ORICA RISK MANAGEMENT

Association of European Business Open Event
“HSE Risk Management in Russia: Opportunities and Challenges”
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Anastasia Burtseva
Senior Manager SHES & Operations Excellence Europe

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ABOUT ORICA

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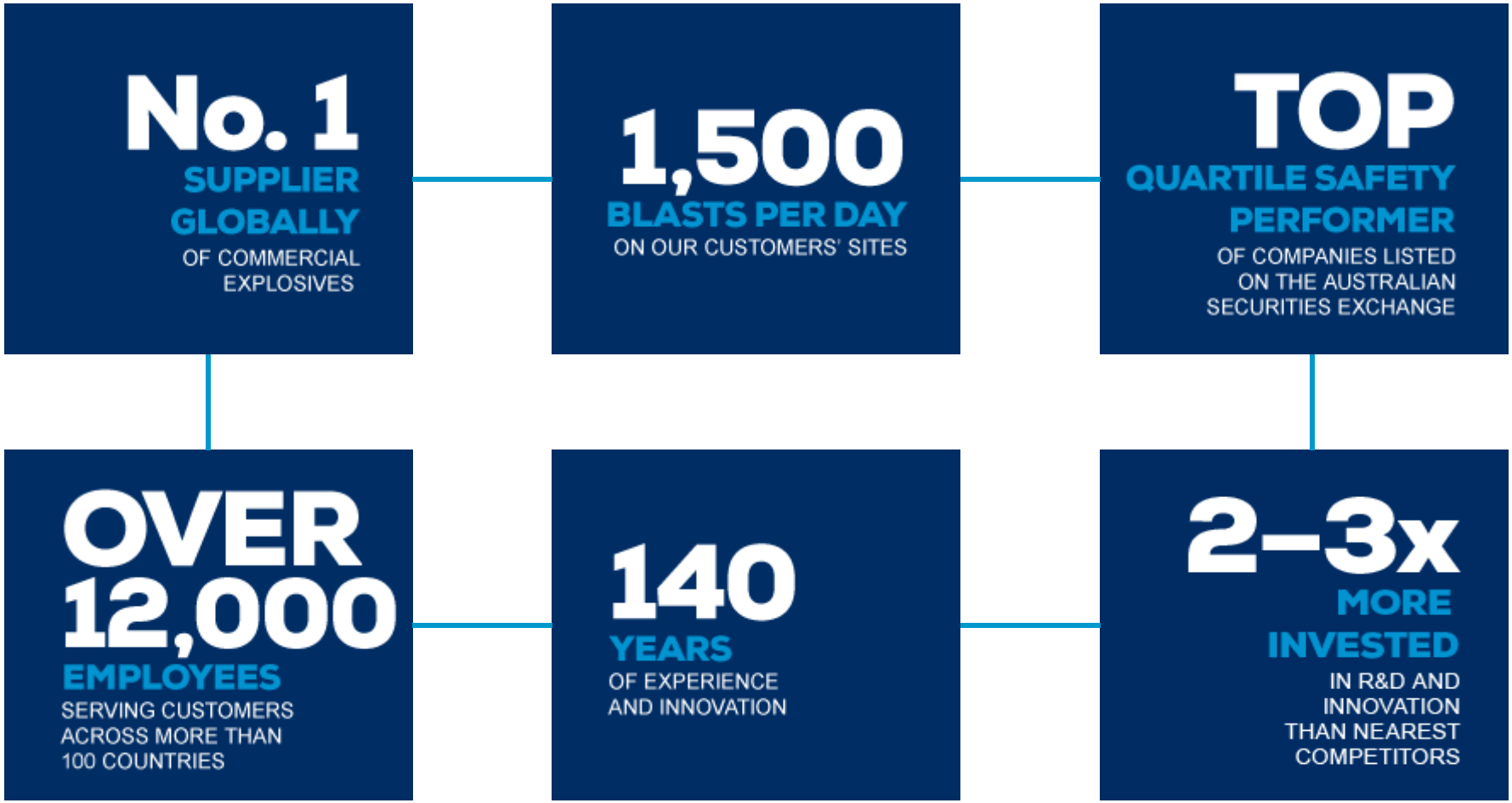
