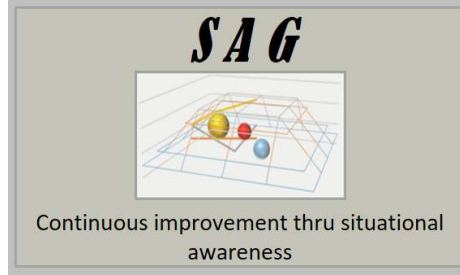


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Introduction:

To help make the most out of mining and process resources *Seekers Strategy Solutions* is offering the *Fragmentation Driven Continuous Improvement Process™ - FDCIP™*. A combination of unique process and supporting technologies creates the platform for maximizing asset's productivity and reducing operational cost.

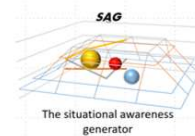
Seekers Strategy Solutions provides *FDCIP™* tools, training and support thru the implementation until the tools and the process becomes an integral part of the operation.

Seeker Strategy Solutions

Management, Situational Awareness &
Continuous Improvement Solutions

Website: www.seekersstrategy.com

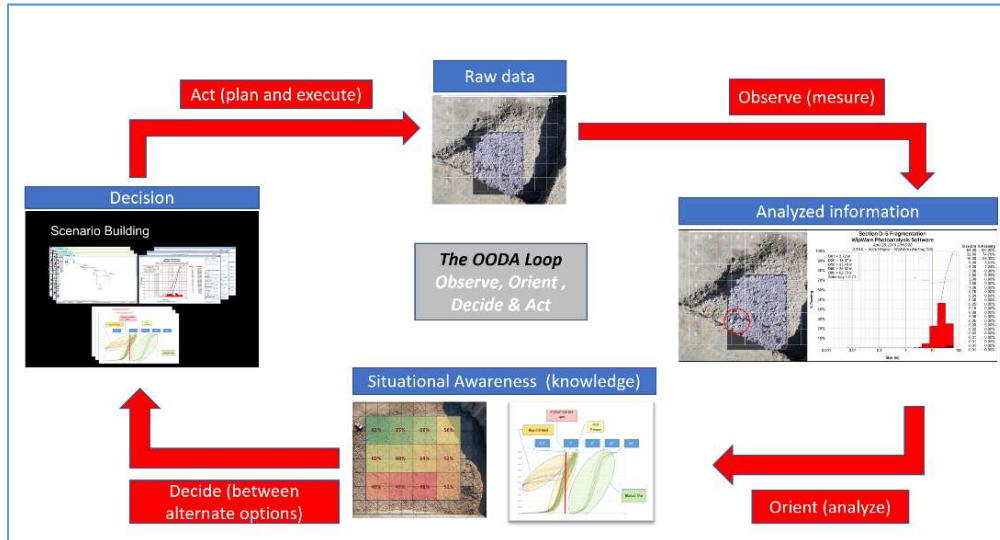
Address: 1043 Fosters Mill Road Boynton Beach Florida 33436 U.S.A.



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Background:

Continuous Improvement is a leader of cost reduction in the mining sector. A key element is **Situational Awareness** that is achieved by Integrating existing monitoring & simulation technologies that make up the **Fragmentation Driven Continuous Improvement**.



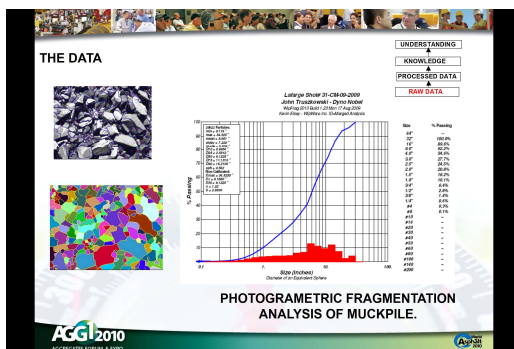
This method utilizes the OODA continuous loop –

- Monitors and compares the fragmentation in different locations in the process
- Attributes the findings to performance indicators.
- Compares the results to benchmarks.
- Simulates alternate scenarios for improvement, and
- Presents the downstream contribution effect.

The technologies utilized in this process are - fragmentation photo analyses, mobile equipment and process monitoring tools. The advantage of the concept is the integration of the tools to create a Head's Up Display – HUD. The process starts with defining the operations objectives, existing tools and restrictions.

