Projects in Real Life

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Case Study of Project Risk
MW Rail & Workshop

Prepared by Ferenc Birloni, PhD

2017

IMPORTANCE OF EXPERIENCE

- ✓ Who knows what Experience is?
- ✓ Do you know how to quantify experience?

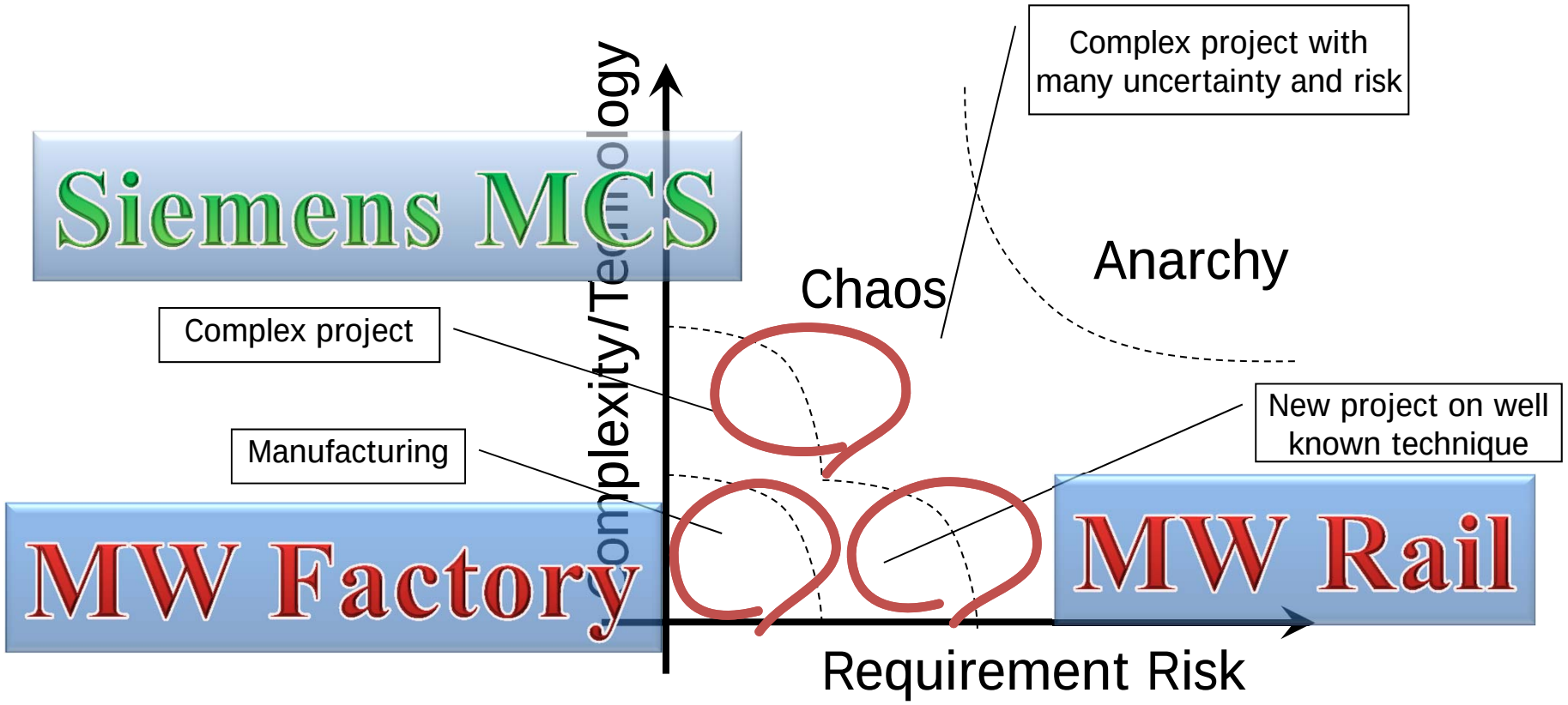
Content - Case Studies

- **MW Rail**
  - Railway Signalling / Construction Works

- **MW Factory**
  - Air Conditioning Control Panel

- **Siemens PSE**
  - R&D Risk Metrics
  - Documentation / Code Review Metrics

Project Risk Level Assessment



MW RAILWAY SIGNALLING

- ✓ Risk – The Background Preparation
- ✓ Project Risk Assessment
- ✓ Project Execution – Working with Risk
- ✓ Project Review

Preparation

- Site visit
- Walk through
  - GPS – pictures
  - design check (if available)
- What else to look for?

Risk Management Plan - Rail

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- Responsibilities
- Level of Consequence
- Likelihood
- “As low as Reasonably Practical”
- Risk Ratings

Industry Certificates, Trainings

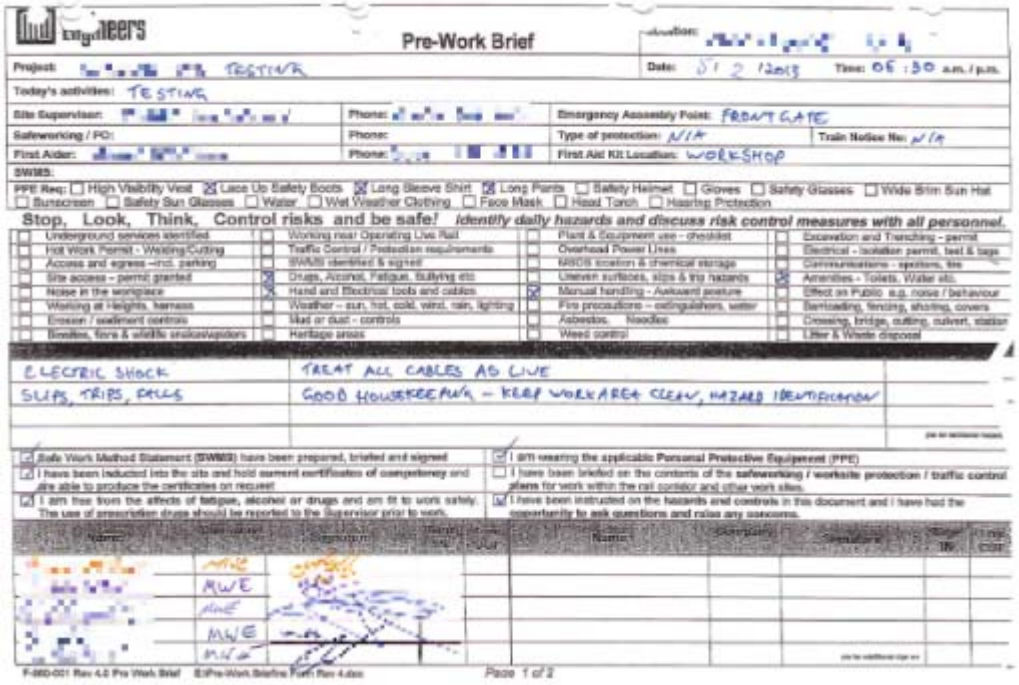
- Medical
- WS Construction Industry
- Rail Safety Worker

Weather conditions / Access

- Heavy rain, or high temperature can delay instantly the execution of a project
- Limited access to site / permission required
- Mobilise / Demobilise
- Stand by rate applies

Project execution

- Step to step, phase to phase assess & manage the risk
- Even on a day to day basis with a pre work briefing



Pre-Work Brief

Project: TESTING

Today's activities: TESTING

Date: 5 / 2 / 2013 Time: 06 : 30 a.m. / p.m.

Site Supervisor: Phone: Emergency Assembly Point: FRONT GATE

Safeworking / PO: Phone: Type of protection: N/A Train Notice No: N/A

First Aider: Phone: First Aid Kit Location: WORKSHOP

SWMS:

PPE Req: ☐ High Visibility Vest ☒ Lace Up Safety Boots ☒ Long Sleeve Shirt ☒ Long Pants ☐ Safety Helmet ☐ Gloves ☐ Safety Glasses ☐ Wide Brim Sun Hat ☐ Sunscreen ☐ Safety Sun Glasses ☐ Water ☐ Wet Weather Clothing ☐ Face Mask ☐ Head Torch ☐ Hearing Protection

Stop, Look, Think, Control risks and be safe! *Identify daily hazards and discuss risk control measures with all personnel.*

☐ Underground services identified	☐ Working near Operating Live Rail	☐ Plant & Equipment use - checklist	☐ Excavation and Trenching - permit
☐ Hot Work Permit - Welding/Cutting	☐ Traffic Control / Protection requirements	☐ Overhead Power Lines	☐ Electrical - isolation permit, test & tags
☐ Access and egress –incl. parking	☐ SWMS identified & signed	☐ MSDS location & chemical storage	☐ Communications - systems, link
☐ Site access - permit granted	☒ Drugs, Alcohol, Fatigue, Bullying etc	☐ Uneven surfaces, slips & trip hazards	☒ Amenities - Toilets, Water etc.
☐ Noise in the workplace	☒ Hand and Electrical tools and cables	☒ Manual handling - Awkward posture	☐ Effect on Public e.g. noise / behaviour
☐ Working at Heights, harness	☐ Weather – sun, hot, cold, wind, rain, lightning	☐ Fire precautions – extinguishers, water	☐ Set/loading, fencing, shoring, covers
☐ Erosion / sediment controls	☐ Mud or dust - controls	☐ Asbestos. Needles	☐ Crossing, bridge, cutting, culvert, station
☐ Snakes, flora & wildlife snake/spiders	☐ Heritage areas	☐ Weed control	☐ Litter & Waste disposal

ELECTRIC SHOCK	TREAT ALL CABLES AS LIVE
SLIPS, TRIPS, FALLS	GOOD HOUSEKEEPING – KEEP WORK AREA CLEAN, HAZARD IDENTIFICATION

☑ Safe Work Method Statement (SWMS) have been prepared, briefed and signed

☑ I have been inducted into the site and hold current certificates of competency and are able to produce the certificates on request

☑ I am free from the effects of fatigue, alcohol or drugs and am fit to work safely. The use of prescription drugs should be reported to the Supervisor prior to work.