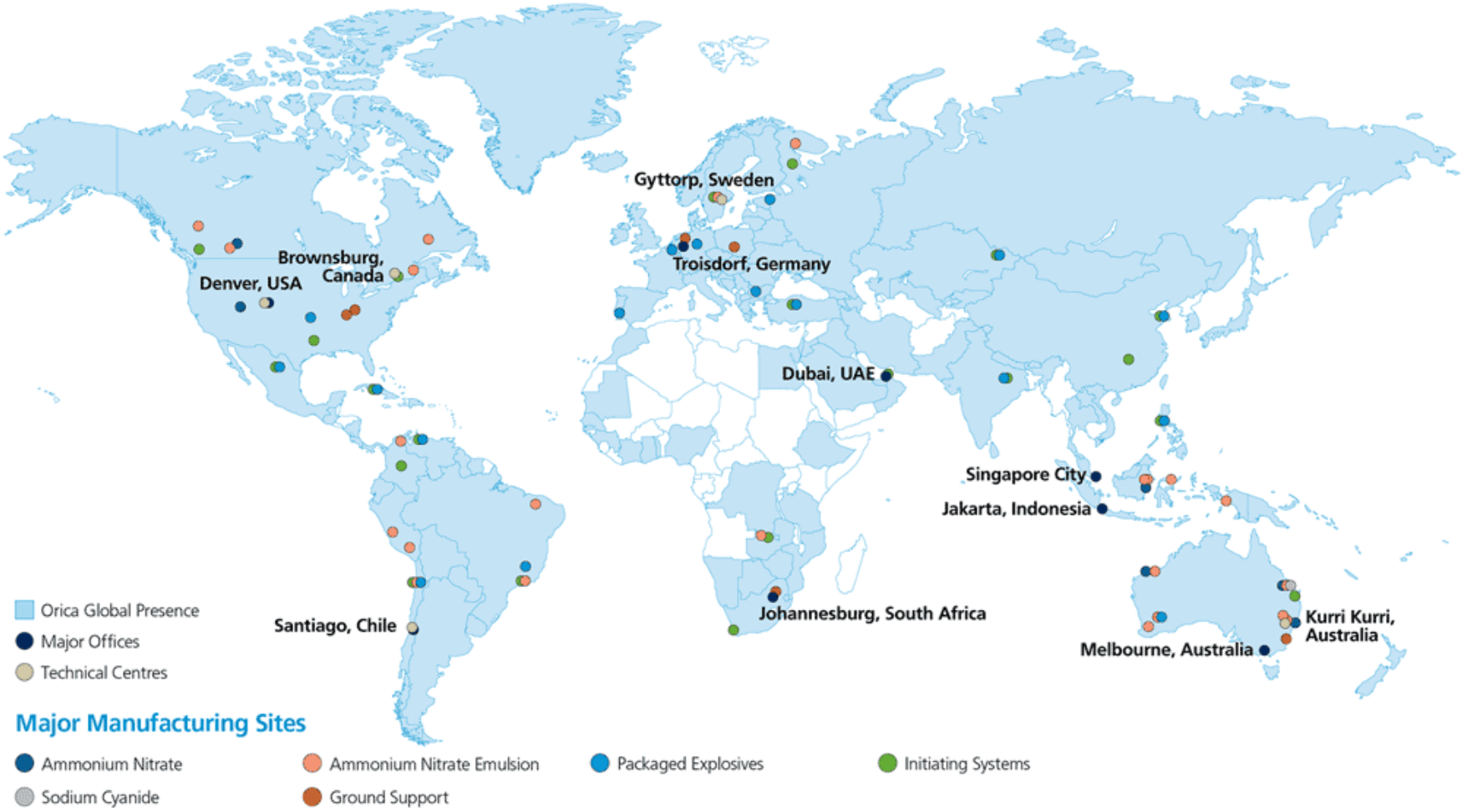
Orica is the world's largest provider of commercial explosives and innovative blasting systems to the mining, quarrying, oil and gas and construction markets, a leading supplier of sodium cyanide for gold extraction, and a specialist provider of ground support services in mining and tunnelling.

