

Stewardship. Integrity. Commitment.



Getting Started with Digital Transformation

SIU-E Project Management Symposium

Denise Callahan

Director of PMO, Analytics & Strategic Planning

The Doe Run Company

November 22, 2019



Stewardship. Integrity. Commitment.

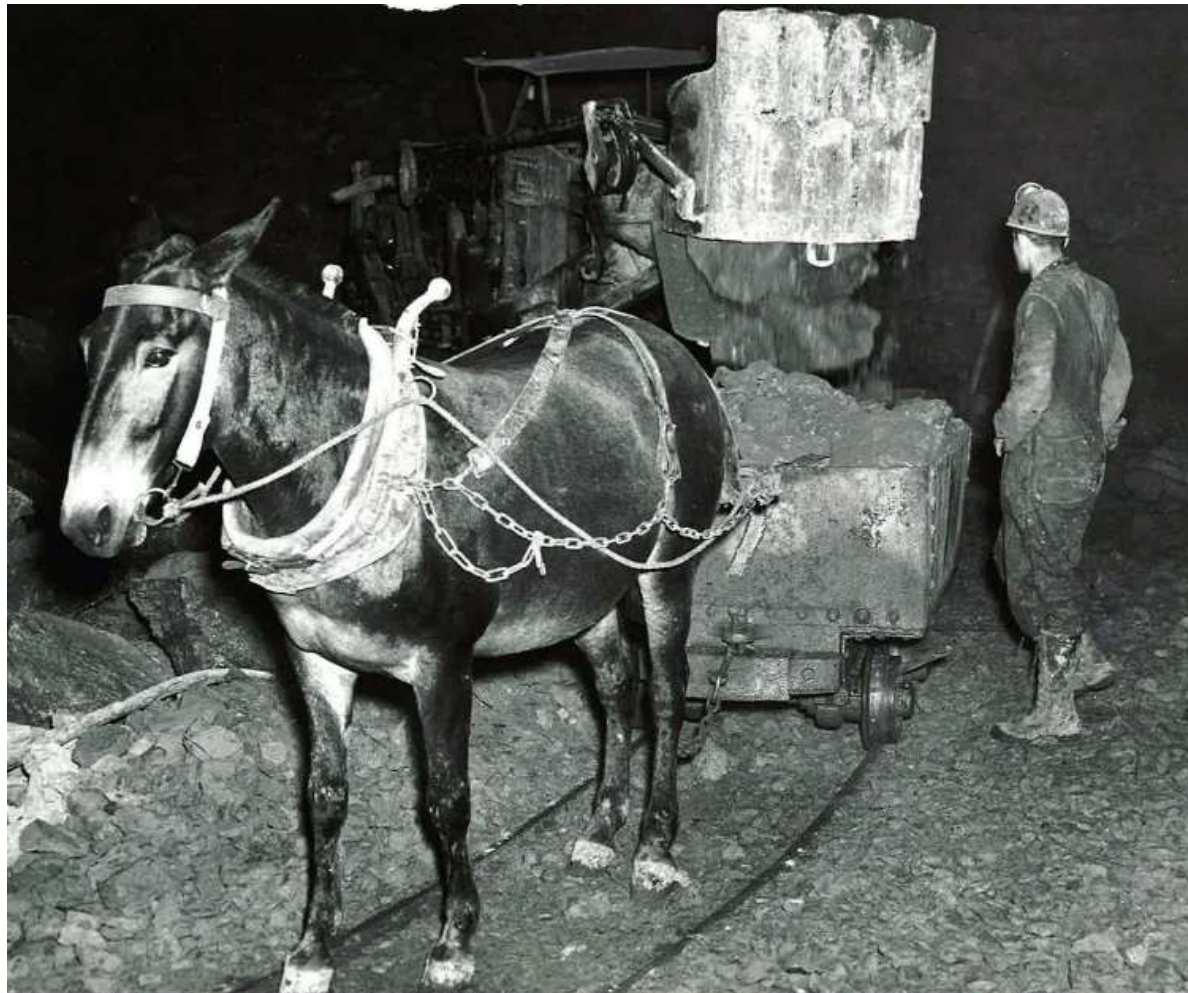


Who we are

- More than 150 years in operation
- One of the largest lead mining districts in the world
- Global provider of lead, zinc and copper concentrates
- Recycle ~ 13.5 million batteries each year
- Fabricated Products plant in Arizona and an oxide plant in Washington