☑ I am wearing the applicable Personal Protective Equipment (PPE)

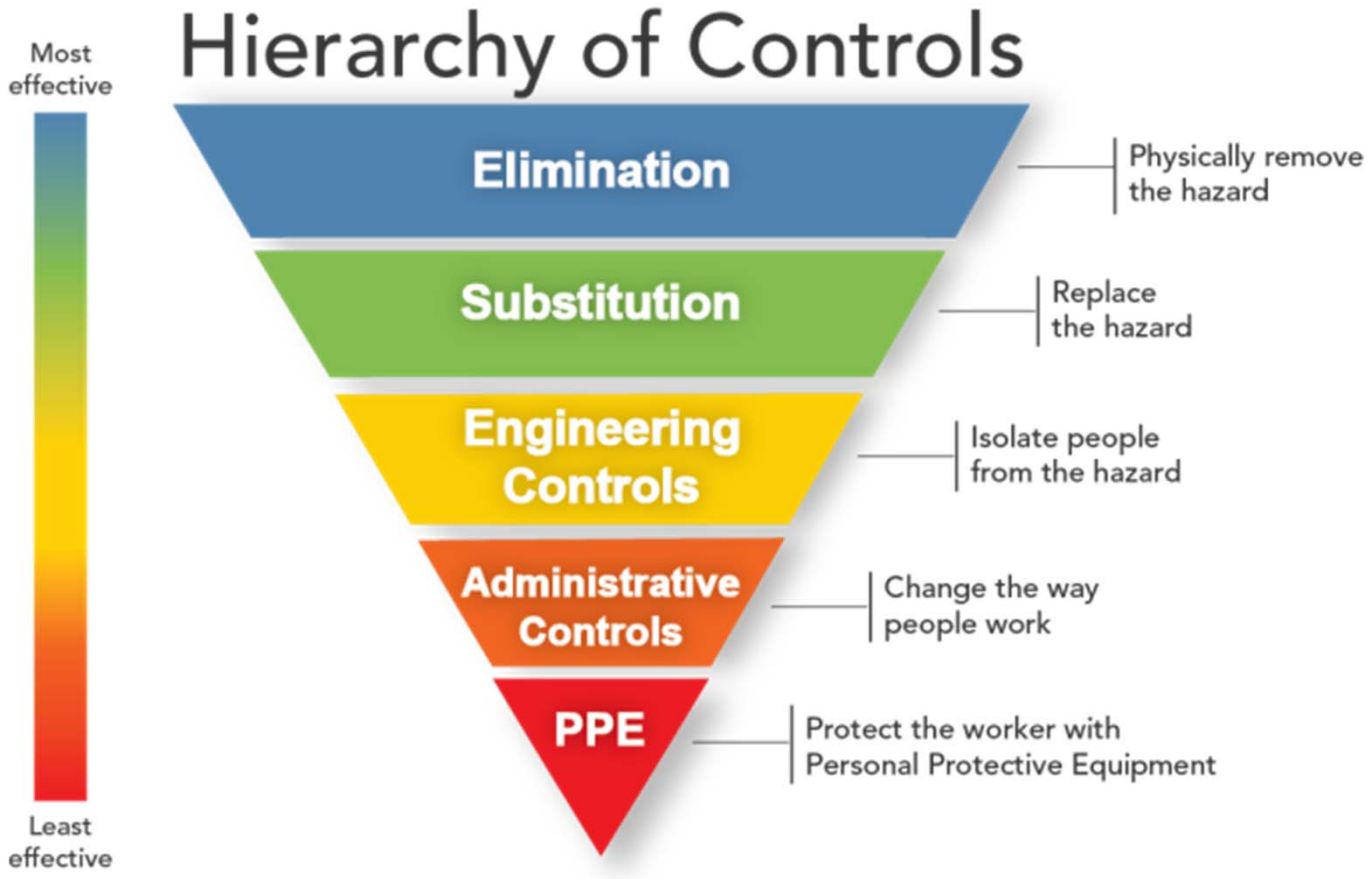
☐ I have been briefed on the contents of the safeworking / worksite protection / traffic control plans for work within the rail corridor and other work sites.

☑ I have been instructed on the hazards and controls in this document and I have had the opportunity to ask questions and raise any concerns.

Name	Description	Time In	Time Out	Name	Description	Signature	Time In	Time Out
	MWE							
	MWE							
	MWE							

F-SBD-001 Rev 4.0 Pre Work Brief E:\Pre-Work Briefing Form Rev 4.doc Page 1 of 2

The Hierarchy of Control



Environment problems

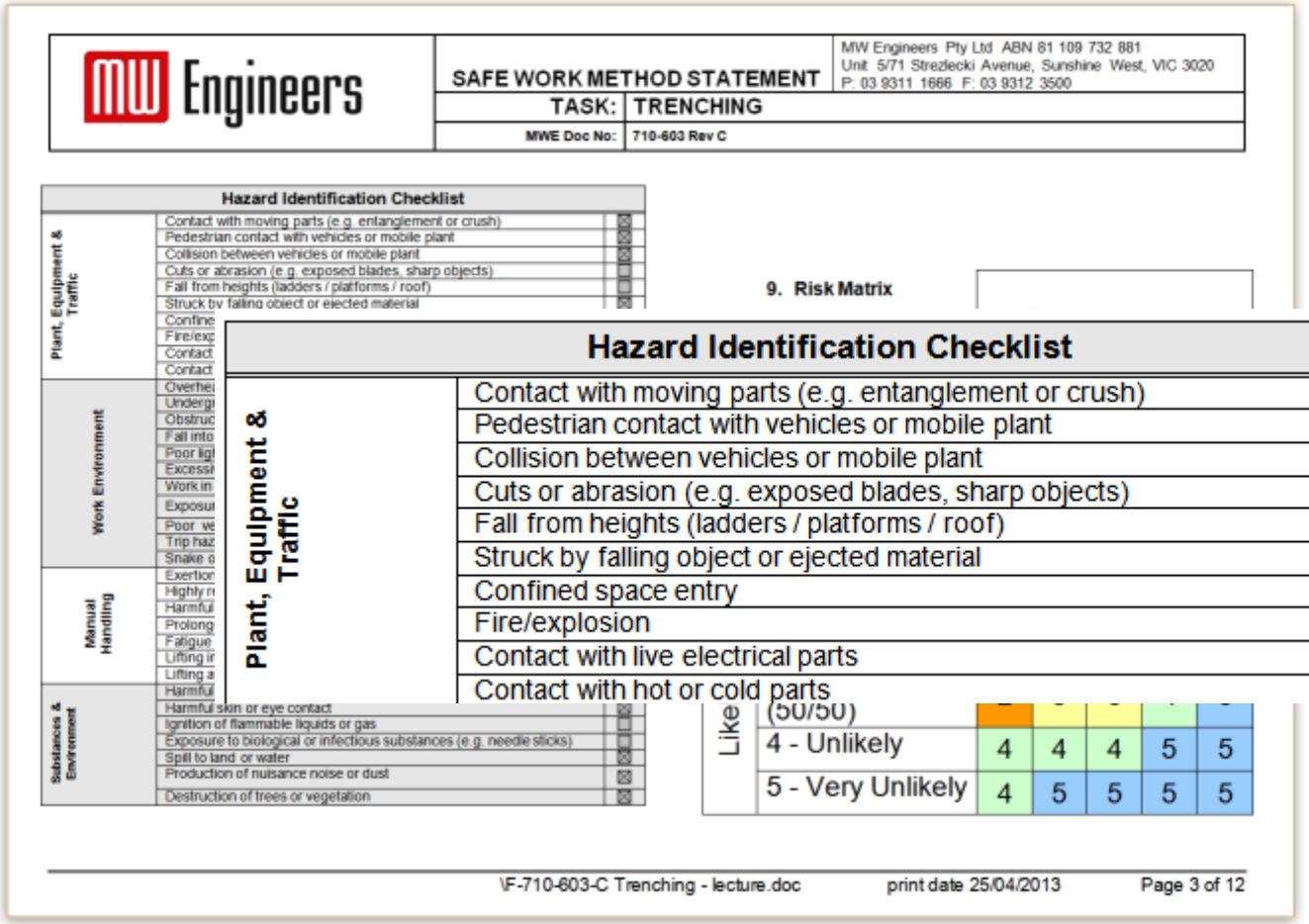
- Significant delay in project execution by environmental problems associate high cost increase
- Can lead to re-design
- Cost associated:
  - Special equipment
  - Additional work / delay
  - Standby cost of stuff

Trenching – rock / cable

- Trenching several hundreds of meters along the rail line can end up with cutting rock in the way
- Cost/risk calculation:
  - $175 per cubic metre rock rate

- Hit PWR/Com cable
  - **Dial before you dig**

SWMS - Trenching



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SAFE WORK METHOD STATEMENT

MW Engineers Pty Ltd ABN 81 109 732 881
Unit 5/71 Strzlecki Avenue, Sunshine West, VIC 3020
P: 03 9311 1666 F: 03 9312 3500