AT A GLANCE

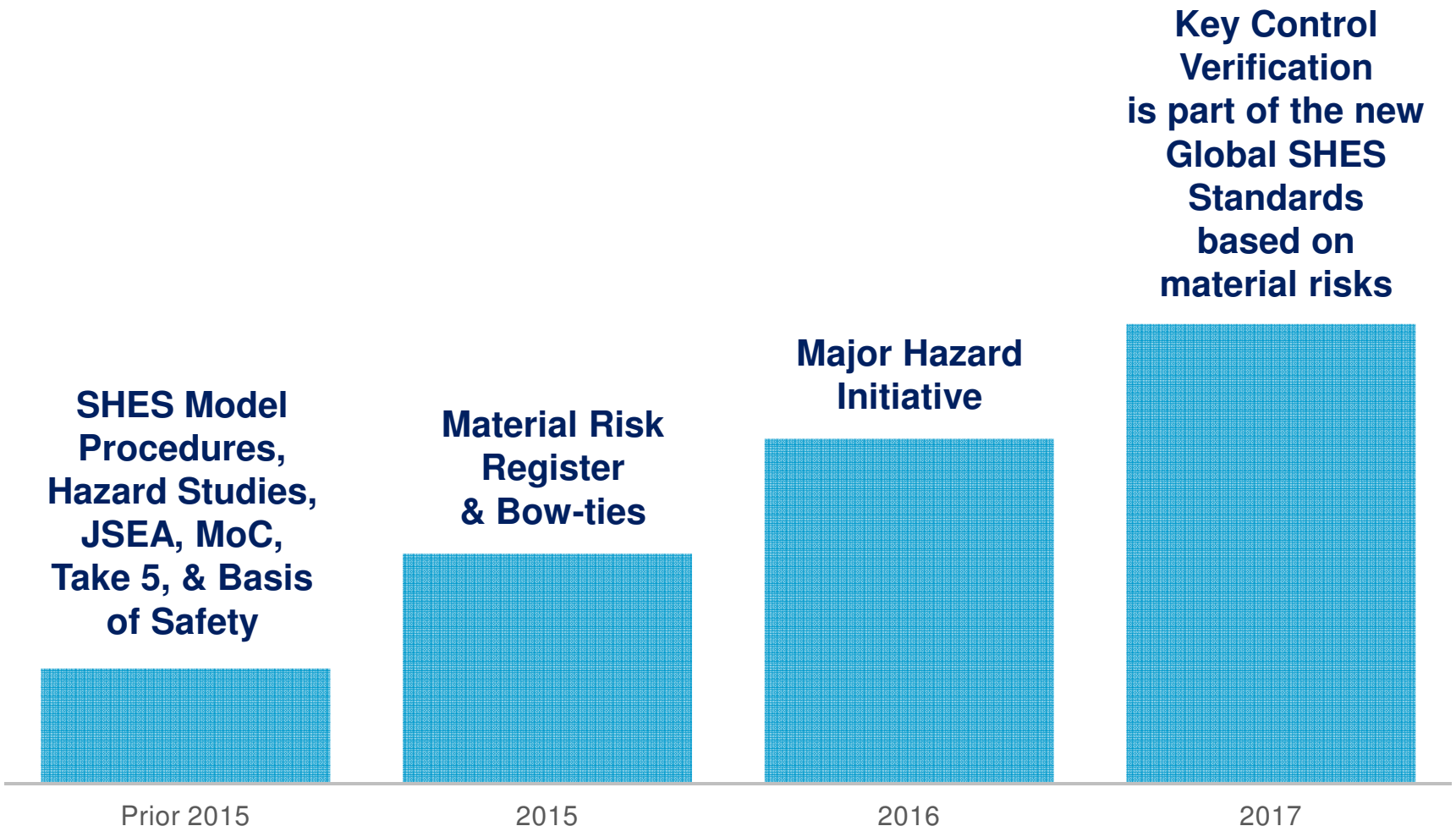


GLOBAL REACH

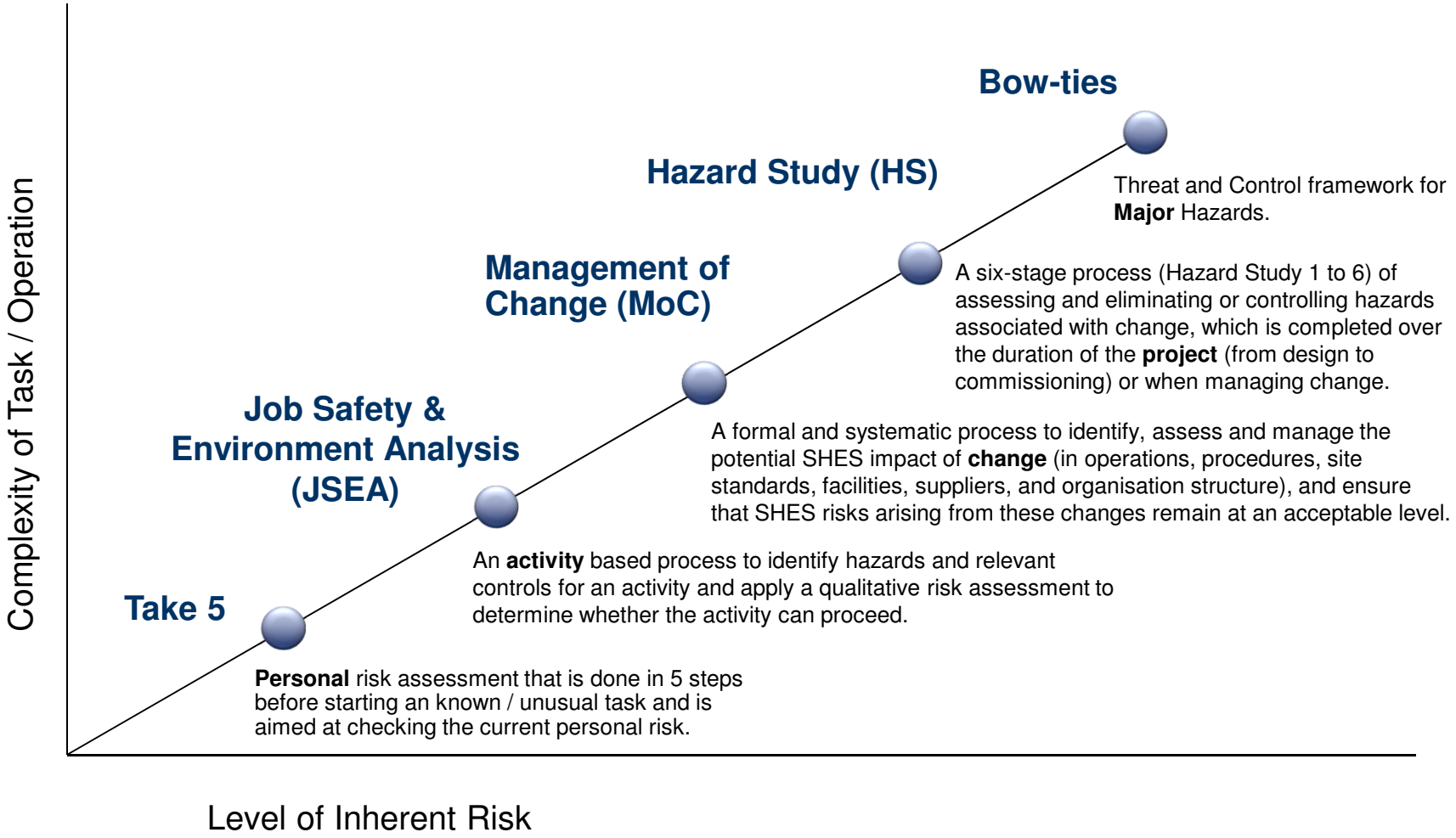


ORICA RISK MANAGEMENT

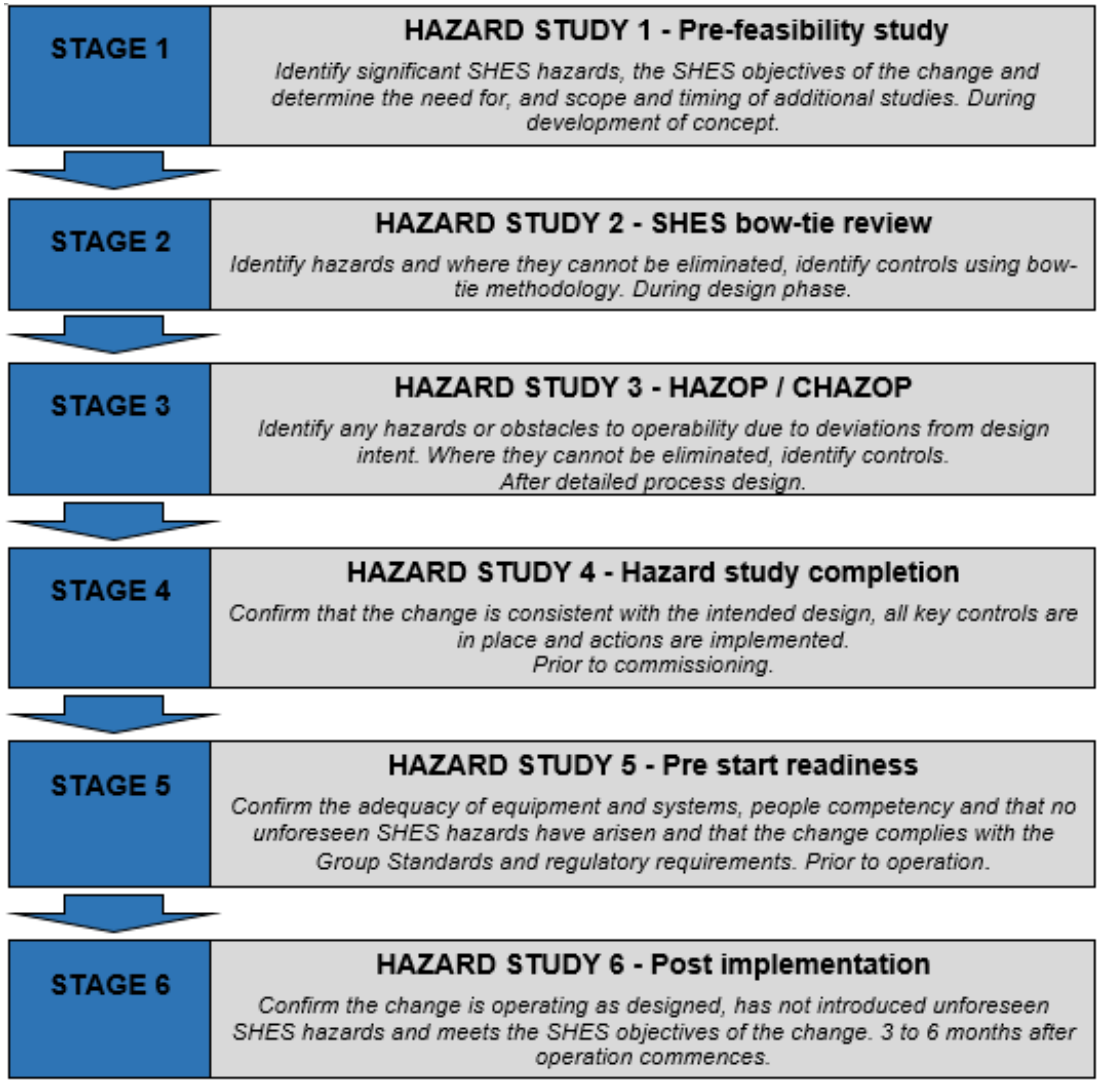
SHES RISK MANAGEMENT EVOLUTION IN ORICA



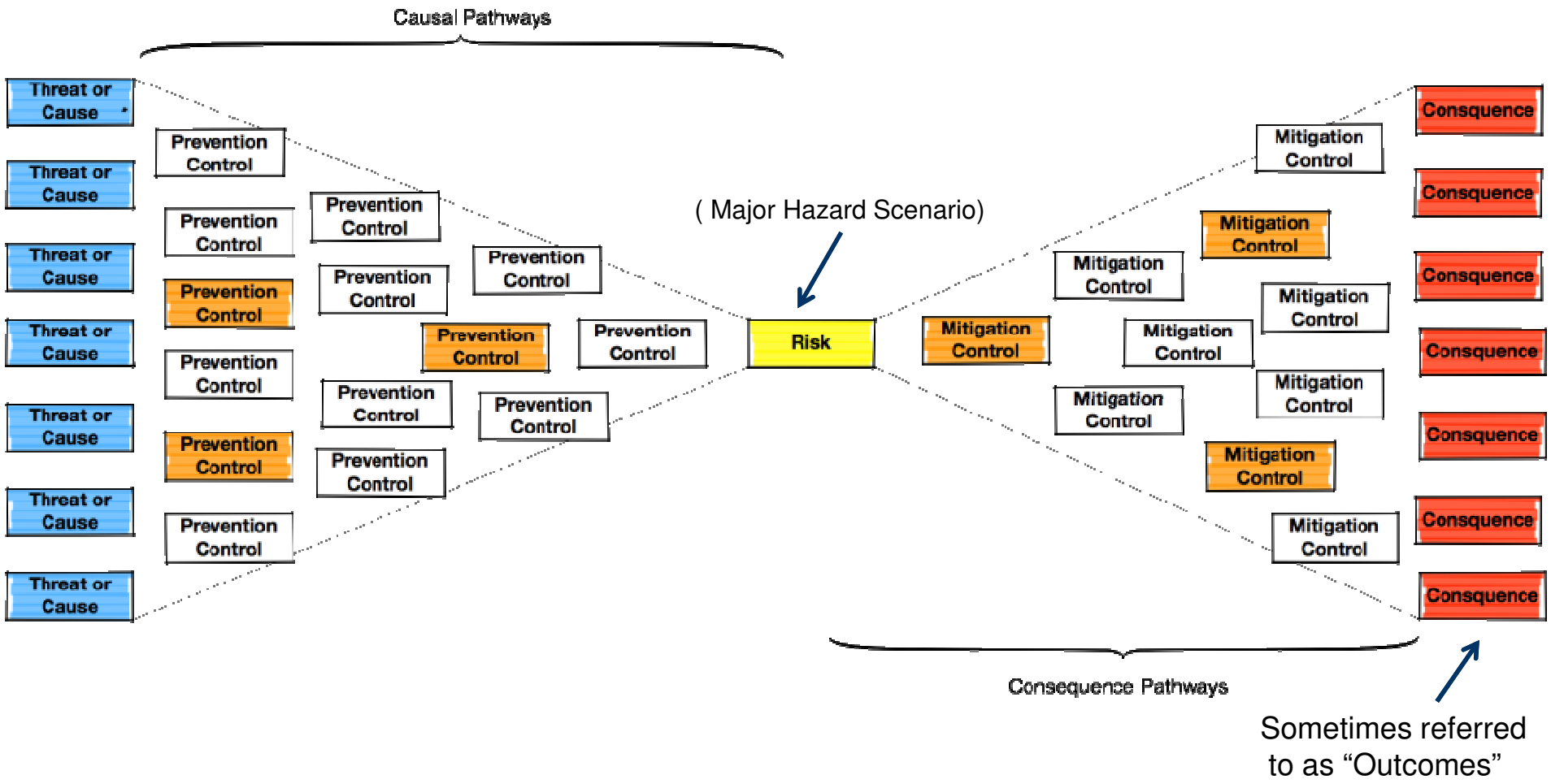
ORICA RISK MANAGEMENT TOOLS



