doi:10.1071/MU15041

You, Fang, Dalal, Ram, Mulligan, David and Huang, Longbin (2015) Quantitative Measurement of Organic Carbon in Mine Wastes: Methods Comparison for Inorganic Carbon Removal and Organic Carbon Recovery. *Communications in Soil Science and Plant Analysis*, 46 Supplement 1: 375-389. doi:10.1080/00103624.2014.989113



Adam, A. B., Owen, John R. and Kemp, D. (2015) Households, livelihoods and mining-induced displacement and resettlement. *Extractive Industries and Society*, 23: 581-589. doi:10.1016/j.exis.2015.05.002

Adams, Matthew P., Saunders, Megan I., Maxwell, Paul S., Tuazon, Daniel, Roelfsema, Chris M., Callaghan, David P., Leon, Javier, Grinham, Alistair R. and O'Brien, Katherine R. (2015) Prioritizing localized management actions for seagrass conservation and restoration using a species distribution model. *Aquatic Conservation: Marine and Freshwater Ecosystems*. doi:10.1002/aqc.2573 2.29119 09

Ali, H. Saleem and Nawaz, Shuja (2015). Pakistan's ecological precipice: An opportunity for redefining security. In David Reed (Ed.), *In pursuit of prosperity: U.S foreign policy in an era of natural resource scarcity* (pp. 280-300) New York, United States: Routledge.

Ali, Saleem H. (2015). Power and peace: how nations can go nuclear without weapons. In John Watson (Ed.), *Politics, policy & the chance of change* (pp. 22-29) Melbourne, VIC, Australia: Melbourne University Press.

Ali, Saleem H. and Pincus, Rebecca (2015). A cold prelude to a warming world. In Rebecca H. Pincus and Saleem H. Ali (Ed.), *Diplomacy on ice: energy and the environment in the Arctic and Antarctic* (pp. 1-10) New Haven, CT, United States: Yale University Press.

Bangerter, Philip J., Corder, Glen D., Giurco, Damien, McLellan, Ben C. and Murphy, Andrew (2015). Sustainability in plant design. In *Metallurgical plant design* (pp. 151-179) Montreal, Canada: Canadian Institute of Mining, Metallurgy and Petroleum.

Benjamin C McLellan (2015). Challenges and merits of choosing alternative functional units. In Subramanian Senthilkannan Muthu (Ed.), *The Carbon Footprint Handbook* (pp. 45-60) Boca Raton, FL United States: CRC Press.

Corder, G. D., Golev, A. and Giurco, D. (2015) "Wealth from metal waste": Translating global knowledge on industrial ecology to metals recycling in Australia. *Minerals Engineering*, 76 2-9. doi:10.1016/j.mineng.2014.11.004

Dalaibuyan, Byambajav (2015). Mining, "social license" and local level agreements in Mongolia. In: Dick Pratt, *Proceedings from the International Conference on Perspectives on the Development of Energy and Mineral Resources Hawaii, Mongolia and Germany. International Conference on Perspectives on the Development of Energy and Mineral Resources Hawaii, Mongolia and Germany, Honolulu, Hawaii, United States, 11-13 February, 2015*

DeGeorges, Damien and Ali, Saleem H. (2015). Connecting China through "Creative Diplomacy": Greenland, Australia, and climate cooperation in polar regions. In Rebecca H. Pincus and Saleem H. Ali (Ed.), *Diplomacy on ice: energy and the environment in the Arctic and Antarctic* (pp. 151-160) New Haven, CT, United States: Yale University Press.

Everingham, Jo-Anne and Franks, Daniel M. (2015). Development of mining-affected regions: the influence of the Commonwealth in a state dominated sphere. In Anthony Hogan and Michelle Young (Ed.), *Rural and regional futures* (pp. 282-298) London, United Kingdom: Routledge.

Everingham, Jo-Anne, Devenin, Veronica and Collins, Nina (2015) "The beast doesn't stop": The resource boom and changes in the social space of the Darling Downs. *Rural Society*, 24 1: 42-64. doi:10.1080/10371656.2014.1001480

Farzaneh, Hooman, McLellan, Benjamin and Ishihara, Keichi N. (2015) Toward a CO2 zero emissions energy system in the Middle East Region. *International Journal of Green Energy*. doi:10.1080/15435075.2014.889014

Franks, Daniel M. and Davis, Rachel (2015) The costs of conflict. *SUSTAIN: Cutting Edge Business Solutions*, 2 February: 58-59.

Franks, Daniel M. *Mountain movers: mining, sustainability and the agents of change*. London, United Kingdom: Earthscan and Routledge, 2015.

Furgusson, Lee and Bangerter, Philip J. (2015) Principles of Environmental Remediation in Open and Closed Systems: A Case Study of the Lake Dianchi Drainage Basin. *International Journal of Engineering Sciences and Research Technology*, 4 5:

Golev, Artem (2015) The maturing of the rare earths sector?. *Australian Resources and Investment*, 9 3: 103-104.