TASK: TRENCHING

MWE Doc No: 710-603 Rev C

Hazard Identification Checklist

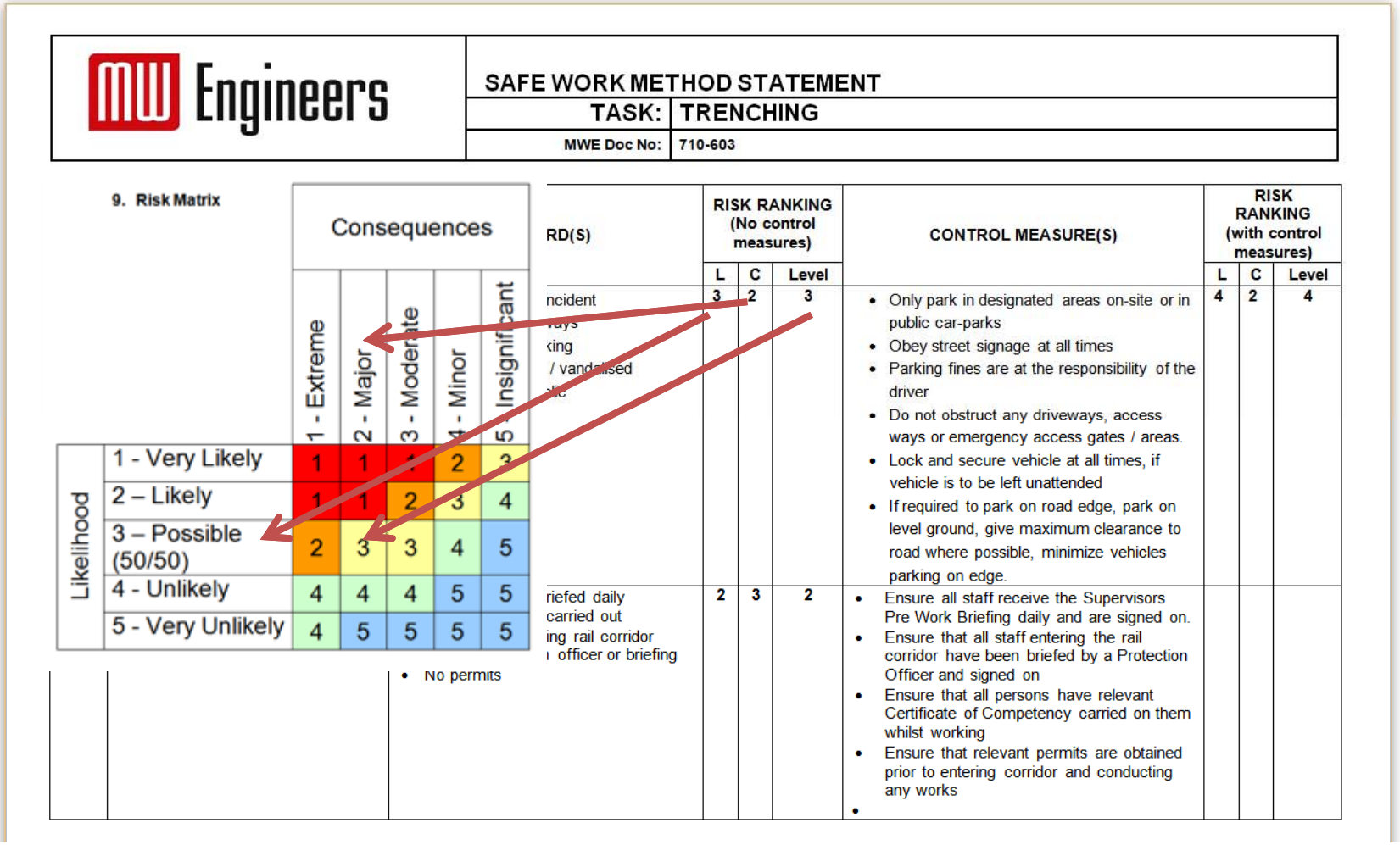
Plant, Equipment & Traffic	Contact with moving parts (e.g. entanglement or crush)	☒
	Pedestrian contact with vehicles or mobile plant	☒
	Collision between vehicles or mobile plant	☒
	Cuts or abrasion (e.g. exposed blades, sharp objects)	☐
	Fall from heights (ladders / platforms / roof)	☐
	Struck by falling object or ejected material	☒
	Confined space entry	☐
	Fire/explosion	☒
	Contact with live electrical parts	☒
	Contact with hot or cold parts	☐

9. Risk Matrix

Like						
	(50/50)					
	4 - Unlikely	4	4	4	5	5
	5 - Very Unlikely	4	5	5	5	5

\F-710-603-C Trenching - lecture.doc print date 25/04/2013 Page 3 of 12

PI Chart Example



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SAFE WORK METHOD STATEMENT

TASK:	TRENCHING
MWE Doc No:	710-603

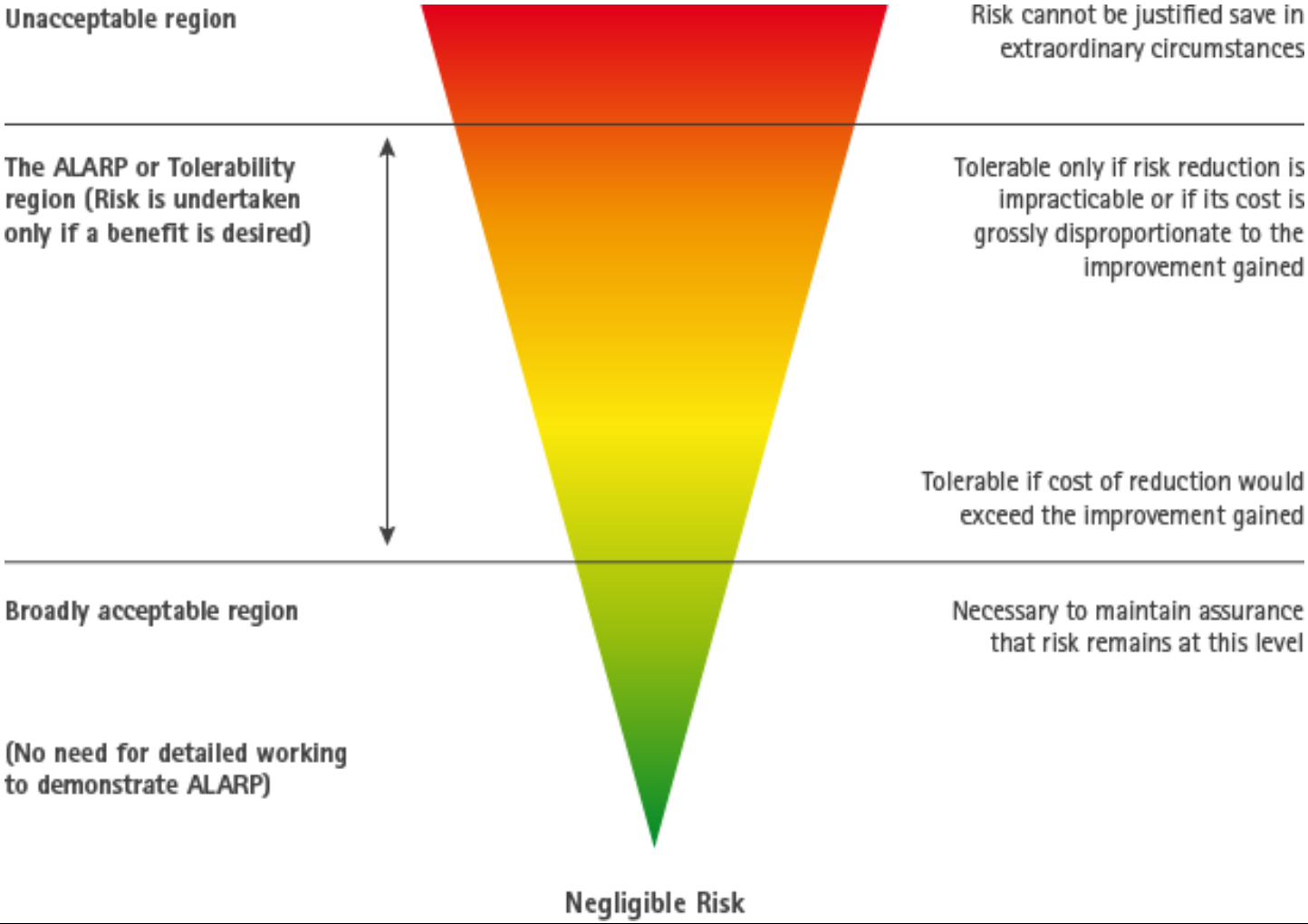
9. Risk Matrix

Likelihood \ Consequences	1 - Extreme	2 - Major	3 - Moderate	4 - Minor	5 - Insignificant
1 - Very Likely	1	1	1	2	3
2 – Likely	1	1	2	3	4
3 – Possible (50/50)	2	3	3	4	5
4 - Unlikely	4	4	4	5	5
5 - Very Unlikely	4	5	5	5	5

RD(S)	RISK RANKING (No control measures) L	C	Level	CONTROL MEASURE(S)	RISK RANKING (with control measures) L	C	Level
ncident ıays cing / vandalised ılic	3	2	3	• Only park in designated areas on-site or in public car-parks • Obey street signage at all times • Parking fines are at the responsibility of the driver • Do not obstruct any driveways, access ways or emergency access gates / areas. • Lock and secure vehicle at all times, if vehicle is to be left unattended • If required to park on road edge, park on level ground, give maximum clearance to road where possible, minimize vehicles parking on edge.	4	2	4
riefed daily carried out ing rail corridor ı officer or briefing	2	3	2	• Ensure all staff receive the Supervisors Pre Work Briefing daily and are signed on. • Ensure that all staff entering the rail corridor have been briefed by a Protection Officer and signed on • Ensure that all persons have relevant Certificate of Competency carried on them whilst working • Ensure that relevant permits are obtained prior to entering corridor and conducting any works •			