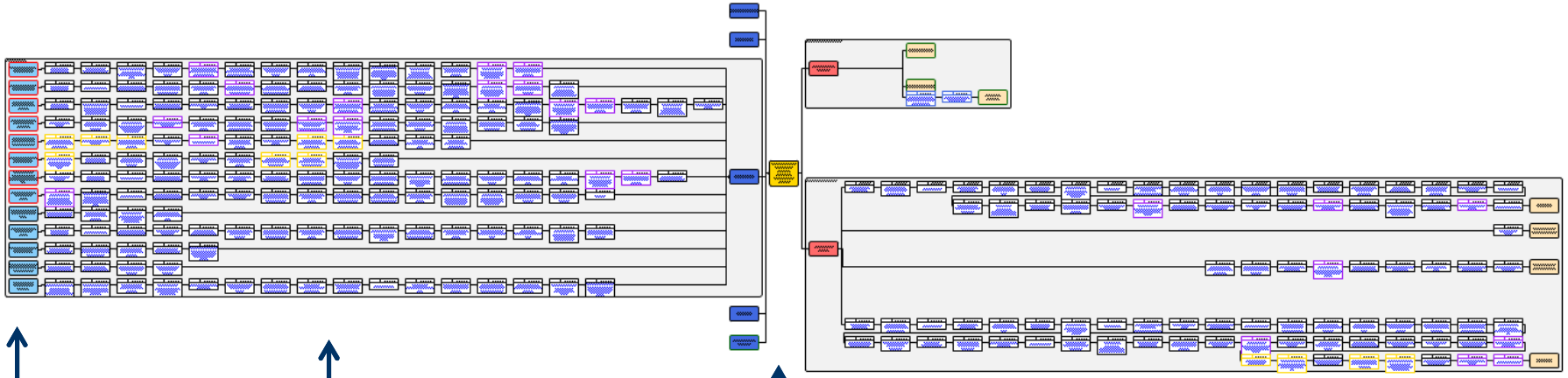
HAZARD STUDIES IN ORICA



THE BOWTIE CONCEPT



ORICA BOWTIE DIAGRAMS



Threats
- Events that can cause the explosion

Preventative Controls
- Things that can prevent explosion occurring

Major Hazard
- Explosion

Mitigating Controls