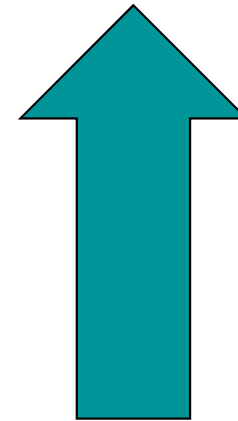
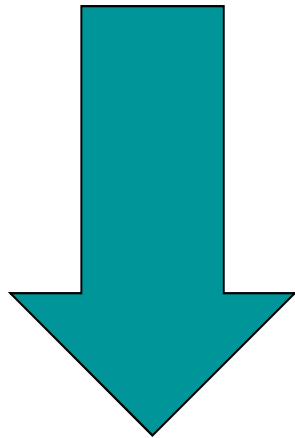


St. Joseph Lead Company formed in 1864



Top Down or Bottom Up?

Top Down
Starts with
Senior Management

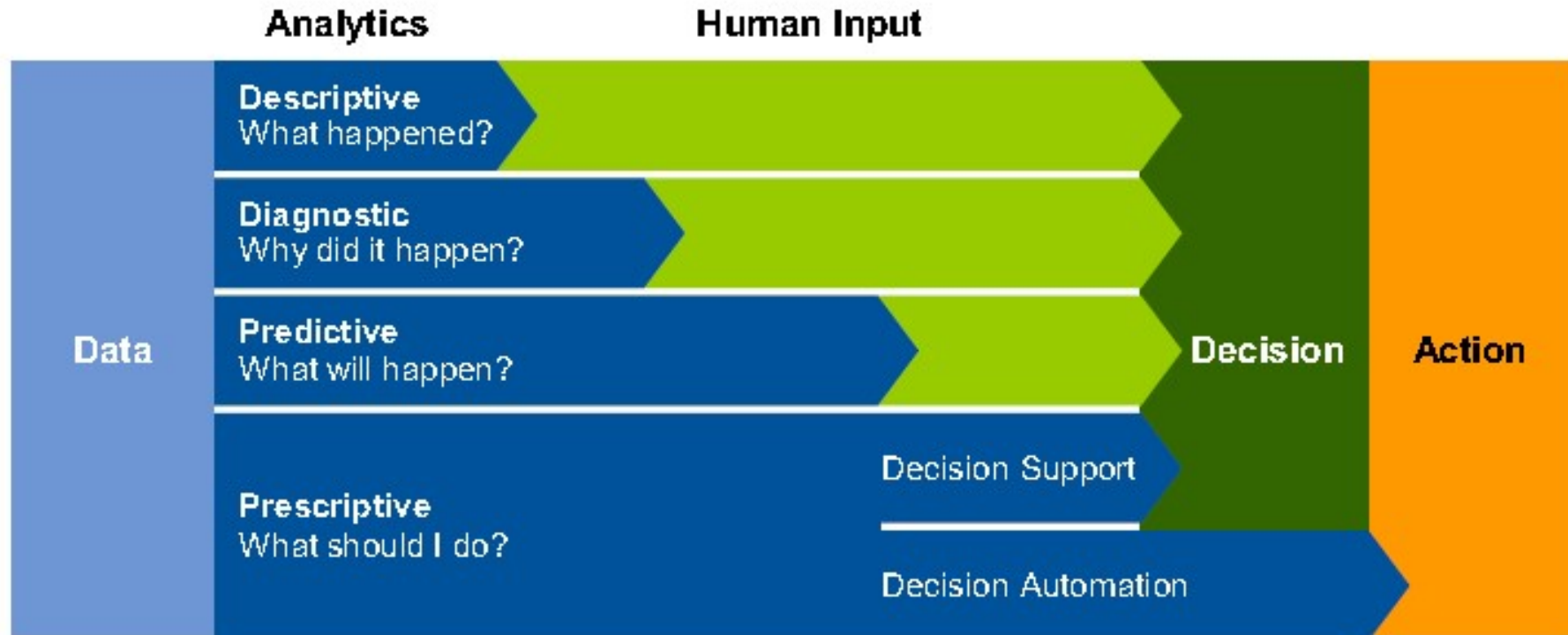


Bottom Up
Starts with the
Workforce

