

“MRC-WIKI” – A MINE REHABILITATION AND CLOSURE KNOWLEDGE MANAGEMENT TOOL FOR CENTRAL QUEENSLAND COAL MINE PRACTITIONERS



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31 March 2017 – UoN, TFI Mine Rehab Conference, Muswellbrook







1. INSPIRATION

20 YEAR ANNIVERSARY OF CQMRC

50th workshop, Rockhampton,
April 2013

OVERVIEW

1. Inspiration for the project
2. Research objectives
3. Methods
4. Research findings
5. Iterative process
6. Conclusions



Game Over!

#d8ChookRaffle

2. RESEARCH OBJECTIVES

- Guide users to knowledge, tools
- Capture less formal knowledge
- Encourage discussion
- Establish a KM system that could be managed by practitioners

3. METHODS

- Undertook Scoping study (2014) – Australian tools
- Reviewed KM tools globally
- Studied KM theory
- Selected Content Management System
- Created MRC-wiki
- Facilitated interaction with/in CQMRG and in SMI
- Encouraged knowledge sharing
- Sought feedback on the wiki
- Improved appearance and function
- Handed the wiki over to the CQMRG

ACARP C23023
INDUSTRY-BASED REHABILITATION AND
CLOSURE KNOWLEDGE MANAGEMENT SYSTEM:
SCOPING STUDY



Corinne Unger¹, Alan Woodley², Melina Gillespie¹, Thomas Baumgartl¹, Carl Smith³, Peter Erskine¹ and Andrew Fletcher¹

(1) Centre for Mined Land Rehabilitation, Sustainable Minerals Institute, The University of Queensland (2) Centre for Water in the Minerals Industry, Sustainable Minerals Institute, The University of Queensland (3) School of Agriculture and Food Sciences, The University of Queensland

13 May 2014

SMI CMLR
Centre for Mined Land
Rehabilitation



**THE UNIVERSITY
OF QUEENSLAND**
AUSTRALIA

ACARP C23023 INDUSTRY-BASED REHABILITATION AND CLOSURE KNOWLEDGE MANAGEMENT SYSTEM: SCOPING STUDY

Corinne Unger¹, Alan Woodley², Melina Gillespie¹, Thomas Baumgartl¹, Carl Smith³, Peter Erskine⁴ and Andrew Fletcher¹
¹The University of Queensland, Sustainable Minerals Institute, Centre for Mined Land Rehabilitation, ²Queensland University of Technology, ³The University of Queensland, School of Agriculture and Food Sciences, Australia

Rationale

The Central Queensland Mine Rehabilitation Group (CQMRG) celebrated its 20th anniversary in 2013. During this forum it was recognised that the vast body of knowledge held by rehabilitation and closure experts was being lost as senior practitioners retired from the industry. It was noted that even more knowledge could be readily lost unless a knowledge management platform was developed to capture, store and enable retrieval of this information. This loss of knowledge results in a significant cost to industry. A scoping study was undertaken and showed that a dedicated Mine Closure and Rehabilitation Wiki would be the most suitable knowledge management and decision support

Method and Results

Evaluation of the 8 knowledge management and decision support tools explored;

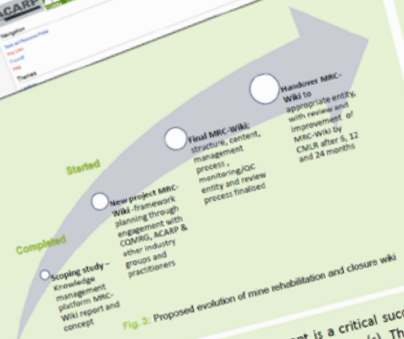
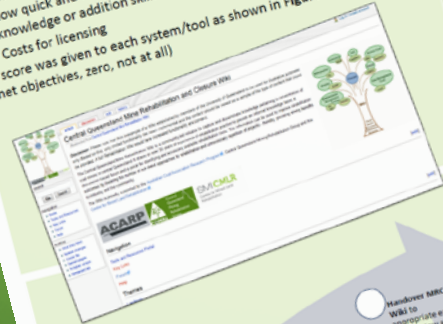
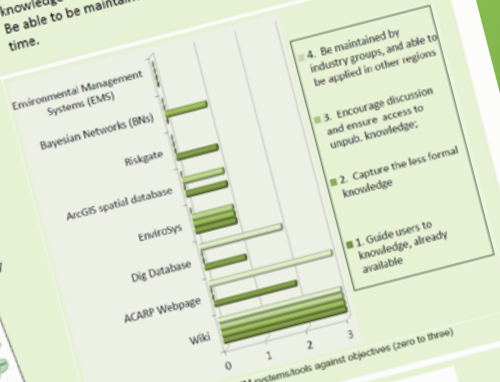
- how tools were currently used,
- the strengths and weaknesses of each against objectives
- how quick and easy each system was to use in the context of prior knowledge or addition skills.
- Costs for licensing

A score was given to each system/tool as shown in Figure 1. (3 = fully met objectives, zero, not at all)

Objectives

This project evaluated the capability of existing knowledge management and support tools to identify a knowledge management system which would:

1. Guide users to knowledge, already available
2. Capture the less formal long-term knowledge of rehabilitation practitioners and stakeholders in a rehabilitation manual and discussion forum format;
3. Encourage discussion and ensure the accessibility of this unpublished knowledge in perpetuity; and
4. Be able to be maintained by industry groups, such as the CQMRG over time.