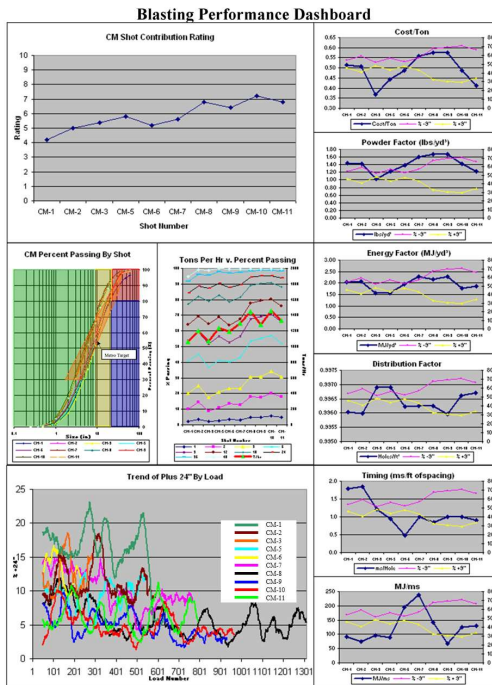
Keywords

1. **Situational awareness - SA.**
 - a. The ability to identify, process, and comprehend the critical elements of information about what is happening with regards to a complete mission, in our case plant mine to gate process. More simply, **knowing** what is going on around you and what are you going to do about it.
 - b. Robust understanding of cause and effect based the process of pushing data from different sources up the information hierarchy and creating a reliable balanced picture.
2. **Continuous improvement OODA process** – a four step that is continuously repeated- Observe, Orient, Decide & Act.
 - a. Observe – collect reliable data reflecting all aspect of the operation.
 - b. Orient – Create a Situational Awareness.
 - c. Decide- make a decision (and a plan) based on the objective, SA, guidelines and restrictions.
 - d. Act – carryout the plan. As the plan is in motion the situation changes and the OODA process (Loop) starts again.
3. **FDCIP** - Fragmentation Driven Continuous Improvement Process. a continuous Improvement loop with fragmentation as its leading factor.
4. **Fragmentation Photo Analyses** – a method to evaluate the particle distribution in a pile or on a running conveyor. This method utilizes a digitized picture of a pile, identifies, measures each particle and creates a distribution curve. As this is a digitize process and is both accurate and extremely fast it allows to conduct measurements on running conveyors and at a truck dump location such as the primary crusher.

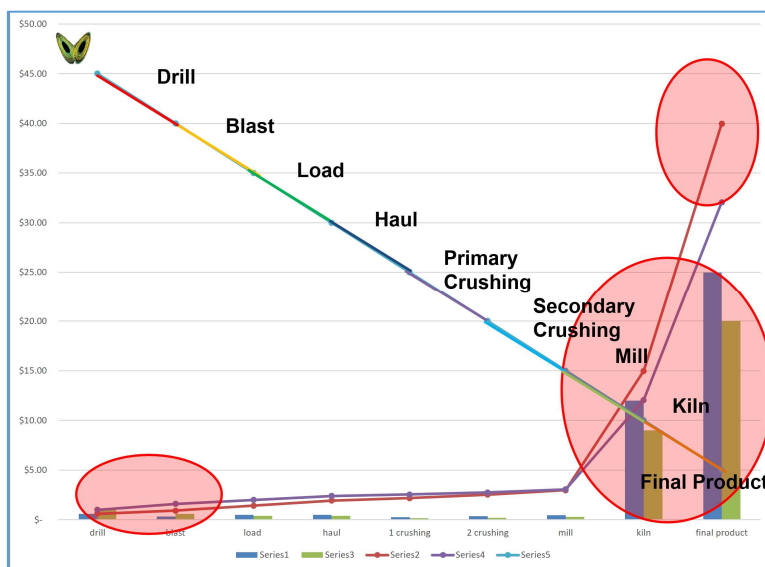


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5. **HUD** – Head’s Up Display or “Dash-Board”. The means by which it is possible to display important information collected from different sources in one place that allows correlation between the different items and decision making.