- Golev, Artem and Corder, Glen (2015) Modelling metal flows in the Australian economy. *Journal of Cleaner Production*, 112 4296-4303. doi:10.1016/j.jclepro.2015.07.083 3.32861000
- Gotzmann, Nora, Vanclay, Frank and Seier, Frank (2015) Social and human rights impact assessments: what can they learn from each other?. *Impact Assessment and Project Appraisal*, 1-10. doi:10.1080/14615517.2015.1096036
- Graetz, Geordan (2015) Energy for whom? uranium mining, indigenous people, and navigating risk and rights in Australia. *Energy Research and Social Science*, 8113-126. doi:10.1016/j.erss.2015.05.006
- Graetz, Geordan (2015) Ranger Uranium Mine and the Mirarr (Part 1), 1970-2000: the risks of 'riding roughshod'. *Extractive Industries and Society*, 2 1: 132-141. doi:10.1016/j.exis.2014.10.004
- Graetz, Geordan (2015) Ranger uranium mine and the Mirarr (Part 2), 2000-2014: 'A risk to them is a risk to us'. *Extractive Industries and Society*, 2 1: 142-152. doi:10.1016/j.exis.2014.10.005
- Graetz, Geordan and Franks, Daniel M. (2015) Conceptualising social risk and business risk associated with private sector development projects. *Journal of Risk Research*. doi:10.1080/13669877.2014.1003323
- Halwatura, D., Lechner, A. M. and Arnold, S. (2015) Drought severity–duration–frequency curves: a foundation for risk assessment and planning tool for ecosystem establishment in post-mining landscapes. *Hydrology and Earth System Sciences*, 19 2: 1069-1091. doi:10.5194/hess-19-1069-2015
- Horsley, Julia, Prout, Sarah, Tonts, Matthew and Ali, Saleem H. (2015) Sustainable livelihoods and indicators for regional development in mining economies. *Extractive Industries and Society*, 2 2: 368-380. doi:10.1016/j.exis.2014.12.001
- Huang, Ganlin and Ali, Saleem H. (2015) Local sustainability and gender ratio: evaluating the impacts of mining and tourism on sustainable development in Yunnan, China. *International Journal of Environmental Research and Public Health*, 12 1: 927-939. doi:10.3390/ijerph120100927
- Ives, Christopher D., Biggs, Duan, Hardy, Mathew J., Lechner, Alex M., Wolnicki, Mateusz and Raymond, Christopher M. (2015) Using social data in strategic environmental assessment to conserve biodiversity. *Land Use Policy*, 47 332-341. doi:10.1016/j.landusepol.2015.04.002
- Jamieson, Evan, McLellan, Benjamin, van Riessen, Arie and Nikraz, Hamid (2015) Comparison of embodied energies of Ordinary Portland Cement with Bayer-derived geopolymer products. *Journal of Cleaner Production*, 99 112-118. doi:10.1016/j.jclepro.2015.03.008
- Junior, Renzo Mori, Franks, Daniel M and Ali, Saleem (2015) Designing Sustainability Certification for Greater Impact - An analysis of the design characteristics of 15 sustainability certification schemes in the mining industry Brisbane QLD, Australia: Centre for Social Responsibility in Mining, The University of Queensland
- Kemp, Deanna and Owen, John (2015). The reality of remedy in mining and community relations: an anonymous case-study from Southeast Asia. In Mahdev Mohan and Cynthia Morel (Ed.), *Business and human rights in South East Asia: risk and the regulatory turn* (pp. 239-258) London, United Kingdom: Routledge.
- Kemp, Deanna, Harvey, Bruce and Barnes, Rodger (2015) Benchmarking leading practice in aboriginal business procurement in the extractive resource sector Brisbane, QLD, Australia: Centre for Social Responsibility in Mining
- Lechner, Alex M., Doerr, Veronica, Harris, Rebecca M. B., Doerr, Erik and Lefroy, Edward C. (2015) A framework for incorporating fine-scale dispersal behaviour into biodiversity conservation planning. *Landscape and Urban Planning*, 141 11-23. doi:10.1016/j.landurbplan.2015.04.008
- Lechner, Alex M., Harris, Rebecca M. B., Doerr, Veronica, Doerr, Erik, Drielsma, Michael and Lefroy, Edward C. (2015) From static connectivity modelling to scenario-based planning at local and regional scales. *Journal for Nature Conservation*, 28 78-88. doi:10.1016/j.jnc.2015.09.003
- Lechner, Alex Mark, McIntyre, Neil, Bulovic, Nena, Kujala, Heini, Whitehead, Amy, Webster, Anthony, Wintle, Brendan, Rifkin, Will and Scott, Margaretha (2015). A GIS tool for land and water use planning in mining regions. In: T. Weber, M. J. McPhee and R. S. Anderssen, MODSIM2015: 21st International Congress on Modelling and Simulation. Modelling and Simulation Society of Australia and New Zealand. International Congress on Modelling and Simulation, Gold Coast, QLD, Australia, (1359-1365). 29 November to 4 December 2015.
- Makki, Muhammad, Ali, Saleem H. and Van Vuuren, Kitty (2015) 'Religious identity and coal development in Pakistan': ecology, land rights and the politics of exclusion. *The Extractive Industries and Society*, 2 2: 276-286. doi:10.1016/j.exis.2015.02.002
- McLellan, Benjamin, Florin, Nick, Giurco, Damien, Kishita, Yusuke, Itaoka, Kenshi and Tezuka, Tetsuo (2015). Decentralised energy futures: The changing emissions reduction landscape. In: 22nd CIRP Conference on Life Cycle Engineering. 22nd CIRP Conference on Life Cycle Engineering, LCE 2015, Sydney, NSW Australia, (138-143). 7- 9 April 2015. doi:10.1016/j.procir.2015.02.052

McLellan, Benjamin C., Giurco, Damien P., Corder, Glen D., Golev, Artem, Kishita, Yusuke, Florin, Nick and Sharpe, Samantha (2015). Mineral-water-energy nexus: implications of localized production and consumption for industrial ecology. In: The Tipping Point: Vulnerability and Adaptive Capacity. 21st International Sustainable Development Research Society Conference: The Tipping Point: Vulnerability and Adaptive Capacity, Geelong, VIC, Australia, 10-12 July 2015.