Discussion

The Wiki met the knowledge management objectives across all four objectives. A mock up of the webpage was prepared applying a structure derived from Leximancer which uses word searching capabilities to identify and group keywords. In this case, a sample of mine rehabilitation ACARP reports was used to illustrate one way of structuring a knowledge management system - Figure 2. The proposed MRC-Wiki milestones for implementation of findings have been summarised in Figure 3.

Conclusion Effective knowledge management is a critical success factor in achieving sustainable mine rehabilitation and transitioning from active mining, through decommissioning to post-mining land use(s). The MRC-Wiki has the potential to provide a central hub to connect practitioners with existing tools and resources, thereby providing ready access to coal mine rehabilitation and closure knowledge. Project C24067 to develop MRC-Wiki was supported by ACARP and commenced in March 2015.

For more information contact: c.unger1@uq.edu.au
 Project report, May 2014:
<http://www.acarp.com.au/abstracts.aspx?report=C23023>



POSTER 2015

Environmental Management Systems (EMS)

Bayesian Networks (BNs)

Riskgate

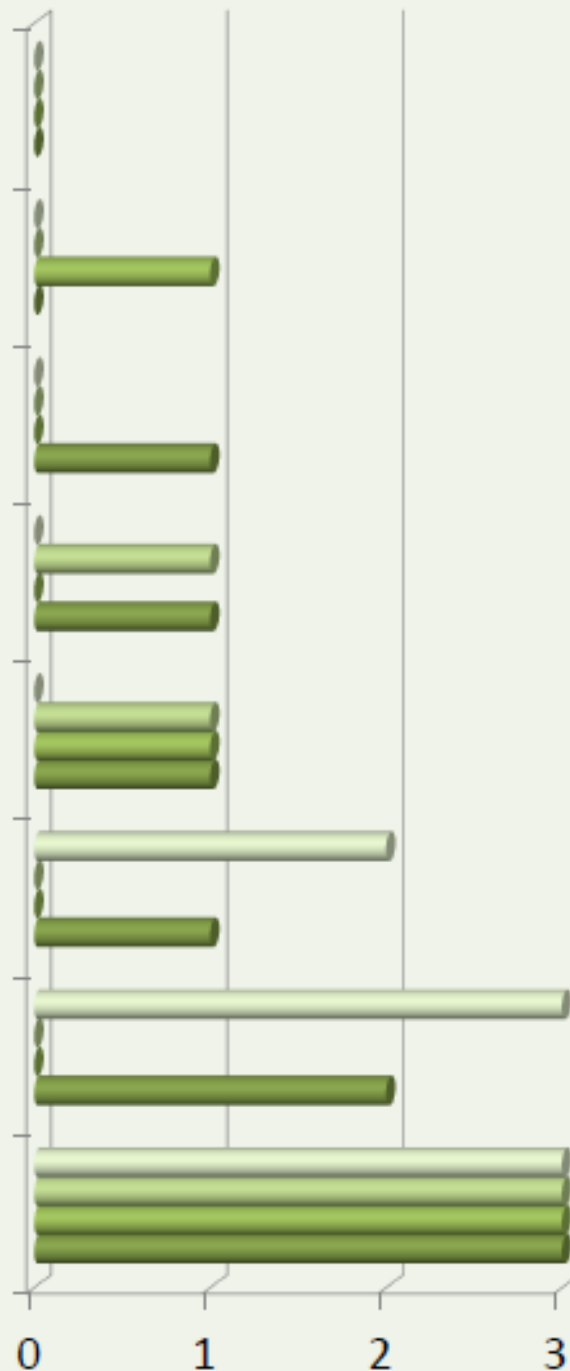
ArcGIS spatial database

EnviroSys

Dig Database

ACARP Webpage

Wiki



4. Be maintained by industry groups, and able to be applied in other regions

3. Encourage discussion and ensure access to unpub. knowledge;

2. Capture the less formal knowledge

1. Guide users to knowledge, already available

(Unger et al, 2014)