6. **Downstream contribution** – the impact of an event at the beginning of the linear mining process, blasting, may have on events at the end of the process, final product. The intent is for that initial event to impact the next phase but the whole process. Events at the beginning of the mining (blasting) process are considerably cheaper than events at the end (crushing)



Objective:

Implement the **FDCOIP** HUD by analyzing collected data utilizing:

- fragmentation analyses tools including drone imaging and, WipWare
- HME performance monitoring tools / MISOM's FARA
- Process data collection tools.
- Performance simulation tool AggFlow

In order to establish correlations between all aspects of the process, identify cause & effects to support decision making as a part of Continuous Improvement to increase downstream contribution and reduce operating cost as an on going process.

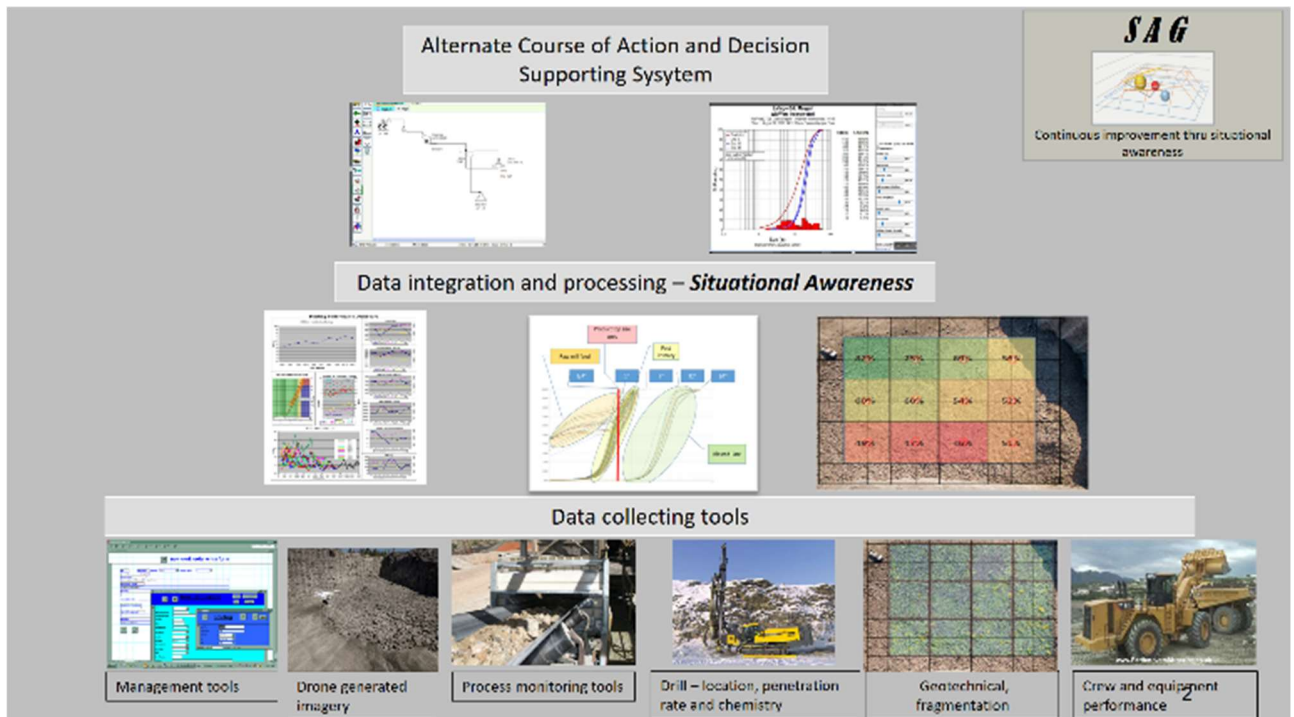
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Method:

Collect data utilizing :WipWare fragmentation analyses tools including drone, HME performance monitoring tools / MISOM's FARA, Existing on site process collection tools and AggFlow performance simulation tool.

In order to establish correlation between the different types of data, identify cause & effects to support decision making as a part of Continuous Improvement to increase downstream contribution and reduce operating cost by:

1. On site data collection with minimal interference to current site day to day operations and utilizing, crusher performance monitoring, Fragmentation Photo Analyses and Mobile equipment monitoring system OEM or generic.
2. Pushing the data up the **information hierarchy** to knowledge level and identifying avenues for continuous improvement actions by creating a theoretical benchmark to be calibrated by the baseline (once a loop is closed the process should be repeated) utilizing AggFlow and **Situational Awareness Generator (SAG)** basic functions.
3. Creating a format for presenting the process and the conclusions, and presenting the first loop (the baseline) as a case study of the opportunities.