McLellan, Benjamin, Tanaka, Yoshiki, Dinh, Thi Thu Huyen, Dinh, Huong Long, Jusakulvijit, Piradee, Freemantle, Faizi Ashley Taro and Hakimov, Aibek (2015). Carbon footprint of the operation and products of a restaurant: a study and alternative perspectives. In Subramanian Senthilkannan Muthu (Ed.), The Carbon footprint handbook (pp. 369-388) Boca Raton, FL United States: CRC Press.

Mori Junior, Renzo (2015) The Value of Third-Party Certification in Assuring Stakeholders' Compliance. The Code - The Newsletter of the International Cyanide Management Institute, 1-2.

O'Callaghan, Terry and Vivoda, Vlado (2015) Problems of regulatory governance in the mining sector in Asia. Transnational Corporations, 22 1: 31-57.

Owen, John R. and Kemp, Deanna (2015) Mining-induced displacement and resettlement: a critical appraisal. Journal of Cleaner Production, 87 C: 478-488. doi:10.1016/j.jclepro.2014.09.087

Raymond, C. M., Lechner, A. M., Lockwood, M., Carter, O., Harris, R. M. B. and Gilfedder, L. (2015) Private land manager capacity to conserve threatened communities under climate change. Journal of Environmental Management, 159 235-244. doi:10.1016/j.jenvman.2015.04.048

Rifkin, Will, Everingham, Jo-Anne, Witt, Kathy and Uhlmann, Vikki (2015) Lessons CSG operators can learn from Southern Queensland towns. Gas Today, Autumn 31: 76-79.

Smyth, Eddie, Steyn, Michael, Esteves, Ana Maria, Franks, Daniel M. and Vaz, Kemal (2015) Five 'big' issues for land access, resettlement and livelihood restoration practice: findings of an international symposium. Impact Assessment and Project Appraisal, 33 3: 220-225. doi:10.1080/14615517.2015.1037665

Tang, Xu, McLellan, Benjamin C., Snowden, Simon, Zhang, Baosheng and Hook, Mikael (2015) Dilemmas for China: Energy, economy and environment. Sustainability (Switzerland), 7 5: 5508-5520. doi:10.3390/su7055508

Vanclay, Frank, Esteves, Ana Maria, Aucamp, Ilse and Franks, Daniel M. (2015) Social Impact Assessment: Guidance for assessing and managing the social impacts of projects Fargo ND, United States: International Association for Impact Assessment

Vivoda, Vlado (2015). State-market interaction in hydrocarbon sector: the cases of Australia and Japan. In Andrei V. Belyi and Kim Talus (Ed.), States and markets in hydrocarbon sectors (pp. 240-264) Houndmills, Basingstoke, Hampshire, United Kingdom: Palgrave Macmillan. doi:10.1057/9781137434074.0019

Vivoda, Vlado and Graetz, Geordan (2015) Nuclear policy and regulation in Japan after Fukushima: navigating the crisis. Journal of Contemporary Asia, 45 3: 490-509. doi:10.1080/00472336.2014.981283

Wang, Ge, Zhang, Qi, McLellan, Benjamin C. and Li, Hailong (2015) Multi-region optimal deployment of renewable energy considering different interregional transmission scenarios. Energy, . doi:10.1016/j.energy.2015.08.060

Zhang, Qi, McLellan, Benjamin C. and Li, Hailong (2015) An integrated scenario analysis for future zero-carbon energy system. International Journal of Energy Research, 39 7: 993-1010. doi:10.1002/er.3313

SMICWIMI

Centre for Water in the
Minerals Industry

Cranston, Peter S. and Krosch, Matt N. (2015) DNA sequences and austral taxa indicate generic synonymy of *Paratrichocladius* Santos-Abreu with *Cricotopus* Wulp (Diptera: Chironomidae). Systematic Entomology, 40 4: 719-732. doi:10.1111/syen.12130

Hunter, Jane, Brooking, Charles, Reading, Lucy and Vink, Sue (2015) A web-based system enabling the integration, analysis and 3D sub-surface visualization of groundwater monitoring data and geological models. International Journal of Digital Earth. doi:10.1080/17538947.2014.1002866

Krosch, Matt N., Cranston, Peter S., Baker, Andrew M. and Vink, Sue (2015) Molecular data extend Australian *Cricotopus* midge (Chironomidae) species diversity, and provide a phylogenetic hypothesis for biogeography and freshwater monitoring. Zoological Journal of the Linnean Society, 175 3: 496-509. doi:10.1111/zoj.12284

McIntyre, Neil, Woodley, Alan, Danoucaras, Anastasia and Coles, Neil (2015) Water management capacity building to support rapidly developing mining economies. Water Policy, 17 6: 1191-1208. doi:10.2166/wp.2015.017

Mo, John P. T. and Maud, Sholto (2015). Heuristic systems engineering of a web based service system. In: Transdisciplinary Lifecycle Analysis of Systems. 22nd ISPE-Inc International Conference on Concurrent Engineering, Delft Netherlands, (21-30). 20-23 July 2015. doi:10.3233/978-1-61499-544-9-21

Reading, L. P., Lockington, D. A., Bristow, K.L. and Baumgartl, T. (2015) Are we getting accurate measurements of Ksat for sodic clay soils?. *Agricultural Water Management*, 158 120-125. doi:10.1016/j.agwat.2015.04.015