KM TOOLS - GLOBAL

- GARD GUIDE
- CLOSEDURE
- HUMAN RIGHTS WIKI
- WATER WIKI



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gard guide chapters

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- [Table of Contents](#)
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- [3. Corporate, Regulatory and Community Framework](#)
- [4. Defining the Problem - Characterization](#)
- [5. Prediction](#)
- [6. Prevention and Mitigation](#)
- [7. Drainage Treatment](#)
- [8. Monitoring](#)
- [9. Management and Performance Assessment](#)
- [10. ARD Communication and Consultation](#)

Chapter 1

http://www.gardguide.com/index.php?title=Main_Page

[Click Here to L](#)

1.0 The Global Acid Rock Drainage Guide

1.1 Introduction

1.1.1 Acid Rock Drainage

1.2 Acid Rock Drainage Management – The Business Case

1.3 Scope and Objectives of the Global Acid Rock Drainage Guide

1.3.1 Scope

1.3.2 Objectives

1.4 Relation to Other Guides

1.5 Approach of the Global Acid Rock Drainage Guide

1.6 Application to Mine Phase

1.7 The Sustainable Development Approach

1.8 Layout and How to Use the Guide

1.8.1 Layout

1.8.2 How to Use the Global Acid Rock Drainage Guide

1.9 Chapter References

List of Figures

List of Appendices

The GARD Guide

1.1 Introduction

Development of this Global Acid Rock Drainage Guide (GARD Guide) was sponsored by the International Network for Acid Rock Drainage (INAP) Alliance. It is the property of INAP. Access and use of the GARD Guide is granted by INAP [under certain conditions](#).

This GARD Guide deals with the prediction, prevention, and management of drainage produced from sulphide mineral oxidation (SD), "acid mine drainage" or "acid and metalliferous drainage" (AMD), "mining influenced water" (MIW), and addresses metal leaching caused by sulphide mineral oxidation. While focused on mining, the technology described v applies to other minerals in other activities (e.g., rock cuts, excavations, tunnels). Some of the approaches in the GARD Guide are also applicable to other minerals.

The GARD Guide is intended as a state-of-practice summary of the best practices and technology to assist mine operators in managing sulphide mineral oxidation. The GARD Guide will be of interest to the following:

CLOSEDURE - FINLAND



Closedure

Frontpage

Wiki

Process

Water management

Water treatment

Wastes & waste facilities

Monitoring

Project

Mine Closure

Welcome to the Closedure Project Pages and Wiki! Closedure is a project that will produce an open internet resource on technologies and approaches used in mine closure. A major part of Closedure is to identify and systematically evaluate technologies that can be used to achieve selected closure objectives.

The overall aim of the Closedure project is to improve one of the most crucial points in eco-efficient mining: mine closure. The expected outcomes are:

- Reduction in adverse environmental, societal, and economic effects related to closure of mining operations
- Easier, better informed selection of technical methods for key closure operations
- Smoother mine closure planning and permitting processes

Latest in Wiki

- **Enonkoski**
10.04.2015
- **Vihanti**
10.04.2015
- **River and lake sediment sampling**
09.04.2015
- **Sediment sampling**
09.04.2015
- **Soil and sediment sampling**
09.04.2015
- **Permeable reactive barrier**
09.04.2015
- **Biologic sulphate reduction in mine shaft lakes**
08.04.2015
- **Active treatment technologies**
08.04.2015
- **Sulphate reduction in reactors**
08.04.2015
- **Isotope methods in groundwater studies**
07.04.2015



<http://wiki.gtk.fi/web/mine-closure/wiki>

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We work with everyone to advance human rights in business. We track over 6000 companies, and help the vulnerable eradicate abuse.

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Human rights



or Browse

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Issues

Countries

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NEWS

Analyst assesses prospects of African Court prosecuting corporate human rights abuses

Liberia Agricultural Company fined by govt following deaths, injuries of employees

Jepent: NGOs publish guidelines for seeking free, prior and informed consent in REDD+ projects

NYU Stern Ctr. for Business & Human Rights says IBA draft guidelines for lawyers needs more "attention to substantive industry standards"

Companies should do more to tackle pervasive gender discrimination, says founder of Everyday Sexism Project

FIND MORE

CURRENT FEATURES



NGO report alleges harmful social and environmental impacts by Golden Veroleum Liberia; includes company statement



Weekly Update 8 Apr: Barrick Gold compensates tribal women & girls over alleged violence in Papua New Guinea



Comments sought: Sustainability Themes for 2020 Tokyo Olympics and Paralympics



NYU Stern Center launches project on recruitment in South Asia for construction in Gulf

FIND MORE

ACTION PLATFORMS

Explore company & government actions on business & human rights

COMPANY ACTION PLATFORM

GOVERNMENT ACTION PLATFORM



WATER WIKI



IWA Water Wiki

INFORMATION RESOURCE & HUB FOR THE

GLOBAL WATER COMMUNITY



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search...