• No permits

As Low as Reasonably Practical



Risk Score Calculation – NSCA

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SAFE WORK METHOD STATEMENT

TASK: TRENCHING

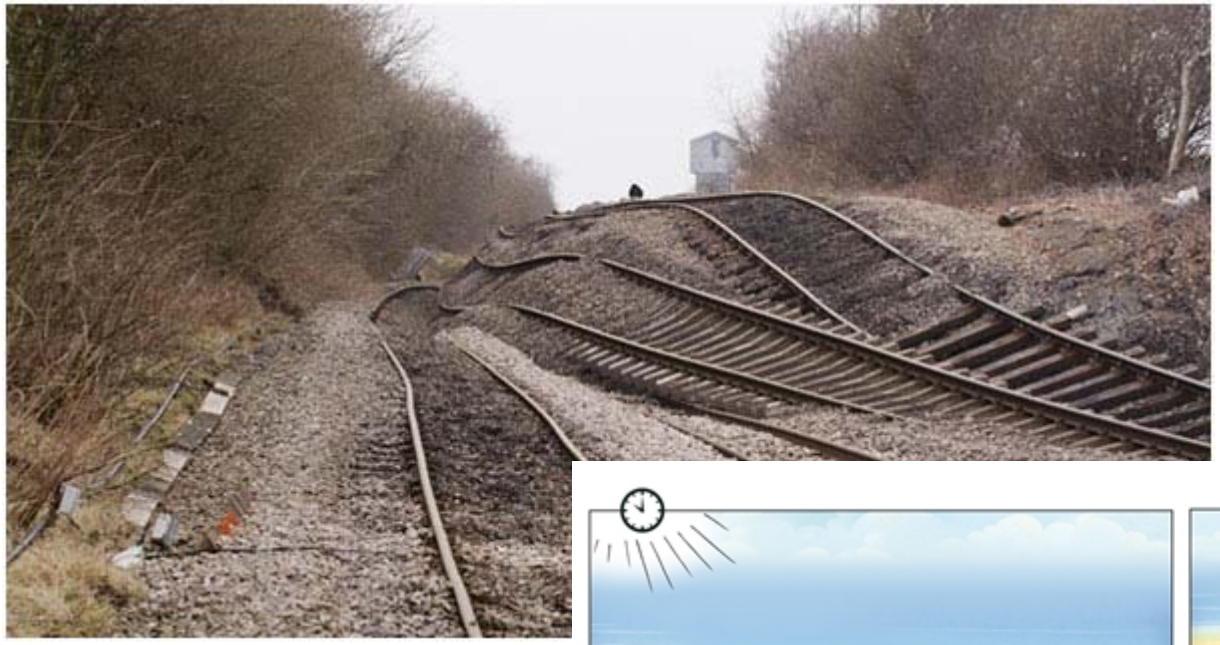
MWE Doc No: 710-603

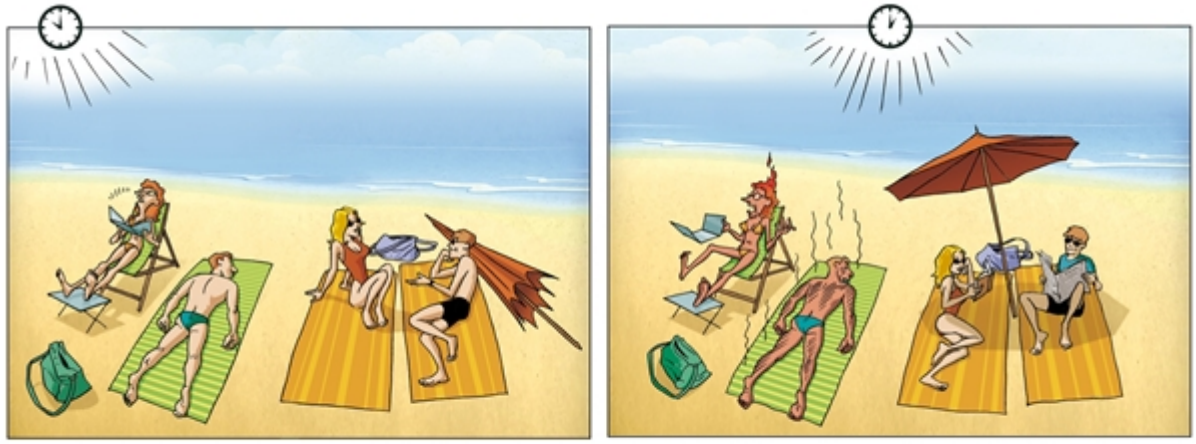
ITEM No.	JOB STEP (in sequence)	HAZARD(S)	RISK RANKING (No control measures)			CONTROL MEASURE(S)	RISK RANKING (with control measures)		
			L	C	Level		L	C	Level
2	Parking Vehicle (carparks, side of road, local roads, etc)	• Traffic accident / incident • Obstructing driveways • Unauthorised parking • Vehicle damaged / vandalised • Obstruction to public	3	2	3	• Only park in designated areas on-site or in public car-parks • Obey street signage at all times • Parking fines are at the responsibility of the driver • Do not obstruct any driveways, access ways or emergency access gates / areas. • Lock and secure vehicle at all times, if vehicle is to be left unattended • If required to park on road edge, park on level ground, give maximum clearance to road where possible, minimize vehicles parking on edge.	4	2	4
3	Briefings	• Employees not briefed daily regarding works carried out • Employees entering rail corridor without protection officer or briefing • No permits	2	3	2	• Ensure all staff receive the Supervisors Pre Work Briefing daily and are signed on. • Ensure that all staff entering the rail corridor have been briefed by a Protection Officer and signed on • Ensure that all persons have relevant Certificate of Competency carried on them whilst working • Ensure that relevant permits are obtained prior to entering corridor and conducting any works •			

Riskex-Risk-Score Riskex-Cost-Justification

source: http://www.safetyrisk.com.au/risk-assessment-form-templates/

Hazard Report / Incident Report





RISK = HAZARD x EXPOSURE

PROJECT REVIEW
POST ASSESSMENT OF RISKS

What is a Project Review?

A meeting where a team looks back on a past period of work so that they can **learn** from their experience and apply this learning to future projects.

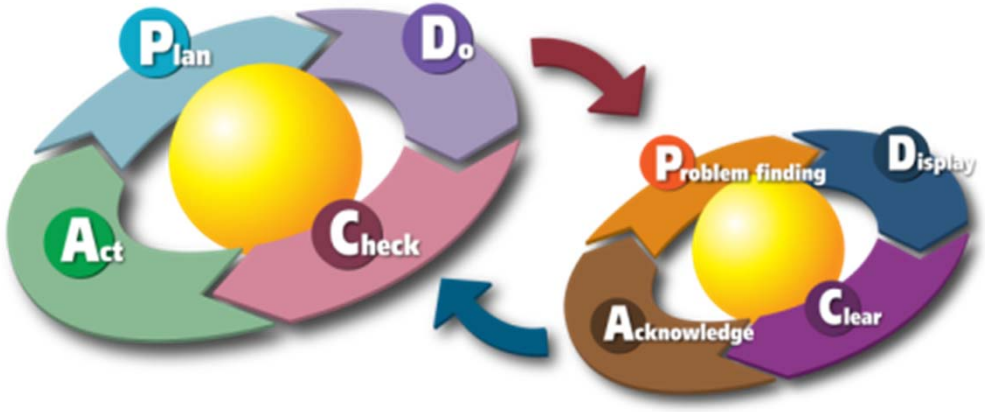
Primary Goal:

Create preventive actions on future Risks

Why Project Review?

- Reflection is a key step in **learning** from experience.
- Project Reviews help teams to focus on **process improvement** and build **ownership**.
- Reviews build community and improve cross **communication**.

- **How often would you do it?**



Source: Karn G. Bulsuk (http://karnbulsuk.blogspot.com)

Review in Your Project

- Not consider yet to do one?
- At the end of the project, in case of accident?
- Every major milestone?
- Every month or more often?

Image courtesy: www.idea.gov.uk

The Prime Directive

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Regardless of what we discover, we understand and truly believe that everyone did the best job they could, given what they knew at the time, their skills and abilities, the resources available, and the situation at hand.

- Norm Kerth

Preparation & Roles

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Quality Manager:

- Review previous actions
- Plans and guides meeting: timing, rules, exercises
- Captures outputs: minutes, photo, intranet
- Listen, Observe, Unpack information

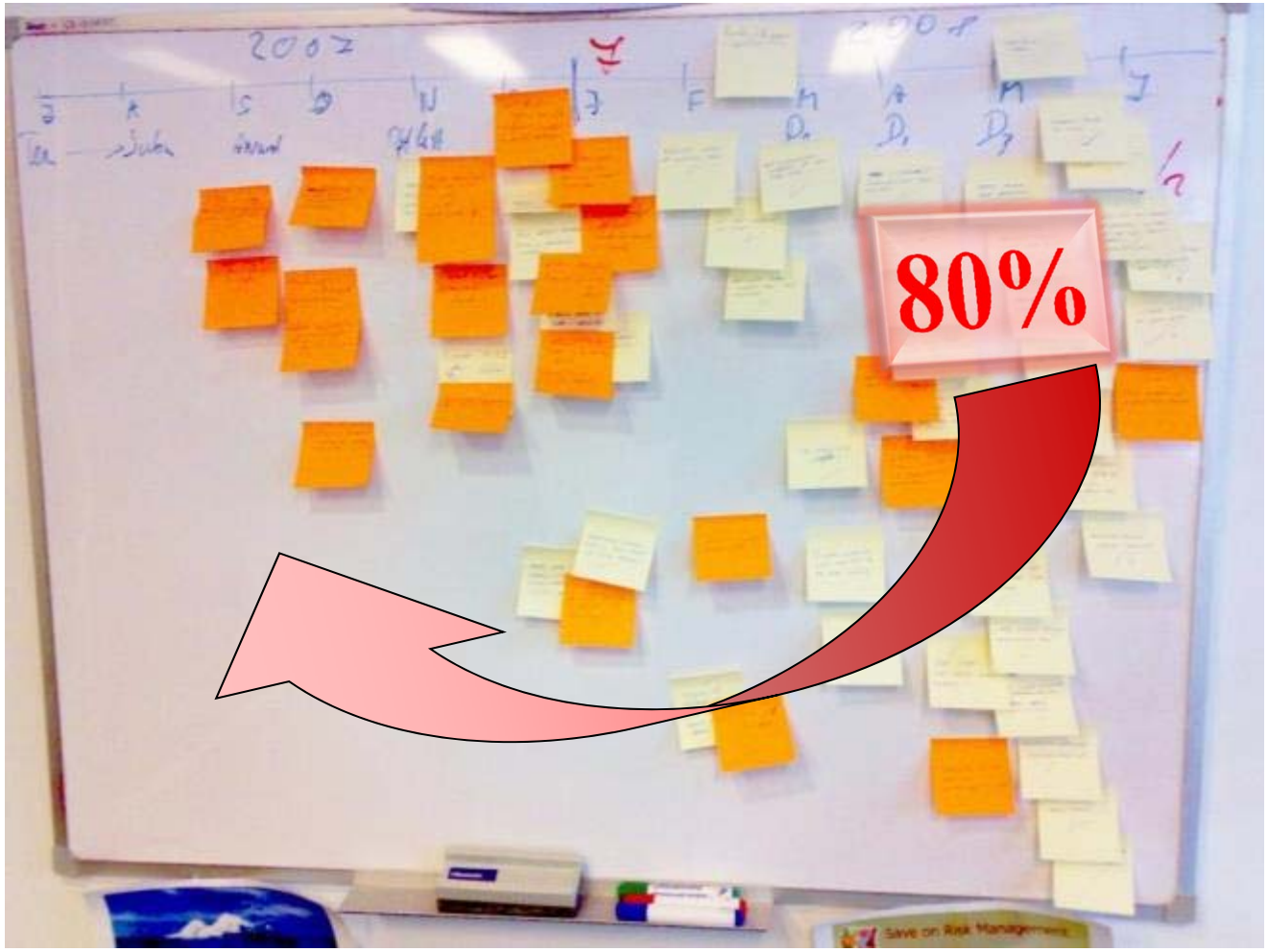
Team:

- Share experiences
- Make new commitments

Product / Project Manager:

- Sets goal and expectations
- Supports recommendations

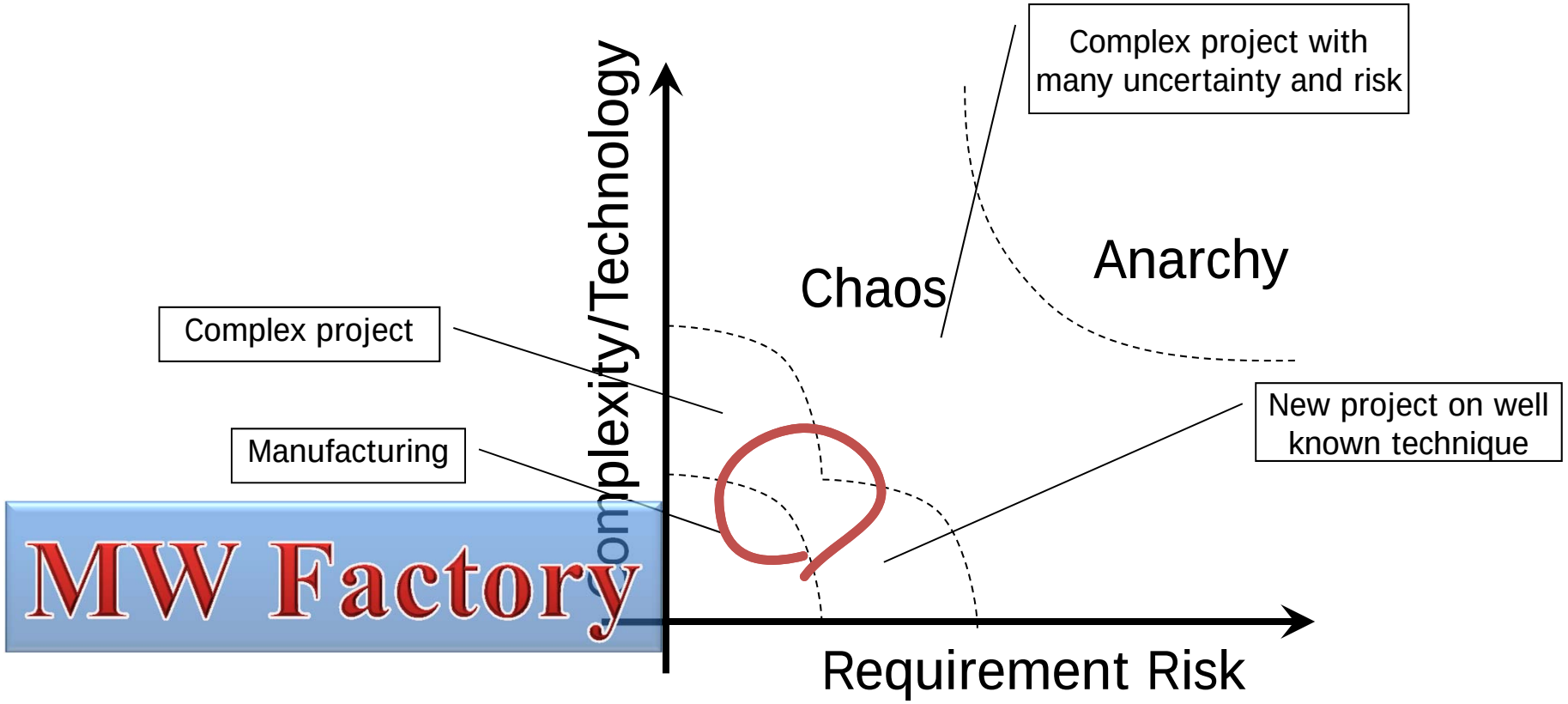
Project Phase Review – Rail



END SUMMARY - RAILWAY

- ✓ Railway Signalling works – with Case Studies
- ✓ Project Review – with Case Study

Project Risk Level Assessment



MW A/C Panel Overhaul
Case Study

- ✓ Contracting Risk Management
- ✓ Procedures – Quality Checks for Risk Reduction
- ✓ In Details – Wire preparation
- ✓ Corrective Action Report (CAR)

Business Preparation

- Business Analysis – Business Risk
- Risk Assessment
- Risk Analysis – how to handle the risks
- Reduce/Eliminate risk - Plan

source: http://digitalbloggers.com/normalguy/im-too-scared-to-change/

source: http://postmasculine.com/how-to-be-confident-around-women/

Project Risk Assessment Register

- At Proposal/Contracting phase

Project Risk Assessment Register

Project No: 11035
Project Name: QR Air Conditioning units refurbishment

Date	Risk No.	Description of risk(what is it and how can it occur)	Likelihood rating	Consequence rating	Risk Rating	Status (new or review)	Actions	Task Owner (Responsible Officer)
5-Jul	Delivery	Frame delivery delays	1	3	1	new	arrange delivery of a number (say 20) of old units from QR to be stripped, powder coated and refurbished prior to new frames arrival	
5-Jul	Delivery	Carbon Tax implications Unknown 1/7/2012 (20%)	2	3	2	new	Order or fix the price for major parts before July Request prices from different suppliers to cut price	
5-Jul	Procurement	Increased foreign exchange	3	4	4	review	Australian $ is low now, fix orders and prices before July	
5-Jul	Delivery	Increased transportation costs to Australia and locally	4	3	4	review	past 1 year showed an international ~5% increase in prices, and about the same for Australia (recent study is in the risk folder) transport cost decreased in the past 1 year as we have reached to pack 6 units in one transports and received an increasing discount, from ~$130/unit to ~$80/unit	
	Smoking in the workplace	Smoking in the workplace results in health damage to the smoker, other employees and potential legal claims					Smoking in the Workplace Policy Management to monitor to avoid excessive smoking breaks	
	Electrical systems	Personnel electrocuted, potential fire or explosion from poor maintenance or design					Hazard Identification & Risk Assessment Job Safety Analysis & Work Instruction Electrical Safety Hand and Power Tools	

Risk Negotiation at Contracting

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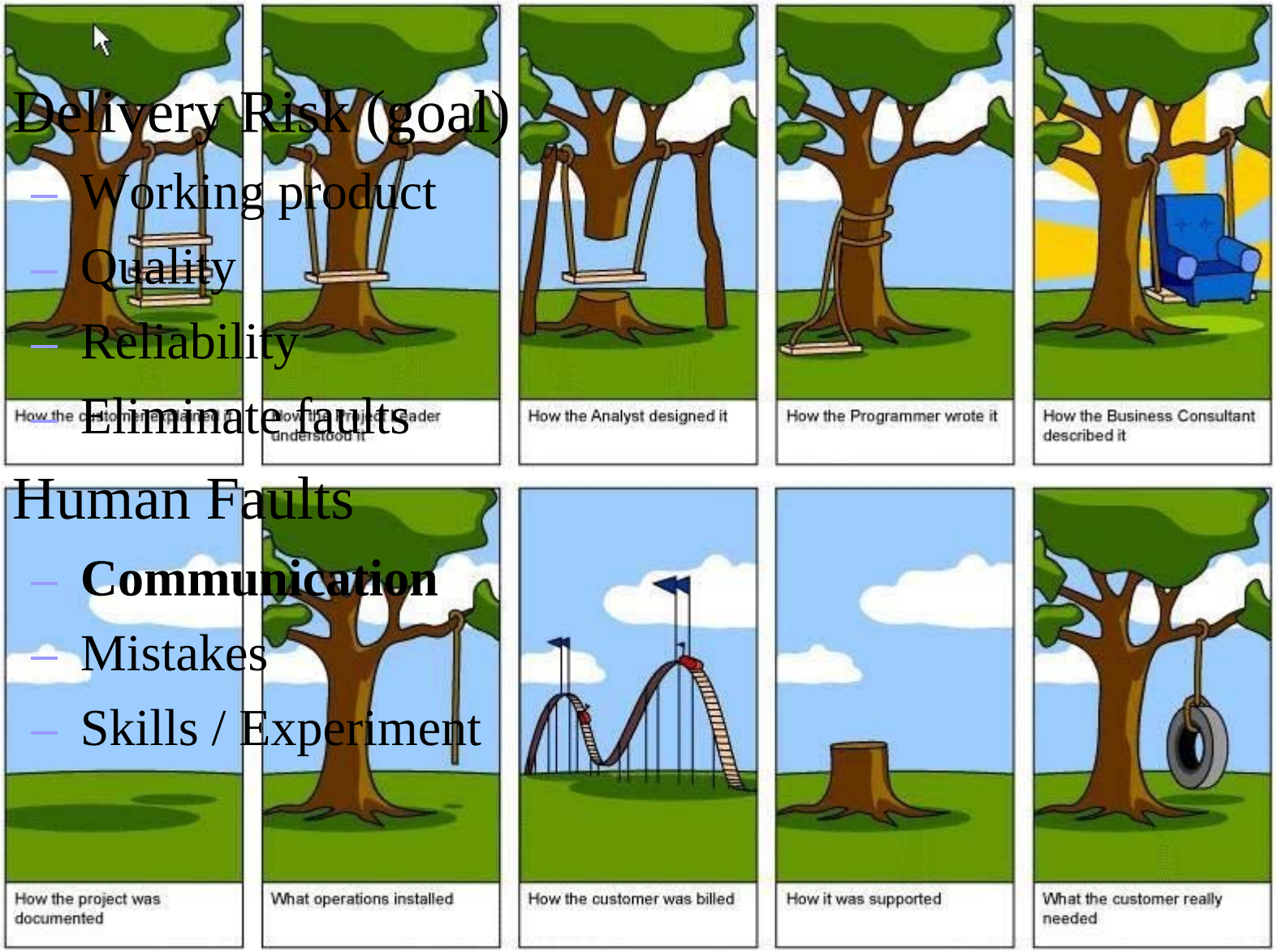
1. Goal: Replicate an old control panel with new design
2. Business Analysis – Risk Assessment
3. Production – Tools/Environment Risk
4. Estimate on unforseen risk & cost factors
5. Clarification of warranty terms & conditions
6. Clarification of Responsibilities
7. Risk / Cost negotiation