Schutze, Mark K., Aketarawong, Nidchaya, Amornsak, Weerawan, Armstrong, Karen F., Augustinos, Antonis A., Barr, Norman, Bo, Wang, Bourtzis, Kostas, Boykin, Laura M., Caceres, Carlos, Cameron, Stephen L., Chapman, Toni A., Chinvinijkul, Suksum, Chomic, Anastasija, De Meyer, Marc, Drosopoulou, Ellena, Englezou, Anna, Ekesi, Sunday, Gariou-Papalexio, Angeliki, Geib, Scott M., Hailstones, Deborah, Hasanuzzaman, Mohammed, Haymer, David, Hee, Alvin K. W., Hendrichs, Jorge, Jessup, Andrew, Ji, Qing, Khamis, Fathiya M., Krosch, Matthew N., Leblanc, Luc, Mahmood, Khalid, Malacrida, Anna R., Mavragani-Tsipidou, Pinelopi, Mwatawala, Maulid, Nishida, Ritsuo, Ono, Hajime, Reyes, Jesus, Rubinoff, Daniel, San Jose, Michael, Shelly, Todd E., Srikachar, Sunyanee, Tan, Keng H., Thanaphum, Sujinda, Haq, Ihsan, Vijaysegaran, Shanmugam, Wee, Suk L., Yesmin, Farzana, Zacharopoulou, Antigone and Clarke, Anthony R. (2015) Synonymization of key pest species within the *Bactrocera dorsalis* species complex (Diptera: Tephritidae): taxonomic changes based on a review of 20 years of integrative morphological, molecular, cytogenetic, behavioural and chemoecological data. *Systematic Entomology*, 40 2: 456-471. doi:10.1111/syen.12113

Sonter, Laura J., Barrett, Damian J., Moran, Chris J. and Soares-Filho, Britaldo S. (2015) Carbon emissions due to deforestation for the production of charcoal used in Brazil's steel industry. *Nature Climate Change*, 5 4: 359-363. doi:10.1038/nclimate2515

Zech, Alraune, Arnold, Sven, Schneider, Christoph and Attinger, Schneider (2015) Estimating parameters of aquifer heterogeneity using pumping tests - implications for field applications. *Advances in Water Resources*, 83 137-147. doi:10.1016/j.advwatres.2015.05.021

SMI JKMRC

Julius Kruttschnitt Mineral
Research Centre

Albijnic, Boris, Subasinghe, G. K. Nimal, Bradshaw, Dee J. and Nguyen, Anh V. (2015) Influence of liberation on bubble-particle attachment time in flotation. *Minerals Engineering*, 74 156-162. doi:10.1016/j.mineng.2014.08.004

Ballantyne, Grant R., Peukert, Wolfgang and Powell, Malcolm S. (2015) Size specific energy (SSE) - energy required to generate minus 75 micron material. *International Journal of Mineral Processing*, 136 2-6. doi:10.1016/j.minpro.2014.09.010

Bennett, P., Shi, F. and Reifenstein, A. (2015). Evaluation of coke strength. In: AISTech 2015 - Proceedings of the Iron and Steel Technology Conference and ICSTI 2015. *AISTech 2015 Iron and Steel Technology Conference and 7th International Conference on the Science and Technology of Ironmaking, ICSTI 2015*, Cleveland, Ohio, (87-102). 4 - 7 May 2015.

Bourgeois, Florent S., Lippiatt, Nicholas R. and Powell, Malcolm S. (2015) Introducing the concept of mechanical texture in comminution: The case of concrete recycling. *International Journal of Mineral Processing*, 136 7-14. doi:10.1016/j.minpro.2014.09.012

Carrasco, C., Keeney, L. and Napier-Munn, T. J. (2016) Methodology to develop a coarse liberation model based on preferential grade by size responses. *Minerals Engineering*, 86 149-155. doi:10.1016/j.mineng.2015.12.013

Carrasco, Cristian, Keeney, L. and Walters, S.G. (2015) Development of a novel methodology to characterise preferential grade by size deportment and its operational significance. *Minerals Engineering*. doi:10.1016/j.mineng.2015.08.013

Cleary, P. W. and Morrison, R. D. (2016) Comminution mechanisms, particle shape evolution and collision energy partitioning in tumbling mills. *Minerals Engineering*, 86 75-95. doi:10.1016/j.mineng.2015.12.006

Cordes, Nikolaus L., Seshadri, Srivatsan, Havrilla, George J., Yuan, Xiaoli, Feser, Michael and Patterson, Brian M. (2015) Three dimensional subsurface elemental identification of minerals using confocal micro-X-ray fluorescence and micro-X-ray computed tomography. *Spectrochimica Acta: Part B Atomic Spectroscopy*, 103-104 144-154. doi:10.1016/j.sab.2014.12.006

Cruz, Nestor, Peng, Yongjun, Wightman, Elaine and Xu, Ning (2015) The interaction of pH modifiers with kaolinite in copper-gold flotation. *Minerals Engineering*, 84 27-33. doi:10.1016/j.mineng.2015.09.019

Cruz, Nestor, Peng, Yongjun, Wightman, Elaine and Xu, Ning (2015) The interaction of clay minerals with gypsum and its effects on copper-gold flotation. *Minerals Engineering*, 77 121-130. doi:10.1016/j.mineng.2015.03.010

Cruz, Nestor, Peng, Yongjun and Wightman, Elaine (2015) Interactions of clay minerals in copper-gold flotation: Part 2 - Influence of some calcium bearing gangue minerals on the rheological behaviour. *International Journal of Mineral Processing*, 141 51-60. doi:10.1016/j.minpro.2015.06.012