★ Watch Page

ANNOTATIONS

EXPORT ▼ MORE ACTIONS ▼

Welcome to the Water Wiki!

The IWA WaterWiki provides a platform for the global water community to interact and share knowledge online.

If you are new to the site, please [Register](#) to get started. For [Help](#), see [How to Register](#).

If you have already registered:

- [Create a personal Profile](#)
- [Create a profile for your organization or research group](#)

If you have any questions, please [Contact Us](#)

Latest Blog Posts

Mar 27 2015 USF Graduate Students Launch #Reclaimis Photo and Video Contest

"Envision a world where we don't run out of clean water, energy or nutrients." This is the vision behind the 2015 #Reclaimis campaign (<http://goo.gl/Nur81g>). In an effort to foster solutions to global problems associated with waste and the management of water, energy and nutrients; USF graduate students and faculty from civil and environmental engineering, anthropology, and marine science have launched a photo and video contest, where the public is asked to define what "reclaiming" resources means to them. ...

Mar 26 2015 Guest Post: Water industry highlights hacking and customer engagement as its main challenge in smart metering

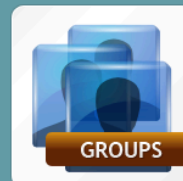
SMI's 4th annual Smart Water Systems conference will strengthen skills in water management whilst keeping attendees at the forefront of technological breakthroughs to adapt to the growing need for water efficiency. The agenda features over 19 case study



ARTICLES



EVENTS



GROUPS



RESOURCES

Latest Articles Most Viewed Events Extra

- Steady State Model for Biological P Removal
- Considerations for a rooftop garden
- Water-Related Business Risks
- Green Water Infrastructure
- Empowering Women in Irrigation Management
- Diamond Project
- Ecosystem-based management approaches for water-related infrastructure projects
- Realizing the human rights to water and sanitation: A Handbook
- Alternative Water Supply Systems
- Impacts of Shallow Geothermal Energy on Groundwater Quality

Recent Contributions

27 Mar

WATERWIKI

- Search
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- Water Wiki Blog
- Help
- My Profile
- Discussion Forum