PROCEDURES
QUALITY CHECKS FOR RISK REDUCTION

Risks in Project Delivery

- Delivery Risk (goal)
  - Working product
  - Quality
  - Reliability
  - Eliminate faults
- Human Faults
  - **Communication**
  - Mistakes
  - Skills / Experiment



Product Milestones

- Th
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- Qu
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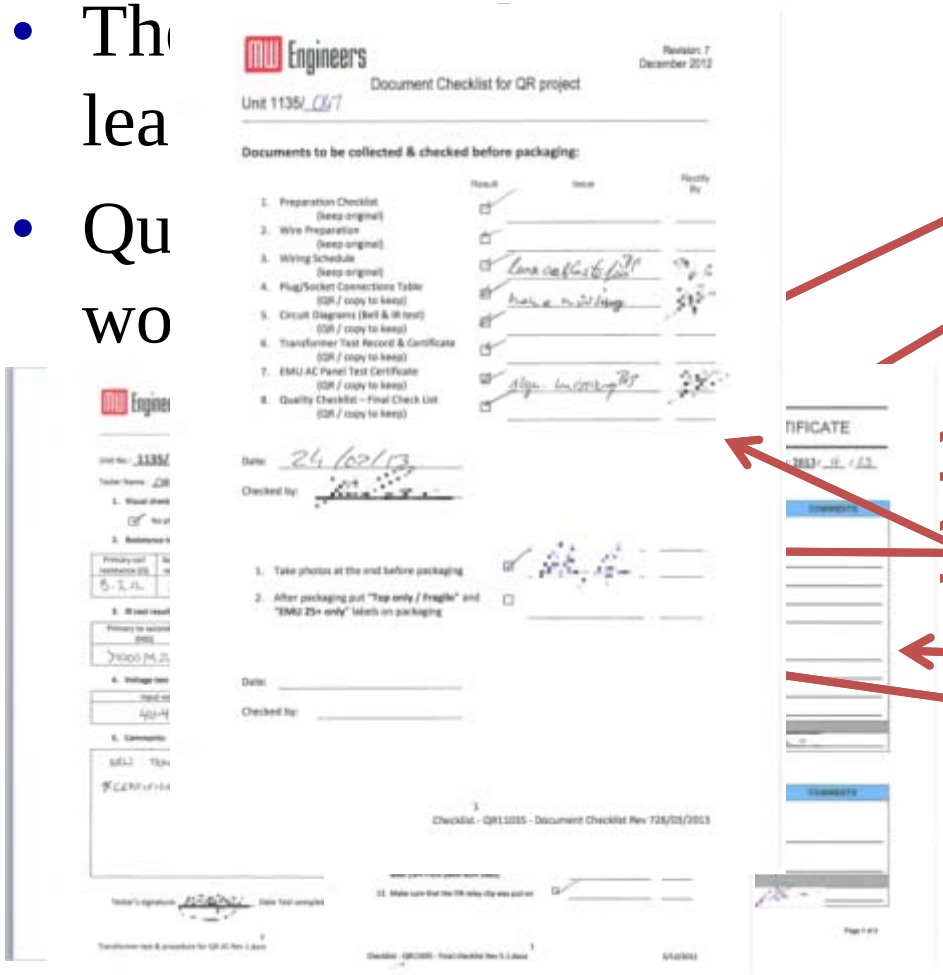

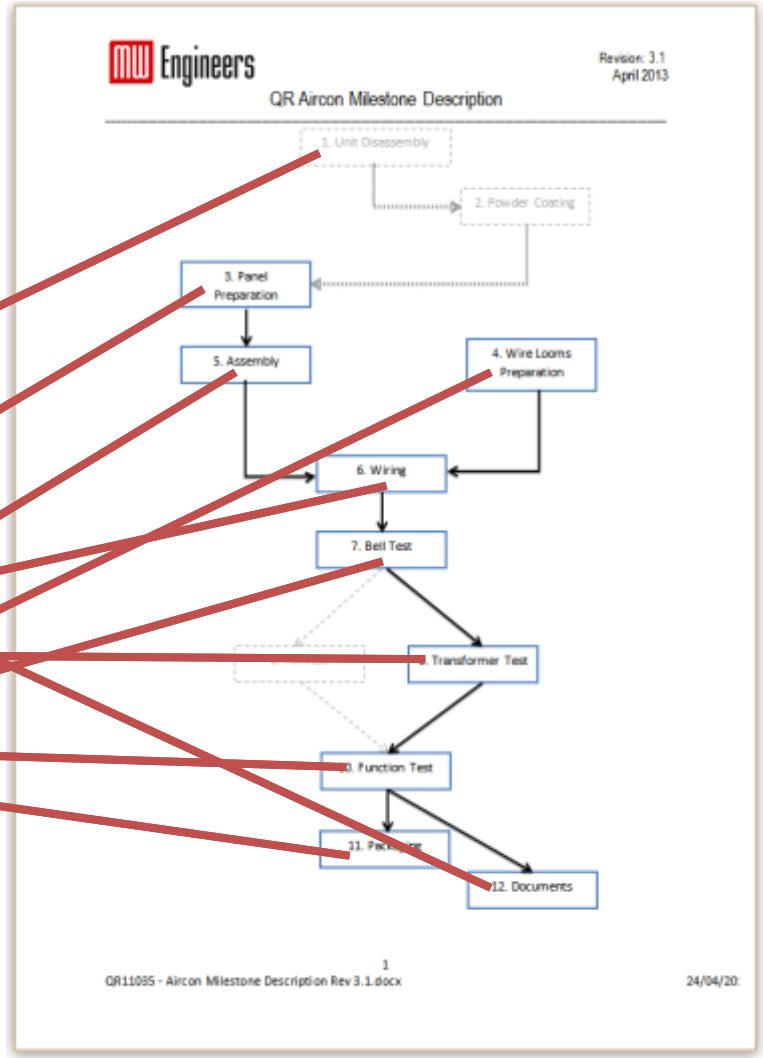

Q Documents - Sample

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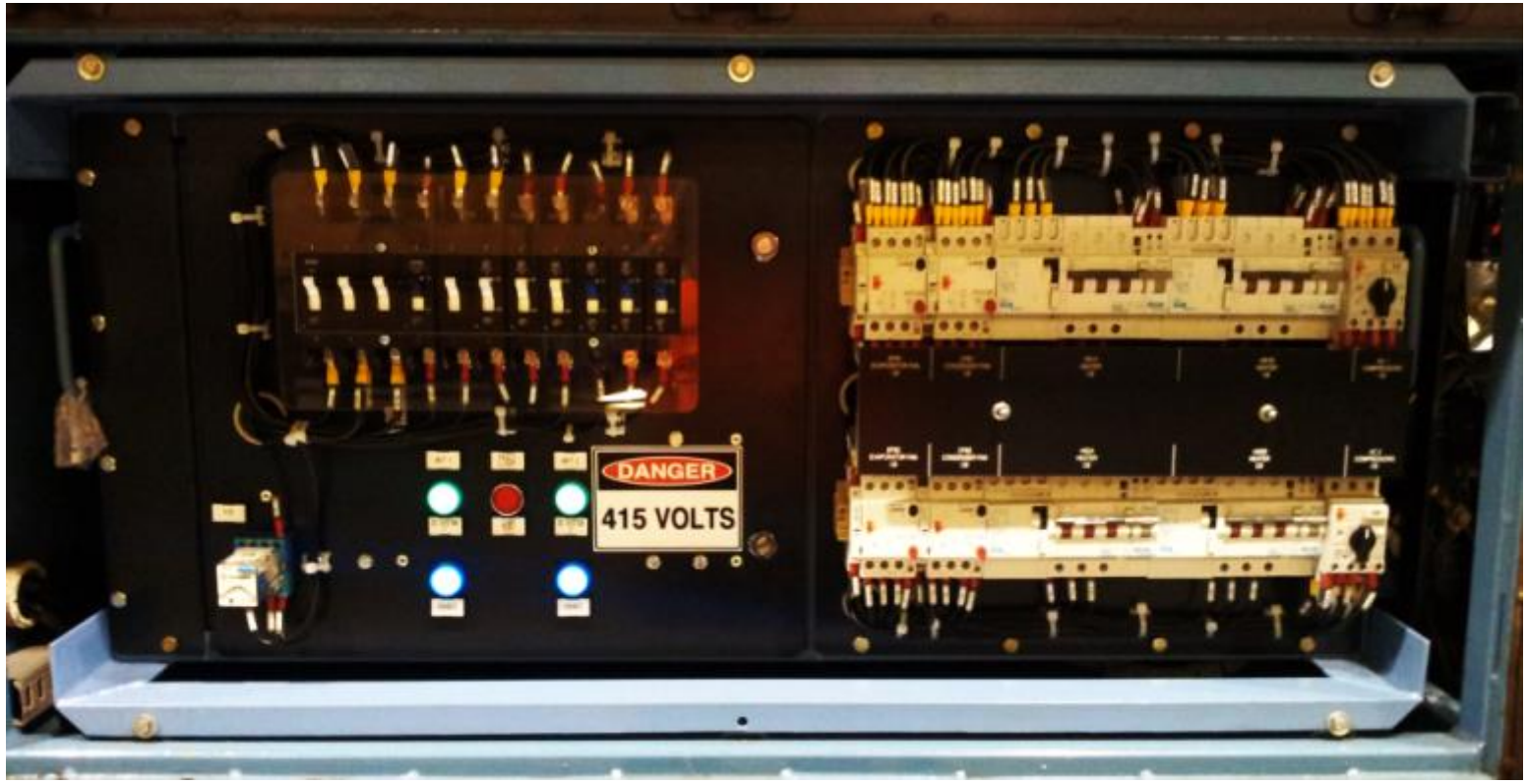