- Delaney, G. W., Morrison, R. D., Sinnott, M. D., Cummins, S. and Cleary, P. W. (2015) DEM modelling of non-spherical particle breakage and flow in an industrial scale cone crusher. *Minerals Engineering*, 74 112-122. doi:10.1016/j.mineng.2015.01.013
- Engelhardt, Dieter, Seppelt, Joe, Waters, Tom, Apfelt, Andy, Lane, Greg, Yahyaie, Mohsen and Powell, Malcolm (2015). The Cadia Hpggr-Sag Circuit – from design to operation – the commissioning challenge. In: Bern Klein, Kelly McLeod, Reem Roufailand Fisher Wang, International Conference on Semi-Autogenous and High Pressure Grinding Technology 2015. *The 6th International Conference on Semi-Autogenous and High Pressure Grinding Technology*, Vancouver, BC, Canada, (1-18). 20-24 September 2015.
- Evans, C. L., Wightman, E. M. and Yuan, X. (2015) Quantifying mineral grain size distributions for process modelling using X-ray micro-tomography. *Minerals Engineering*, 82 78-83. doi:10.1016/j.mineng.2015.03.026
- Evans, Cathy (2015). Mineral liberation. In Professor Alban J. Lynch (Ed.), *Comminution handbook* (pp. 11-23) Carlton, Victoria: Australasian Institute of Mining and Metallurgy.
- Faramarzi, F., Ebrahimi Farsangi, M. A. and Mansouri, H. (2015). Prediction of rock fragmentation using a gamma-based blast fragmentation distribution model. In: A. T. Spathis, D. P. Gribble, A. C. Torrance and T. N. Little, 11th International Symposium on Rock Fragmentation by Blasting. *11th International Symposium on Rock Fragmentation by Blasting*, Sydney, NSW, Australia, (685-692). 24-26 August 2015.
- Firth, B., O'Brien, M., Holtham, P., Scott, N., Hu, S., Dixon, R. and Burger, A. (2014). Dynamic impacts of plant feed and operating practices on a dense medium cyclone (DMC) circuit. In: Glenn Sherritt, *ACPS 2015: 15th Australian Coal Preparation Conference & Exhibition*, Gold Coast, QLD, Australia, 14-18 September, 2014.
- Hakami, A., Mansouri, H., Ebrahimi Farsangi, M. A., Dehghan, M. R. and Faramarzi, F. (2015). Study of the effect of blast pattern design on autogenous and semi-autogenous mill throughput at Gol-e-Gohar iron ore mine. In: A. T. Spathis, D. P. Gribble, A. C. Torrance and T. N. Little, 11th International Symposium on Rock Fragmentation by Blasting. *11th International Symposium on Rock Fragmentation by Blasting*, Sydney, NSW, Australia, (315-320). 24-26 August 2015.
- Liu, L. X. and Powell, M. (2016) New approach on confined particle bed breakage as applied to multicomponent ore. *Minerals Engineering*, 85 80-91. doi:10.1016/j.mineng.2015.10.016
- Louwrens, E., Napier-Munn, T. and Keeney, L. (2015). Geometallurgical characterisation of a tailings storage facility - a novel approach. In: Farshad Rashidi Nejad, *Tailings and Mine Waste Management for the 21st Century*, Sydney, NSW, Australia, (125-131). 27-28 July 2015.
- Maleki-Moghaddam, M., Hasankhoei, A. R., Arghavani, E., Haji-Zadeh, A., Yahyaie, M. and Banisi, S. (2015). Evolution of Ag Mill Shell Liner Design at the Gol-E-Gohar Iron Ore Concentration Plant. In: Bern Klein, Kelly McLeod, Reem Roufail and Fisher Wang, International Conference on Semi-Autogenous and High Pressure Grinding Technology 2015. *The 6th International Conference on Semi-Autogenous and High Pressure Grinding Technology*, Vancouver, BC, Canada, (1-12). 20-24 September 2015.
- Mariano, Riza and Evans, Catherine L. (2014). Error analysis in ore particle composition distribution measurements. In: Proceedings of Process Mineralogy '14. *3rd International Symposium on Process Mineralogy (Process Mineralogy '14)*, Cape Town, South Africa, (36-44). 17-19 November 2014. doi:10.1016/j.mineng.2015.06.001
- Masuret, C., Yahyaie, M., Weerasekara, N. and Powell, M. (2015). Measuring shear abrasion breakage of rocks using a novel characterisation experiment. In: Magnus Evertsson, Erik Hulthén and Johannes Quist, Proceedings of the 14th European Symposium on Comminution and Classification. *14th European Symposium on Comminution and Classification*, Gothenburg, Sweden, (81-86). 7-10 September 2015.
- Meng, Jun, Xie, Weiguo, Runge, Kym and Bradshaw, Dee (2015) Measuring turbulence in a flotation cell using electrical resistance tomography. *Measurement Science and Technology*, 26 11. doi:10.1088/0957-0233/26/11/115305
- Morrison, Robert D. (2015). Reducing energy consumption in comminution by doing much less of it!. In: *Physical Separation '15*, Falmouth, UK, (1-17). 9-10 June 2015.
- Mukherjee, A. K., Thella, J. S., Makhija, D., Patra, A. S., Manna, M. and Ghosh, T. K. (2015) Process to recover iron values from high alumina Indian iron ore slime - a bench scale study. *Mineral Processing and Extractive Metallurgy Review*, 36 1: 39-44.
- Napier-Munn, Tim (2015) Managing risk by doing good experiments. *AusIMM Bulletin*, Apr 2015: 48-51.
- Ndlovu, Bulelwa, Farrokhpay, Saeed, Forbes, Elizaveta and Bradshaw, Dee (2015) Characterisation of kaolinite colloidal and flow behaviour via crystallinity measurements. *Powder Technology*, 269 505-512. doi:10.1016/j.powtec.2014.09.029
- Palaniandy, Samayamutthirian (2015) Impact of mechanochemical effect on chalcopryite leaching. *International Journal of Mineral Processing*, 136 56-65. doi:10.1016/j.minpro.2014.10.005