ARTICLES

- Articles
- Top 10
- Editorial Team
- Hot Topics
- Guidelines

EVENTS

- Events Extra
- Guidelines

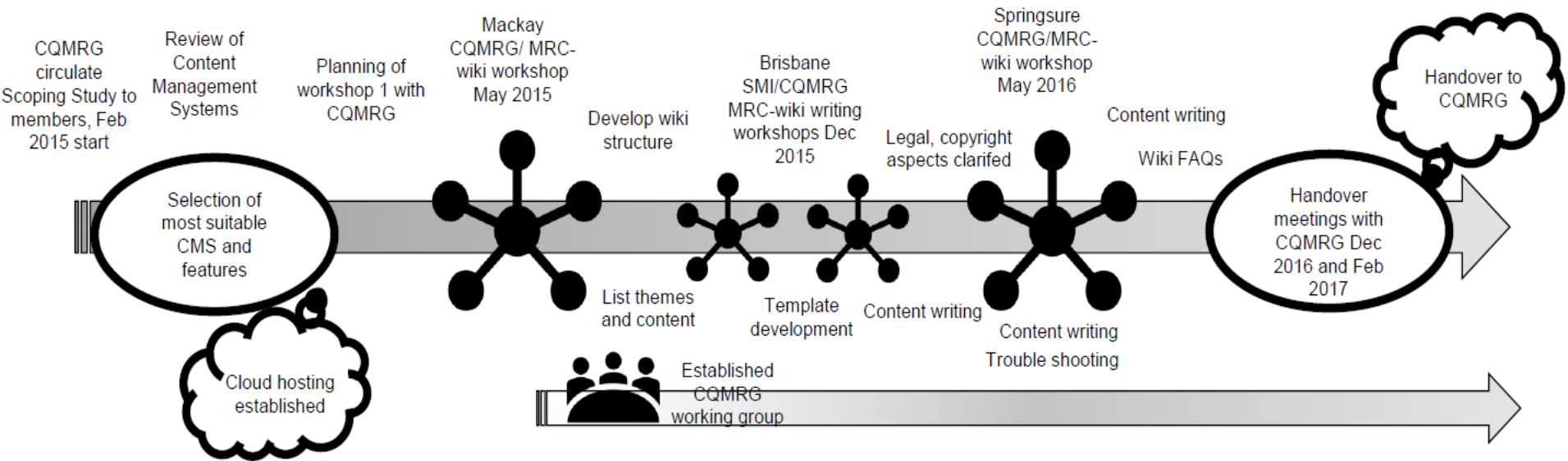
GROUPS

- Listing
- Help
- Discussion Forum

RESOURCES

- Listing
- Water Associations

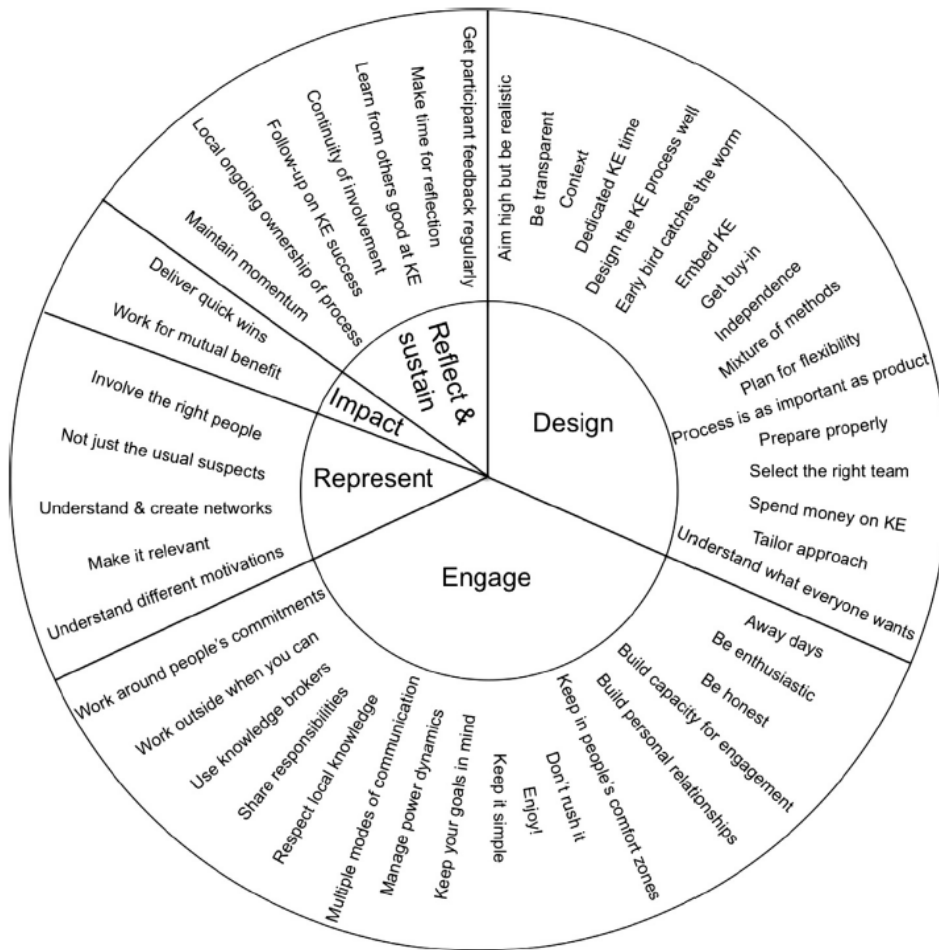
PROJECT TIMELINE



KNOWLEDGE MANAGEMENT THEORY

Effective knowledge
exchange (Reed et
al, 2014)

- Design
- Engage
- Represent
- Impact
- Reflect and sustain



KM THEORY...

Networks of knowledge (NoK) highlight the importance of

- The dynamic amongst individuals
- Relationship between groups
- Understanding motivation for participation (Carmen et al 2015)

Critical interface between academics and non-academics

- Incentives for high impact research vs other KT (Olmos-Penuela, et al, 2014)
- Publications not only motivation (Carmen et al 2015)

KM THEORY...

- Value of NoK goes beyond discovering and organising....identify gaps, new ideas, integrate ideas and contribute to informed decision making
- 'Horizon scanning'...emerging issues (Nesshoever et al, 2016)

KM THEORY...

- Enthusiasm of building a NoK for the future (European biodiversity) (Carmen, et al, 2015)
- Challenges of retirement and staff defection
- Need for structures and ongoing engagement to sustain (Frost 2014)
- Knowledge loss impacts (De Long, 2002)
 - Reduces capacity to innovate and pursue growth
 - More costly errors
 - Less efficiency

4 STRUCTURED WORKSHOPS

- May 2015 Mackay and May 2016 Springsure - CQMRG
- Brisbane SMI workshops December 2015





Subsidence	Water Re-Use	Tailings	Legislation	Final Void	Eco System outcomes
Product Selection	Procurement	Contaminated Land	Grazing Management	Soil	Spoil
Drainage	Geo	Fire Management	Pest & Weeds	Climate	Climate Change
Land Form Design	Species Selection	Final Landuse	Water quality	Education	Cost
Expectations	KPI's	GIS (Monitoring)	Skills		