- Things that can prevent a fatality

Consequences
- Fatality

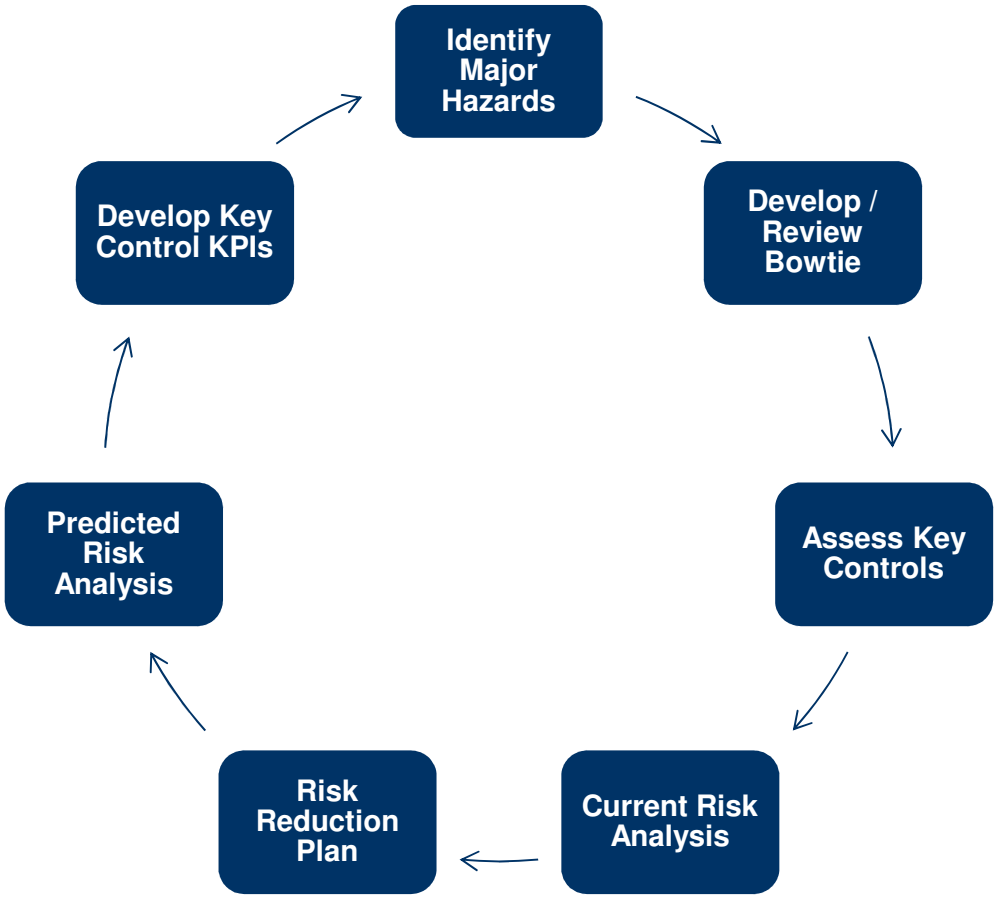
RISK MANAGEMENT PRINCIPLES

- Risk management must be hazard and not task focused.
- The primary focus of risk management must be on the implementation of effective controls not the assessment of risk.
- Risks must be assessed considering the effectiveness of current controls.
- Control effectiveness is directly related to the control hierarchy. (Elimination, Prevention, Reduction and Mitigation)
- Risks are dynamic and must be reviewed regularly.