- Parker, Tamsyn, Shi, Feng N., Evans, Catherine L. and Powell, Malcolm (2014). The effects of electrical comminution on the mineral liberation and surface chemistry of a porphyry copper ore. In: Proceedings of Process Mineralogy '14. *3rd International Symposium on Process Mineralogy (Process Mineralogy '14)*, Cape Town, South Africa, (101-106). 17-19 November 2014. doi:10.1016/j.mineng.2015.03.019
- Pazokifard, Shahla, Farrokhpay, Saeed, Mirabedini, Mojtaba and Esfandeh, Masoud (2015) Surface treatment of TiO₂ nanoparticles via sol-gel method: effect of silane type on hydrophobicity of the nanoparticles. *Progress In Organic Coatings*, 87 36-44. doi:10.1016/j.porgcoat.2015.04.021
- Powell, Malcolm S., Mainza, Aubrey N., Hilden, Marko H. and Yahyaei, Mohsen (2015). Full pre-crush to sag mills – the case for changing this practice. In: Bern Klein, Kelly McLeod, Reem Roufail and Fisher Wang, International Conference on Semi-Autogenous and High Pressure Grinding Technology 2015. *The 6th International Conference on Semi-Autogenous and High Pressure Grinding Technology*, Vancouver, BC, Canada, (1-22). 20-24 September 2015.
- Rizmanoski, Vladimir and Jokovic, Vladimir (2015) Synthetic Ore Samples to Test Microwave/RF Applicators and Processes. *Journal of Materials Processing Technology*, 230 50-61. doi:10.1016/j.jmatprotec.2015.04.032
- Saeidi, Fatemeh, Marcelo Tavares, Luis, Yahyaei, Mohsen and Powell, Malcolm (2015). Modelling single particle breakage as a multi-stage process. In: Magnus Evertsson, Erik Hulthén and Johannes Quist, Proceedings of the 14th European Symposium on Comminution and Classification. *14th European Symposium on Comminution and Classification*, Gothenburg, Sweden, (47-52). 7-10 September 2015.
- Scott, N., Wood, C., Holtham, P., O'Brien, M. and Firth, B. (2015). Integration of plant residence time measurement into a dynamic model of a coal dense medium circuit. In 32nd Annual International Coal Preparation Exhibition and Conference. *International Coal Prep 2015*, Lexington, KY, United States, (89-107). 28-29 April 2015.
- Shao, Qi, Weatherley, Dion, Huang, Longbin and Baumgartl, Thomas (2015) RunCA: a cellular automata model for simulating surface runoff at different scales. *Journal of Hydrology*, 529 P3: 816-829. doi:10.1016/j.jhydrol.2015.09.003
- Shi, Fengnian and Xie, Weiguo (2015) A specific energy-based size reduction model for batch grinding ball mill. *Minerals Engineering*, 70 130-140. doi:10.1016/j.mineng.2014.09.006
- Shi, Fengnian, Zuo, Weiran and Manlapig, Emmy (2015) Pre-concentration of copper ores by high voltage pulses. Part 2: opportunities and challenges. *Minerals Engineering*, 79 315-323. doi:10.1016/j.mineng.2015.01.014
- Toor, Paul, Powell, Malcolm, Hilden, Marko and Weerasekara, Nirmal (2015). Understanding the effects of liner wear on SAG mill performance. In: Plant Design and Operation Strategies - World's Best Practice. *MetPlant2015*, Perth, Australia, 7-8 September 2015.
- Verrelli, David I. and Albijanic, Boris (2015) A comparison of methods for measuring the induction time for bubble-particle attachment. *Minerals Engineering*, 80 8-13. doi:10.1016/j.mineng.2015.06.011
- Wang, L., Peng, Y. and Runge, K. (2016) Entrainment in froth flotation: the degree of entrainment and its contributing factors. *Powder Technology*, 288 202-211. doi:10.1016/j.powtec.2015.10.049
- Wang, L., Peng, Y., Runge, K. and Bradshaw, D. (2015) A review of entrainment: mechanisms, contributing factors and modelling in flotation. *Minerals Engineering*, 70 77-91. doi:10.1016/j.mineng.2014.09.003
- Wang, Yicai (2015) Numerical modelling of heterogeneous rock breakage behaviour based on texture images. *Minerals Engineering*, 74 130-141. doi:10.1016/j.mineng.2014.12.030
- Wei, Y. C. and Peng, Y. (2015) Effect of froth stability on dewatering of coal flotation concentrates. *Institute of Materials, Minerals and Mining. Transactions. Section C: Mineral Processing and Extractive Metallurgy*, 124 3: 167-174. doi:10.1179/1743285515Y.0000000007
- Xie, Weiguo, Bonis, Ioannis and Theodoropoulos, Constantinos (2015) Data-driven model reduction-based nonlinear MPC for large-scale distributed parameter systems. *Journal of Process Control*, 35 50-58. doi:10.1016/j.jprocont.2015.07.009
- Xie, Weining, He, Yaqun, Luo, Cheng, Zhang, Xia, Li, Hong, Yu, Jiadong, Wang, Haifeng and Shi, Feng N. (2015) Comparison of float-sink and progressive release flotation of ground products of coal middlings. *Physicochemical Problems of Mineral Processing*, 51 2: 675-684. doi:10.5277/ppmp150225
- Yahyaei, M, Powell, M.S, Toor, Paul, Tuxford, Andrew and Limpus, Andrew (2015) Relining efficiency and liner design for improved plant performance. *Minerals Engineering*, 83 64-77. doi:10.1016/j.mineng.2015.08.016
- Yahyaei, M., Weerasekara, N. S. and Powell, M. S. (2015) Characterisation of superficial breakage using multi-size pilot mills. *Minerals Engineering*, 81 71-78. doi:10.1016/j.mineng.2015.07.011
- Yahyaei, M., Weerasekara, N. and Powell, M. (2015). A study of the effect of particle size on surface breakage in a pilot mill. In: Magnus Evertsson, Erik Hulthén and Johannes Quist, Proceedings of the 14th European Symposium on Comminution and Classification. *14th European Symposium on Comminution and Classification*, Gothenburg, Sweden, (212-216). 7-10 September 2015.