RECORDING OUTPUT

For later use and analysis



INTERACTION

- ID rehabilitation and closure issues
- Group work and one-on-one interviews
- Summaries presented
- template trialled
- Recorded outcomes
- NVivo theme organising
- Structured wiki
- Began to populate wiki

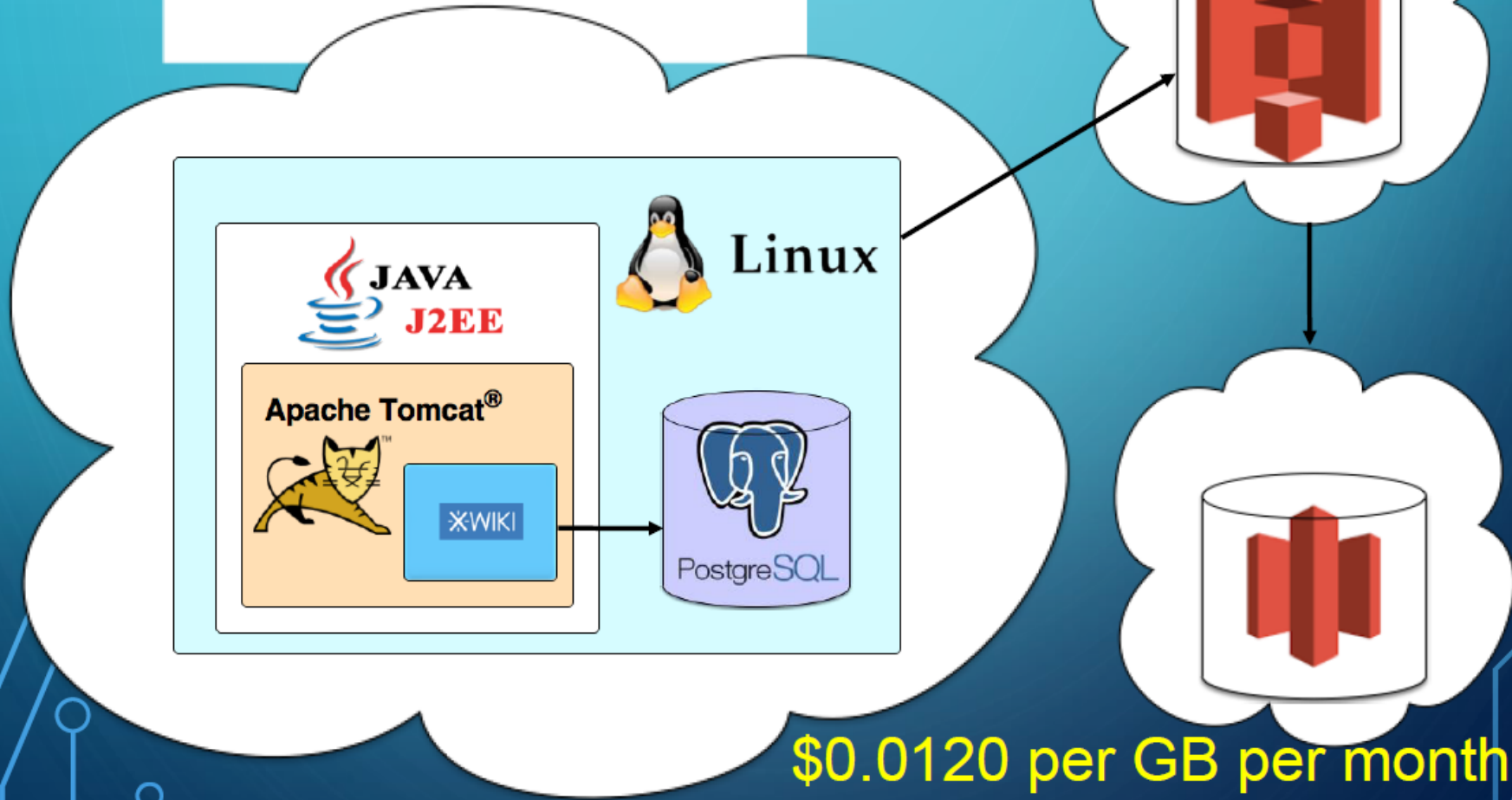
CONTENT MANAGEMENT SYSTEM COMPARISON

features

	MediaWiki	Dokuwiki	TikiWiki CMS	XWiki	OCPortal	OpenAtrium	Drupal	SiteCake
Wiki / CMS	Wiki	Wiki	Wiki / CMS	Wiki	CMS	CMS	CMS	CMS
WYSIWYG	Some	Some	Some	Full	Some	Some	Full	Full
Multiple Users	Y	Y	Y	Y	Y	Y	Y	N
User Groups	Y	Y	Y	Y	Y	Y	Y	N
Forums	Plugin	N	Y	Y	—	—	Plugin	N
Blog	Plugin	N	Y	Y	—	—	Plugin	Y
Attachments	Any	Media	Any	Any	—	—	Any	Media
Plugins	Y	Y	Y	Y	—	—	Y	N
Themes	Limited	Limited	Limited	Full	—	—	Full	Full
Custom Layout	Some	No	No	Yes	Some	Some	Yes	Yes