RISK MANAGEMENT PROCESS

Group Standard GS.18 Risk Management

1. Risk identification
   - Identification of material events and uncertainties which could potentially impact the achievement of objectives and targets listed in 5-Year Business Plans.
2. Risk assessment
   - A risk assessment must be conducted to understand the current risk of the potential material events identified.
3. Control assignment
   - A set of specific controls must be designed and implemented for material events to reduce the current risk for each material event to an acceptable level.
4. Monitoring and reporting
   - All assigned controls must be periodically evaluated and reported to ensure effectiveness.



MAJOR HAZARD INITIATIVE (MHI)

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MHI (Major Hazard Initiative) is an initiative of our CEO, Alberto Calderon, after Chile Fatal Incident in September 2016.

"Evidence from major incidents … indicates that although the risks were known, the controls were not always effectively implemented."

*Health & Safety Critical Control Management Good Practice Guide" International Council for Mining & Metals (ICMM), London, UK, 2015

MHI Objective:

- Making sure Everybody has knowledge and understanding of their Top Major Hazards and Key Controls of these major hazards, and
- To verify all these key controls are 100% effective, 100% of the time.

Major Hazard Identification and Key Control Verification is not only the initiative of one year. This is a requirement of Orica Risk Management Standard, issued in September 2016.

MHI DEFINITIONS

Major Hazard (material event): Any event which has a Potential Impact of Very High or above on Impact Matrix (a fatality, 3-6 month recovery - environmental impact, >AUD20m financial impact, adverse global media coverage, loss of key operating licence(s), significant delays on key project >9 months, permanant loss of major customer or operational shutdown >1 week).

Key Control: The controls that are most important in managing major hazard events. They can be preventative controls or mitigating controls. Within the hierarchy of controls, they can be engineering or/and procedural controls. A single key control or a series of key controls (layers of protection) will be better than 90% effective at preventing or mitigating an event.

Key Control Verification: Verifying the key controls are effective and can effectively control the major hazard event. An effective control is one which is in place, working as intended, checked/tested and understood by everyone who test/maintain it and everyone who is protected by it.

ORICA MAJOR HAZARD REGISTER

We currently have 80 Safety Major Hazard (Material Event) Scenarios. Bow-ties are developed for each of them.

Examples:

- Falling from height;
- Entanglement and entrapment in equipment;
- Collisions involving vehicles and mobile equipment;
- Fire / explosion during transport of dangerous goods;
- Fire / explosion from hot work;
- Fire / explosion from incompatible chemicals;
- Fire / explosion from pumping;
- Surface / underground mining operations events, e.g. flyrock, mine walls failure, rock fall, unplanned detonation, etc.

ORICA KEY CONTROLS

On average, each Major Hazard has got 10 key controls.

Example:

Major Hazard:

- Entanglement and entrapment in equipment

Key Controls:

- Install equipment guards that prevent personal contact with the moving parts of equipment or machinery.
- Provide an accessible emergency-stop (E-stop) control for the equipment that is proof tested at least annually.
- Inspect the condition of physical equipment guards at least annually.
- Proof test interlocks used as / with equipment guards at least annually.
- Provide a permit based system for removal or bypassing of equipment guards, including any live testing.
- Isolate the equipment, and release or secure stored energy, before removing any equipment guard, unless conducting live testing.

KEY CONTROL VERIFICATION

Checklists with a set of questions (different for Engineering & Administrative controls) were developed and used for Key control verification. The answers to all questions in the Checklist need to be “Yes” before the control is deemed verified.

Example questions:

Engineering controls

- Inspect the control in the field. Is it in place and appear to be in good working order?
- Can an actual test of the control be performed? If so, did it work as intended? If an actual test cannot be performed, is there any other evidence that the control would work as intended?
- Are operators and supervisors trained in the control? Are they aware of what is protects against? How it works? What to do if it is inoperative?