Adaption – a Key to Success

- Learning cycles
- Technical issues
- Client requests
- All Risk Management

- 5 milestones => 12
- 10s of check => ~100 points
- 5w => 3 days wiring
- 200h => 40h full production

1 out of 180 had failure

(2+ years in service)

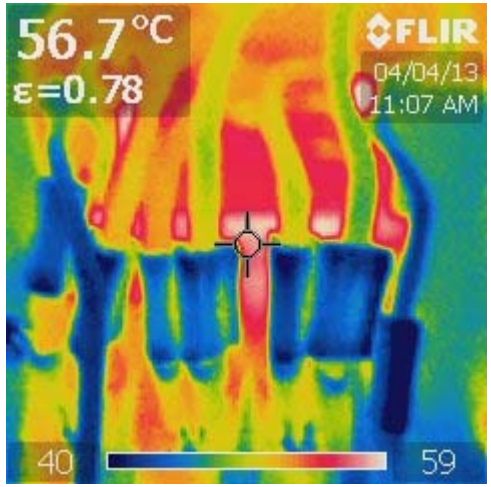
WIRE PREPARATION MILESTONE

Risk - Tools

- Tools register
- Goals: check & calibrate every tools
- Check final quality: strength of the crimp
- Before a tool is used
- Every day

Wire preparation

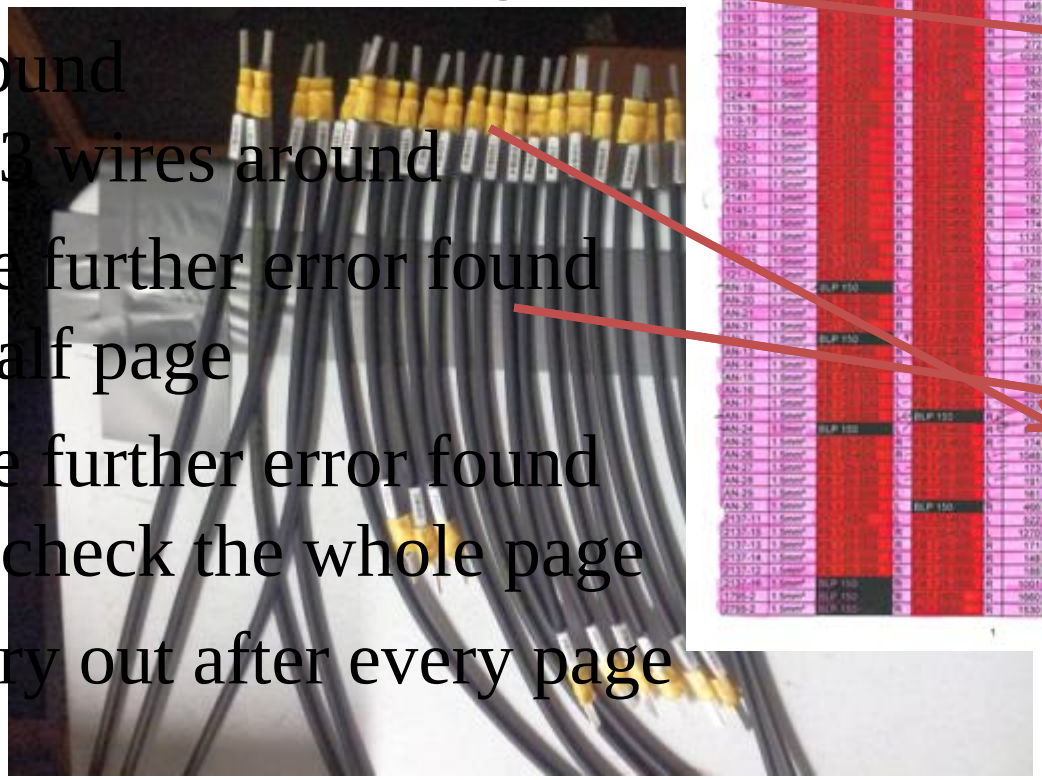
- 270 wires/unit, 2x130 units
- Production quality check
  - Cable type
  - Length [mm]
  - Label / direction
  - Proper lug / stripping / crimping / direction



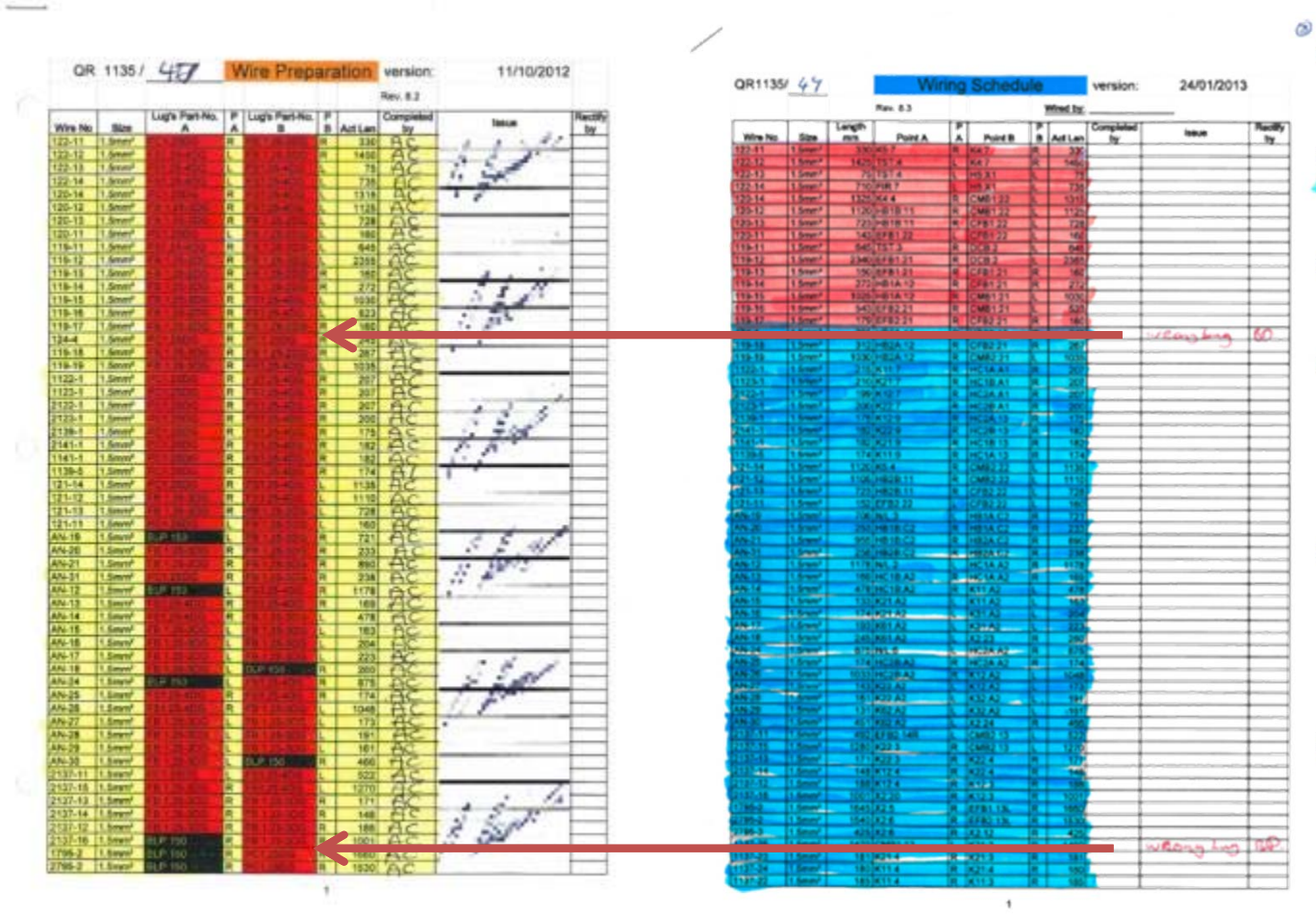
Wire No	Size	Lug's Part-No. A	P A	Lug's Part-No. B	P B	Act Len	Completed by	Issue	Rectify by
122-11	1.5mm²	PC1.25DG	R	FB 1.25-3DG	R	330	BK		
122-12	1.5mm²	FS1.25-4DG	L	FB 1.25-3DG	R	1450	BK		
122-13	1.5mm²	FS1.25-4DG	L	FS1.25-4DG	L	75	BK		
122-14	1.5mm²	FS1.25-4DG	L	FS1.25-4DG	L	735	BK		
120-14	1.5mm²	PC1.25DG	R	FS1.25-4DG	L	1315	BK		
120-12	1.5mm²	FB 1.25-3DG	R	FS1.25-4DG	L	1125	BK		
120-13	1.5mm²	FB 1.25-3DG	R	FB 1.25-2DG	L	728	BK		
120-11	1.5mm²	PC1.25DG	L	FB 1.25-2DG	L	160	BK		

Method Used for Quality Control

- Visual inspection
- Check every 10 wire on average
- If any error found
  - check ±3 wires around
- If one or more further error found
  - check half page
- If one or more further error found
  - need to check the whole page
- Checks to carry out after every page