\$0.04 per Hour or \$581 for 3
\$350 per Year years

\$0.0330 per GB per month
\$39.60 for 100GB for 1 Year



\$0.0120 per GB per month
\$14.40 for 100GB for 1 Year



4. RESEARCH FINDINGS

- Xwiki preferred CMS
- Cloud hosting deemed most effective for ease of hand over to CQMRG
- More engagement = more content and enthusiasm
- Supportive CQMRG leadership has been essential
- Structure – all themes - planning, implementing, reviewing, improving; across SD (5 capitals) - human, social, infrastructure, environment and financial

4. RESEARCH FINDINGS - CHALLENGES

- Competition for knowledge may limit contribution
- Writing process for a wiki – different to academic and practitioner writing (less formal)
- Different methods are needed to transfer knowledge
- Changing CQMRG composition – both an opportunity and a challenge
- Expansion and contraction of the industry
- Retirement of mature practitioners
- Relying upon volunteers to sustain MRC-wiki

4. RESEARCH FINDINGS - HIGHLIGHT



FIRST ARTICLE – GIL FLETCHER

MRC-WIKI

Home Themes Search Dashboard Blog FAQ Add Article Log In / Out Register

Mine Rehabilitation and Closure (MRC) Wiki > Contributions > Deep Ripping - Part 1

Deep Ripping - Part 1

Last modified by Corinne Linger on 2016/06/04 14:06



Deep Ripping and Rehabilitation 1
From Gil Fletcher LRS Environmental Townsville gfl@rsenvironmental.com

Deep Ripping and Rehabilitation: Why rip?

Over the last 30 years of practical rehabilitation experience in the Bowen Basin and as a hay mulching contractor (on civil projects) after the following:
Recent observation of rehabilitation that has not employed deep ripping but has relied on an erosion control using hay crimping or mulching techniques have had limited erosion topsoil/seedbed profile leading to early drying off of pasture grasses from poor water storage.

Below is my history of ripping and having been a contractor with hay mulching equipment I feel that recent development by civil engineering erosion control contractors to mow dry hay mulching and crimping is not recognising the important aspect of preparing the reseeded spoil and soil profile to collect and store adequate soil moisture. This is achieved by raking of spoil results in an upper slope of cut material and a lower slope of fill material with the upper slope compacted by dozer traffic as well as pressure glazing of the topsoil compacted but probably of a sufficient compaction to hinder water infiltration.

I fully endorse the techniques of hay mulching and hybrid mulching after deep ripping to provide further erosion control and protection of the seed bed from wind/impacts period for each rainfall event by reducing evaporation and drying.



Ripping pattern

The ripping pattern minimises the amount of rock brought to the surface and the dozer cultivation of the dozer tracks provides an ideal germination seed bed. The rig pattern should not be made from any other erosion ripping technique. The dozer track is to be used for planting and hay mulching should be ground

Mine Rehabilitation and Closure (MRC) Wiki

Last modified by [Vanessa Glenn](#) on 2017/02/02 14:00



About the MRC-Wiki project

MRC-Wiki is a Mine Rehabilitation and Closure knowledge management tool primarily focussed on Central Queensland practitioners to support them in their work as well as to draw upon the knowledge base of this group and its historical network. [more...](#)

Searchable hot topic links

Click on one or more tags to filter the list and click again on a tag to cancel the filter