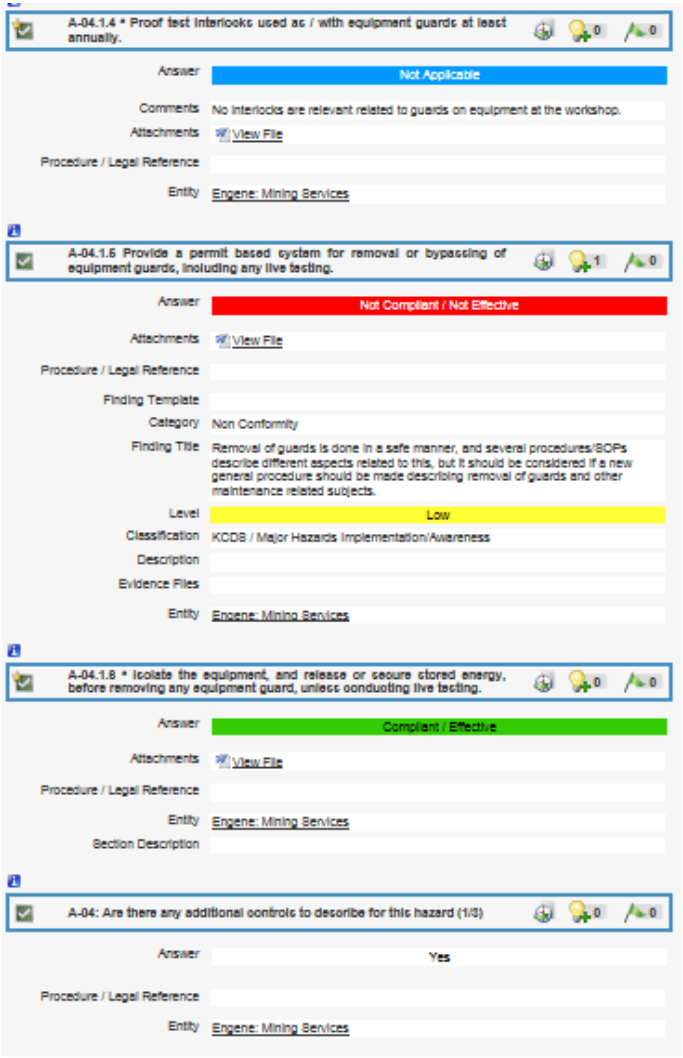
Administrative controls

- Is there a procedure that describes the control? Is it readily accessible to the people who use it? Is it approved by the Site Manager (or delegate)? Has it been reviewed in the last 3 years?
- Are personnel trained about this control? Do they know what the control protects against, how it works to provide that protection?

MHI PROCESS
OCTOBER 2016 - SEPTEMBER 2017

KEY CONTROL VERIFICATION REPORTING IN ENABLON

All Key control verifications are recorded and approved in Enablon:



MHI RESULTS

FY17 GLOBAL MHI RESULTS

- All sites conducted MHI workshops with all employees.
- Round 1 (end March 2017) ~15000 KCVs
- Round 2 (end September 2017) ~13000 KCVs
- In total ~28000 KCVs by the entire organisation during one fiscal year. Each site, on average, conducted 50 KCVs.
- >99% KCVs competed vs planned.
- ~ 5000 findings / actions raised.

ORICA
SAFETY LEADERSHIP INTERACTIONS (SLI)

ROADMAP TO WORLD CLASS SAFETY LEADERSHIP

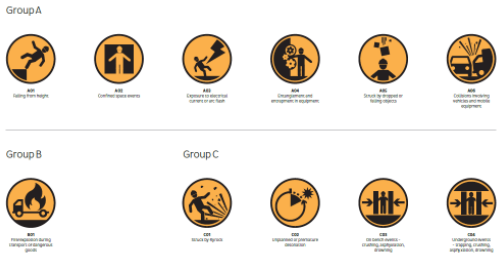
Orica CEO, Alberto Calderon visited the Ravensworth Mine Orica Reload in the Hunter Valley to conduct a Major Hazard Key Control Verification. At the mine, he conducted the verification on pumping with a primary focus on understanding the operator's knowledge of the risks when pumping, the engineering controls in place, the procedures to follow when pumping as well as checking the maintenance records on our equipment.

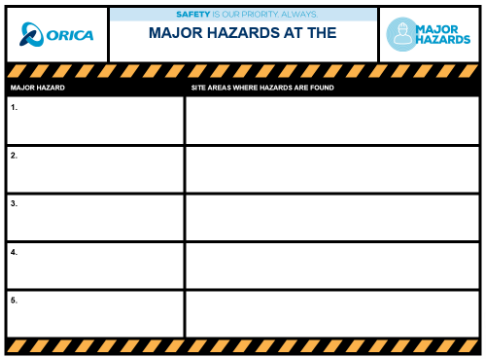
MHI – NEXT STEPS

MHI FY18

- Continue to verify major hazards and record the result in Enablon.
- Visualise Major Hazards & Key Controls.
- Record Safety leadership interactions (SLI) using Enablon mobility application.
- Work out a sustainable process and workflow that is simple, easy and best meets the need of our people for conducting Key Control Verification (KCVs) on an ongoing basis.

Major Hazards iconography





Major Hazards & Key Controls visual boards

Enablon app

THANK YOU

SAFETY
IS OUR PRIORITY.
ALWAYS.