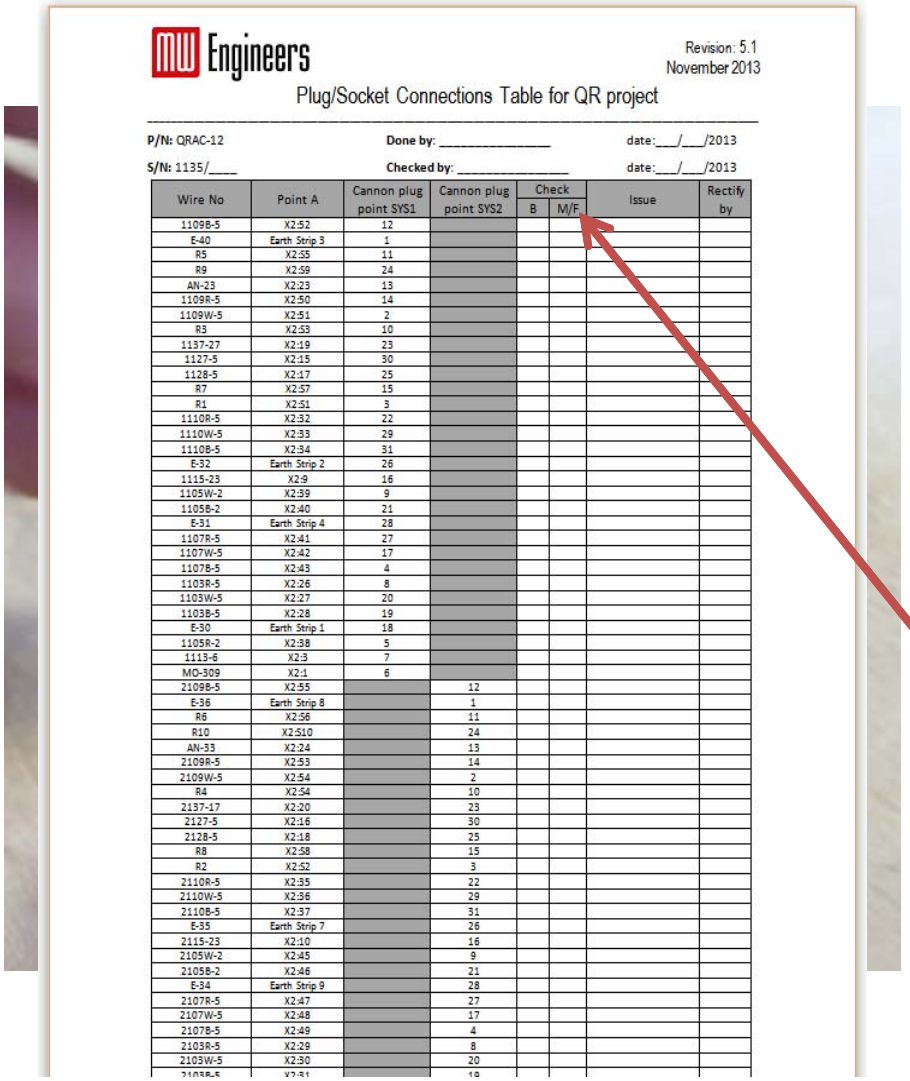


Quality Check – Fails?



- Goal?
- Confident
- Q check later?
- 10% redone at wiring
- Prep is to help wiring
- Check to adapt to person

Risk on Quality – Rectification Cost



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Revision: 5.1
November 2013

Plug/Socket Connections Table for QR project

P/N: QRAC-12 Done by: _____ date:___/___/2013

S/N: 1135/____ Checked by: _____ date:___/___/2013

Wire No	Point A	Cannon plug point SYS1	Cannon plug point SYS2	Check B	Check M/F	Issue	Rectify by
1109B-5	X2:52	12					
E-40	Earth Strip 3	1					
R5	X2:55	11					
R9	X2:59	24					
AN-23	X2:23	13					
1109R-5	X2:50	14					
1109W-5	X2:51	2					
R3	X2:53	10					
1137-27	X2:19	23					
1127-5	X2:15	30					
1128-5	X2:17	25					
R7	X2:57	15					
R1	X2:51	3					
1110R-5	X2:32	22					
1110W-5	X2:33	29					
1110B-5	X2:34	31					
E-32	Earth Strip 2	26					
1115-23	X2:9	16					
1105W-2	X2:39	9					
1105B-2	X2:40	21					
E-31	Earth Strip 4	28					
1107R-5	X2:41	27					
1107W-5	X2:42	17					
1107B-5	X2:43	4					
1103R-5	X2:26	8					
1103W-5	X2:27	20					
1103B-5	X2:28	19					
E-30	Earth Strip 1	18					
1105R-2	X2:38	5					
1113-6	X2:3	7					
MO-309	X2:1	6					
2109B-5	X2:55		12				
E-36	Earth Strip 8		1				
R6	X2:56		11				
R10	X2:510		24				
AN-33	X2:24		13				
2109R-5	X2:53		14				
2109W-5	X2:54		2				
R4	X2:54		10				
2137-17	X2:20		23				
2127-5	X2:16		30				
2128-5	X2:18		25				
R8	X2:58		15				
R2	X2:52		3				
2110R-5	X2:35		22				
2110W-5	X2:36		29				
2110B-5	X2:37		31				
E-35	Earth Strip 7		26				
2115-23	X2:10		16				
2105W-2	X2:45		9				
2105B-2	X2:46		21				
E-34	Earth Strip 9		28				
2107R-5	X2:47		27				
2107W-5	X2:48		17				
2107B-5	X2:49		4				
2103R-5	X2:29		8				
2103W-5	X2:30		20				

- The later phase an error found, the more it costs to rectify
- Spark @ Function test
- Destroyed parts: $2k
- Root Cause Analysis
- Bell test problem?
- Extension: *”flower test”*

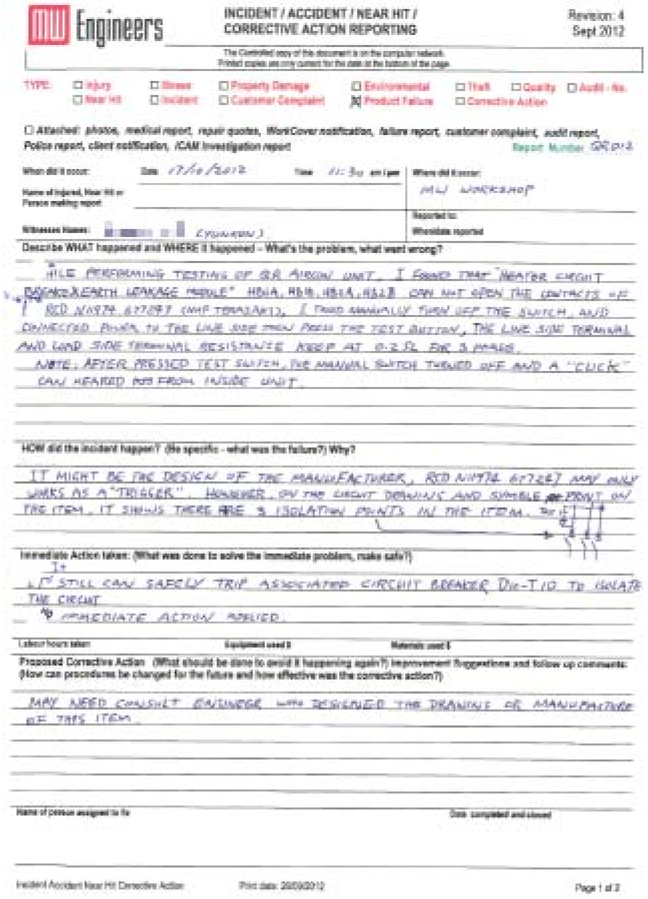
Risk on Quality – Rectification Cost 2

- 1 pin shorter
- Disassembly, rectify
- Broke end clamp…
- Whole plug into parts
- Reassembly
- Reproduction
- Retest

CORRECTIVE ACTION REPORT

CAR Examples

- General reporting also for Incident/Accident/Near hit
- Design issue – isolation
- Cable tie – OHS
- Locknut instead of Loctite


MW Engineers

INCIDENT / ACCIDENT / NEAR HIT / CORRECTIVE ACTION REPORTING

Revision: 4
Sept 2012

TYPE: ☐ Injury ☐ Near Hit ☐ Stress ☐ Incident ☐ Property Damage ☐ Customer Complaint ☐ Environmental ☒ Product Failure ☐ Theft ☐ Corrective Action ☐ Quality ☐ Audit - No.

☐ Attached: photos, medical report, repair quotes, WorkCover notification, failure report, customer complaint, audit report, Police report, client notification, ICAM Investigation report

Report Number: GR012

When did it occur: Date: 17/10/2012 Time: 11:30 am / pm

Where did it occur: MW WORKSHOP

Name of Injured, Near Hit or Person making report:

Reported to:

Witnesses Names: [redacted]

When/date reported:

Describe WHAT happened and WHERE it happened – What's the problem, what went wrong?

WHILE PERFORMING TESTING OF GR AIRCON UNIT, I FOUND THAT "HEATER CIRCUIT BREAKER & EARTH LEAKAGE MODULE" HB1A, HB1B, HB1A, HB2B CAN NOT OPEN THE CONTACTS OF RED NH974 ... I TURNED MANUALLY TURN OFF THE SWITCH, AND CONNECTED POWER TO THE LINE SIDE THEN PRESS THE TEST BUTTON, THE LINE SIDE TERMINAL AND LOAD SIDE TERMINAL RESISTANCE KEEP AT 0.2 Ω FOR 3 PHASES.

NOTE: AFTER PRESSED TEST SWITCH, THE MANUAL SWITCH TURNED OFF AND A "CLICK" CAN HEARED FROM INSIDE UNIT.

HOW did the incident happen? (Be specific - what was the failure?) Why?

IT MIGHT BE THE DESIGN OF THE MANUFACTURER, RED NH974 ... MAY ONLY WORKS AS A "TRIGGER". HOWEVER, ON THE CIRCUIT DRAWING AND SYMBLE PRINT ON THE ITEM, IT SHOWS THERE ARE 3 ISOLATION POINTS IN THE ITEM.

Immediate Action taken: (What was done to solve the immediate problem, make safe?)

IT STILL CAN SAFELY TRIP ASSOCIATED CIRCUIT BREAKER ... TO ISOLATE THE CIRCUIT

NO IMMEDIATE ACTION APPLIED.

Labour hours taken: Equipment used $ Materials used $

Proposed Corrective Action (What should be done to avoid it happening again?) Improvement Suggestions and follow up comments: (How can procedures be changed for the future and how effective was the corrective action?)

MAY NEED CONSULT ENGINEER WHO DESIGNED THE DRAWING OF MANUFACTURE OF THIS ITEM.

Name of person assigned to fix: Date completed and closed:

Incident Accident Near Hit Corrective Action Print date: 20/09/2012 Page 1 of 2

END SUMMARY - MANUFACTURING

- ✓ Contracting Risk Management
- ✓ Procedures – Quality Checks for Risk Reduction
- ✓ In Details – Wire preparation
- ✓ Corrective Action Report (CAR)