[Acacia](#) [actions](#) [Ants](#) [assets](#) [Authors](#) [Biodiversity](#) [Brigalow](#) [Budget](#) [Built capital](#) [built-environment](#) [Carbon](#) [Casuarina](#) [Closure criteria](#) [Closure planning](#) [Column leaching](#) [Communication](#) [Community expectations](#) [completion criteria](#) [Continual improvement](#) [contract](#) [Contributors](#) [Cumulative impacts](#) [Data documentation](#) [Deep ripping](#) [Deming Cycle](#) [Earthworks](#) [Economic capital](#) [Efficiency](#) [EMS](#) [Equipment](#) [Erosion](#) [Eucalyptus](#) [Exposure](#) [Final Landform](#) [Final voids](#) [Five capitals](#) [GIS](#) [Grasses](#) [guidelines](#) [heritage](#) [Human capital](#) [Hydrology](#) [Impact detection](#) [Implementing](#) [improvement plans](#) [Improving](#) [Infiltration](#) [infrastructure](#) [Leaching](#) [Long term](#) [Lysimeter](#) [maintenance](#) [management](#) [Material movements analysis](#) [Melaleuca](#) [metrics](#) [Mine Closure](#) [Mine spoil](#) [monitoring](#) [Native plant](#) [Natural capital](#) [Novel ecosystems](#) [Open-cut mining](#) [overburden](#) [Photos](#) [Planning](#) [Post-closure management](#) [Post-mining land rehabilitation](#) [Post-mining land use](#) [Productivity](#) [Regional planning](#) [Rehabilitation goals](#) [rehabilitation performance](#) [relinquishment](#) [retained structures](#) [Reviewing](#) [Ripping](#) [Salinity](#) [Salt](#) [Seed dormancy](#) [Seed germination](#) [Seed storage](#) [selective handling](#) [Social capital](#) [Soil](#) [Soil health](#) [Soil organic matter](#) [Solubility](#) [Spoil](#) [Statistical power](#) [subcontractor](#) [Subsoil](#) [Surface preparation](#) [surface water management](#) [Sustainable development](#) [targets](#) [Termites](#) [Topsoil](#) [topsoil management](#) [vegetation establishment](#) [Waste rock cover](#) [Water infiltration](#) [Water management](#) [water management infrastructure](#) [Weathering](#)

Help

- [FAQs](#)
- [How to register](#)
- [How to create and edit pages](#)
- [more...](#)
- [XWiki Documentation](#)
- [Getting Started](#)
- [Document Lifecycle](#)

Resources

- [Dig Database](#)
- [ACARP Webpage](#)
- [RISKGATE](#)
- [Leading practice handbooks \(LPSPD\)](#)
- [ICMM Toolkit \(Mine Closure\)](#)
- [more...](#)

MRC-Wiki Themes

Overview of MRC-Wiki themes:

- **Five Capitals Model**
 - [Natural Capital](#)
 - [Social Capital](#)
 - [Human Capital](#)
 - [Financial Capital](#)
 - [Infrastructure Capital](#)
- **Continual Improvement**
 - [Planning](#)
 - [Implementing](#)
 - [Reviewing](#)
 - [Improving](#)

[Themes you can write about](#)

[List of MRC-wiki contributors](#)

5. ITERATIVE PROCESS

- Each interaction provided new content, understandings of motivations and internal group leadership
- Additional workshops
- CQMRG working group
- Advice on MRC-wiki to improve access, appearance and ease of use
- Alternative article generation methods

INCENTIVES

- Interface between academia and practitioners reveals motivation at personal and professional levels
- Personal ties and group relationships are powerful forces for participation
- Non-financial incentives
- Altruism - desire to share/pass on knowledge



CONCLUSIONS

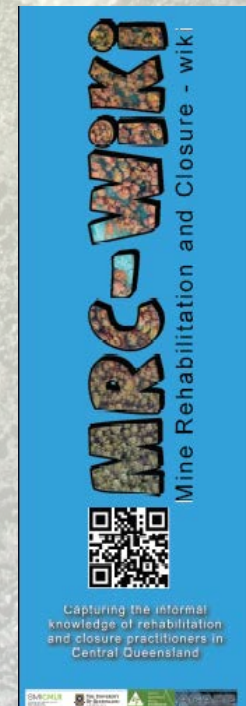
- Mine rehabilitation and closure knowledge is costly to acquire and easily lost
- Rehabilitation and closure KM requires a long term focus
- Creation of knowledge is not enough - knowledge exchange must be designed into research
- This project aims to make the implicit explicit
- Incentives for participation need to be well understood
- Good planning and iterative development are both important
- Relational aspects are critical within CQMRG to sustain this project

ACKNOWLEDGEMENTS

- ACARP 2014 C23023 Industry-based rehabilitation and closure knowledge management system: Scoping Study
- ACARP 2015-16 C24067 “MRC-Wiki” Mine Rehabilitation and Closure Knowledge Management platform - Implementation for Central Queensland coal mines
- ACARP project monitors Stuart Ritchie, Craig Lockhart and Simon Orton
- Stuart Ritchie, Jemma Purandare - Chair and Secretary/Treasurer of CQMRG
- CQMRG Working Group - James Allen, Nanjappa Ashwath, Ross Browning, Jessica Corley, Neil Dale, Tim Ey, Dean Fletcher, Gil Fletcher, Rhianna Goodwin, Rachelle Hobbs, Greg Maddocks, Michael McCabe, Scott Verrall.
- The University of Queensland Institutional Human Research Ethics Approval number for this project is 2015000674.

• Artwork – Freya Kassulke

MRC-WIKI



MRC-WIKI

<http://mrcwiki.org.au>

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