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Deliverables:

These actions will set in place the tools for a FDCIP.

1. Total process evaluation starting off with a benchmark for:
 - a. Market demand v Product production distribution.
 - b. Process equipment productivity actual v theoretical capacity utilizing AggFlow.
 - c. HME productivity v theoretical capacity (product-link or any other method).
2. Blasting dashboard (see attached document for the format).
3. Muck-pile profile map showing:
 - a. Size distribution by location, (WipWare)
 - b. Pile profile
 - c. Pile density.
 - d. Effective / non-effective mucking zones based on the type of loading equipment.
 - e. Zone heave factor / density.
 - f. Zone compatibility to primary, secondary and product (top size ½”).
4. Blast shot video.
5. Loader productivity correlated to the to the blast performance .
6. Crusher productivity (site sources).
7. Correlation between pit fragmentation and crusher performance including final product distribution using AggFlow.
8. Format for a Continuous Improvement Process based on the findings.

Tools:

- a. **WipFrag** – a fragmentation analyses software determining size distribution utilizing pictures of the muck-pile taken by a drone, of the primary dump site (as trucks are dumping), at other locations as needed along the process and at final product piles.
- b. **Drone** – a site owned / contracted drone or a dedicated drone to capture pre-blast, blast and post blast pictures for analyses. A specific flight pattern will be set prior to the blast to assure quality pictures that are suited for analyses.
- c. **Crusher performance monitoring** - Historian or any other system (including belt scales) able to capture crushers, belts and screen performance with time stamp.
- d. **Mobile equipment monitoring system** – mobile equipment monitoring performance such as fuel consumption, cycle time, load on board distance travelled with time stamp OEM or MISOM FARA if other not available.

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The deliverables described will allow the understanding of the impact of the blasting quality on productivity and cost of:

1. Load and haul operations
2. All phases of crushing.
3. Fines generation.

It will also assist in pin pointing issues in the blast.

Creating the continuous improvement loop to include;

1. On site data collection with minimal interference to current site processes and utilizing WipFrag, Historian, AggFlow and MISOM's FARA tools,
2. Push the data up the **information hierarchy** to knowledge level and identify avenues for continuous improvement (once a loop is closed the process should be repeated) in the process utilizing AggFlow and **Situational Awareness Generator (SAG)** basic functions.
3. Presenting the process and the conclusions as a case study of the opportunities.

Typical Jumpstart Milestones:

1. Define the structure of the study and create an expectation alignment (reviewing the current process, measurement tools, expectations / site need, site [pit and process] survey).
2. Collect data according to the definitions.
3. Analyze the data, create a correlation map and identify opportunities – start the continuous loop.
4. Present the analyzed results of the first loop. (once the first loop has been completed we can continue and show additional loops).
5. Evaluate the best CIP process for the site (process, KPI and tools).

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Typical Tasks & Resources

Milestone	Milestone 1 10 days before blast	Milestone 2 From blast day - 1 to end of pile mucking & processing	Milestone 3 7 days from end of mucking	Milestone 4	Milestone 5	Remarks
Remarks	To include a site visit	Utilizing existing data collecting tools or installing generic ones.		A 3 hour presentation	A 5 hour brainstorming session	
Description	Define the structure of the study and create an expectation alignment (reviewing the current process, measurement tools, expectations / site need, site [pit and process] survey).	Collect data according to the definitions thru-out the blast cycle.	Analyze the data, create a correlation map and identify opportunities – start the continuous loop.	Present the analyzed results	Evaluate the best CIP process for the site (process, KPI and tools).	
Seekers	Present the concept and provide a questioner and assist in collecting the preliminary data. Define the	Collect data using wipfrag (drone, handheld & mounted, MISOM / ProductLink,	Analyze the data, create a correlation map and identify opportunities – start the continuous loop	Present the analyzed results	Participate in CIP loop meeting	Including the use of BlastCast and AggFlow scenarios
Mine	Define the depth of the scope and provide data to answer the questioner.	Provide crusher production data as per table		Participate in the presentation.	Participate in CIP loop meeting	
EX Services / Blaster	Provide relevant data – blast reports	Provide relevant data – blast results		Participate in the presentation.	Participate in CIP loop meeting	

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