Yahyaee, Mohsen, Limpus, Andrew, Russell, John, Toor, Paul and Powell, Malcolm (2015). Improving liner design for efficiency. In: Bern Klein, Kelly McLeod, Reem Roufail and Fisher Wang, International Conference on Semi-Autogenous and High Pressure Grinding Technology 2015. *The 6th International Conference on Semi-Autogenous and High Pressure Grinding Technology*, Vancouver, BC, Canada, (1-15). 20-24 September 2015.

Yianatos, J., Vinnett, L., Carrasco, C. and Alvarez-Silva, M. (2015) Effect of entrainment in bubble load measurement on froth recovery estimation at industrial scale. *Minerals Engineering*, 72 31-35. doi:10.1016/j.mineng.2014.12.017

Zuo, Weiran and Shi, Fengnian (2015) A t10-based method for evaluation of ore pre-weakening and energy reduction. *Minerals Engineering*, 79 212-219. doi:10.1016/j.mineng.2015.06.005

Zuo, Weiran, Shi, Fengnian and Manlapig, Emmanuel (2015) Pre-concentration of copper ores by high voltage pulses. Part 1: principle and major findings. *Minerals Engineering*, 79 306-314. doi:10.1016/j.mineng.2015.03.022

Zuo, Weiran, Shi, Feng N., van der Wielen, Klaas Peter and Weh, Alexander (2015) Ore particle breakage behaviour in a pilot scale high voltage pulse machine. *Minerals Engineering*, 84 64-73. doi:10.1016/j.mineng.2015.09.025

Zuo, Weiran, Shi, Fengnian and Manlapig, Emmy (2015) Modelling of high voltage pulse breakage of ores. *Minerals Engineering*, 83 168-174. doi:10.1016/j.mineng.2015.09.006

SMI MISHC

Minerals Industry Safety
& Health Centre

Bond, Carol J. and Kirsch, Philipp (2015) Vulnerable populations affected by mining: predicting and preventing outbreaks of physical violence. *Extractive Industries and Society*, 2 3: 552-561. doi:10.1016/j.exis.2015.06.008

Burgess-Limerick, R and Lynas, D. (2015) An iOS application for evaluating whole-body vibration within a workplace risk management process. *Journal of Occupational and Environmental Hygiene*, 12 7: D137-D142. doi:10.1080/15459624.2015.1009986

Burgess-Limerick, Robin and Dennis, Gary (2015) Safety by design: participative ergonomics for manual tasks risk management. *Australasian Mine Safety Journal*, 24 48-53.

Burgess-Limerick, Robin and Lynas, Danellie (2015). Whole-body vibration associated with surface coal mining equipment. In: Gitte Lindgaard and Dave Moore, Proceedings of the 19th Triennial Congress of the International Ergonomics Association. The 19th Triennial Congress of the International Ergonomics Association, Melbourne, Australia, (368.1-368.6). 9-14 August 2015.

Dodshon, Philippa and Burgess-Limerick, Robin (2015). Application of the Bow Tie Analysis technique to enhancing the identification of risk controls during accident investigation activities. In: Gitte Lindgaard and Dave Moore, Proceedings 19th Triennial Congress of the IEA. 19th Triennial Congress of the IEA, Melbourne, VIC, Australia, (352.1-352.8). 9-14 August 2015.

Horberry, Tim and Burgess-Limerick, Robin (2015) Applying a human-centred process to re-design equipment and work environments. *Safety*, 1 1: 7-15. doi:10.3390/safety1010007

Horberry, Tim, Burgess-Limerick, Robin and Steiner, Lisa (2015). Human-centred design for mining equipment and new technology. In: Gitte Lindgaard and Dave Moore, Proceedings of the 19th Triennial Congress of the International Ergonomics Association. The 19th Triennial Congress of the International Ergonomics Association, Melbourne, Australia, (174.1-174.6). 9-14 August 2015.

Jong, E. C., Luxbacher, K. D., Kirsch, P. A., Mitra, R., Hebblewhite, B. K., Schafrik, S. J. and Conley, B. N. (2015). Risk management: Adapting RISKGATE for underground coal mines in the United States. In: 2015 SME Annual Conference & Expo and CMA 117th National Western Mining Conference Mining: Navigating the Global Waters. 2015 SME Annual Meeting, Society of Mining Metallurgy and Exploration USA, Denver, CO, United States, (274-280). 15-18 February 2015.

Kirsch, Philipp, Hine, Amelia and Maybury, Terry (2015) A model for the implementation of industry-wide knowledge sharing to improve risk management practice. *Safety Science*, 80 66-76. doi:10.1016/j.ssci.2015.07.009

Legge, J., Burgess-Limerick, R. and Peeters, G. (2015). Job-specific pre-employment functional capacity assessments predict musculoskeletal injury risk and 'window for opportunity' in healthy male coal mine workers. In: Gitte Lindgaard and Dave Moore, Proceedings of the 19th Triennial Congress of the International Ergonomics Association. The 19th Triennial Congress of the International Ergonomics Association, Melbourne, Australia, 9-14 August 2015.

Liu, Quanlong, Li, Xinchun and Hassall, Maureen (2015) Evolutionary game analysis and stability control scenarios of coal mine safety inspection system in China based on system dynamics. *Safety Science*, 80 13-22. doi:10.1016/j.ssci.2015.07.005

Narimoto, Lidiane Regina and Burgess-Limerick, Robin (2015). Sugar-cane harvesting machine design 'in the field'. In: Gitte Lindgaard and Dave Moore, *Proceedings of the 19th Triennial Congress of the International Ergonomics Association*. 19th Triennial Congress of the International Ergonomics Association, Melbourne, VIC, Australia, (371.1-371.8). 9-14 August 2015.

Pazell, Sara, Burgess-Limerick, Robin, Horberry, Tim and Davidson, Paul (2015). User-centred design for civil construction: optimising productivity by reducing safety and health risks associated with the operation and maintenance of on-road vehicles and mobile plant. In: Gitte Lindgaard and Dave Moore, *The Proceedings of the 19th Triennial Congress of the International Ergonomics Association*. 19th Triennial Congress of the International Ergonomics Association, Melbourne, VIC, Australia, (1-7). 9-14 August 2015.

Restrepo, J., Luxbacher, K., Kirsch, P., Hebblewhite, B., Mitra, R., Shi, S., Ripepi, N. and Schafrik, S. (2015). Barriers and Incentives: The Application of Comprehensive Risk Management in the US Underground Coal Mining. In: 2015 SME Annual Conference and Expo and CMA 117th National Western Mining Conference: Mining: Navigating the Global Waters. SME Annual Meeting, Society of Mining Metallurgy and Exploration, Denver, CO, United States, (285-290). 15-18 February 2015.

Rifkin, Will and Hine, Amelia (2015). The case for student-generated digital media assignments in science courses. In Garry Hoban, Wendy Nielsen and Alyce Shepherd (Ed.), *Student-Generated Digital Media in Science Education: Learning, Explaining and Communicating Content* (pp. 13-24) Abingdon, Oxon, United Kingdom: Routledge.

Steiner, Lisa and Burgess-Limerick, Robin (2015). The use of simulation for the human-centred design of underground coal mine bolting machines. In: Gitte Lindgaard and Dave Moore, *Proceedings 19th Triennial Congress of the IEA*. 19th Triennial Congress of the IEA, Melbourne, VIC, Australia, (2000.1-2000.7). 9-14 August 2015.

Wester, J. and Burgess-Limerick, R. (2015) Using a task-based risk assessment process (EDEEP) to improve equipment design safety: a case study of an exploration drill rig. *Mining Technology - Transactions of the Institutions of Mining and Metallurgy: Section A*, 124 2: 69-72. doi:10.1179/1743286315Y.0000000003

Zupanc, Christine M., Burgess-Limerick, R, Hill, Andrew, Riek, Stephan, Wallis, Guy M., Plooy, Annaliese M., Horswill, Mark S., Watson, Marcus O. and Hewett, David G. (2015) A competency framework for colonoscopy training derived from cognitive task analysis techniques and expert review. *BMC Medical Education*, 15 216. doi:10.1186/s12909-015-0494-z

Zupanc, Christine M., Burgess-Limerick, Robin and Wallis, Guy (2015) Strategy influences directional control-response compatibility: evidence from an underground coal mine shuttle car simulation. *Theoretical Issues in Ergonomics Science*, 16 1: 1-19. doi:10.1080/1463922X.2013.857738

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Donovan Waller, Anglo American
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Dr Geoff Gault, JK Tech P/L



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Peter Newman, Downer EDI Mining
Gavin Lind, Minerals Council of Australia
Paul Harrison, QLD Dept of Mines & Energy
Jason Economidis

FINANCIAL STATEMENT

Income and Expenditure Statement

January 2015 to December 2015

Revenue	End of Year Actuals \$
University	12,820,237
Research and Consulting	25,824,673
Other	299,889
Total Revenue	38,944,799
Expenditure	
Salaries	21,771,362
Non Salary	10,001,327
University Corporate Overheads	4,964,138
Total Expenditure	36,736,827
SMI Funding	%
Industry	44%
Government	25%
Research Funding Bodies (e.g. CRC ORE, CSIRO, AMIRA) and Industry Funding Bodies (e.g. ACARP, MCA, QRC)	24%
Non-Government Organisations	7%
SMI Top 10 Company Contributors 2015	% of Total Revenue
BG Group	19%
Anglo American	4%
Arrow Energy	4%
Australian Pacific LNG	4%
Santos	3%
Sandvik Mining	2%
Newcrest Mining Limited	2%
Glencore	1%
Sibelco	1%
Rio Tinto	1%

The table above indicates gross revenue flows across all activities within the Institute. A significant portion of the \$12.8m University revenue is returned to the University to cover various University Corporate Overheads.

University of Queensland Research and Innovation (UQRI) defines research as the creation of new knowledge and/or the use of existing knowledge in a new and creative way so as to generate new concepts, methodologies and understandings. This could include synthesis and analysis of previous research to the extent that it leads to new and creative outcomes.

Activities that do not meet the UQRI definition of research are considered consulting. Other revenue sources refer to those not covered by the above categories and include trading revenue and membership fees.