Barriers

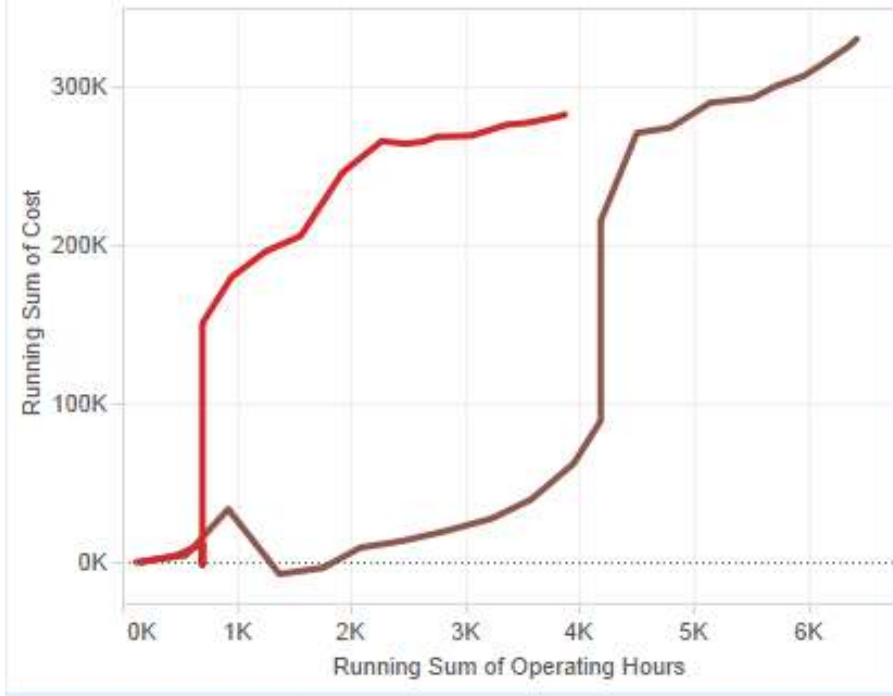
- Cultural acceptance
- Difficulty justifying spend
- Not enough people
- Lack of an underground communication infrastructure

Types of Data Analytics

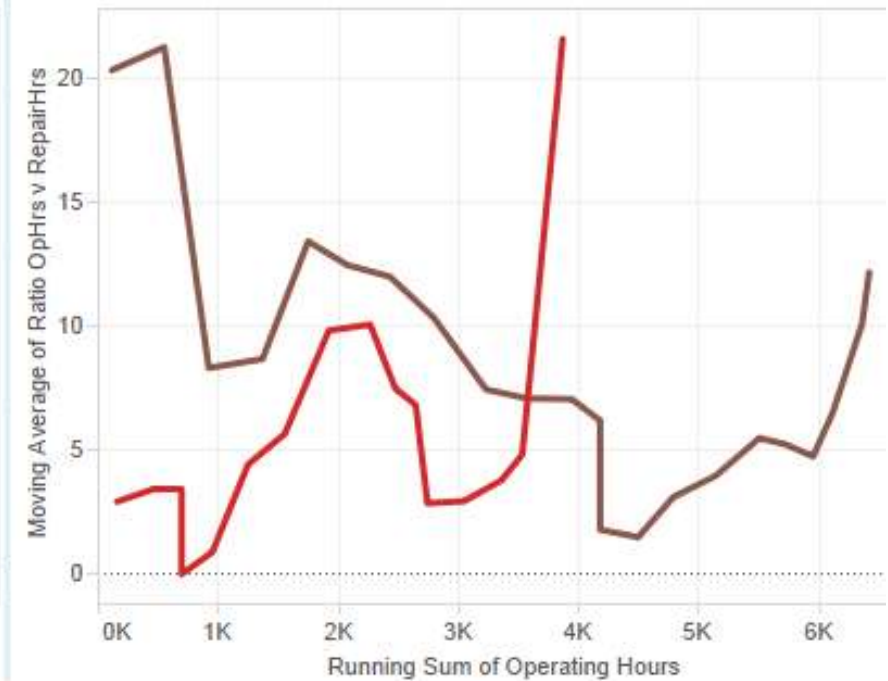


Projects-Descriptive/Diagnostic

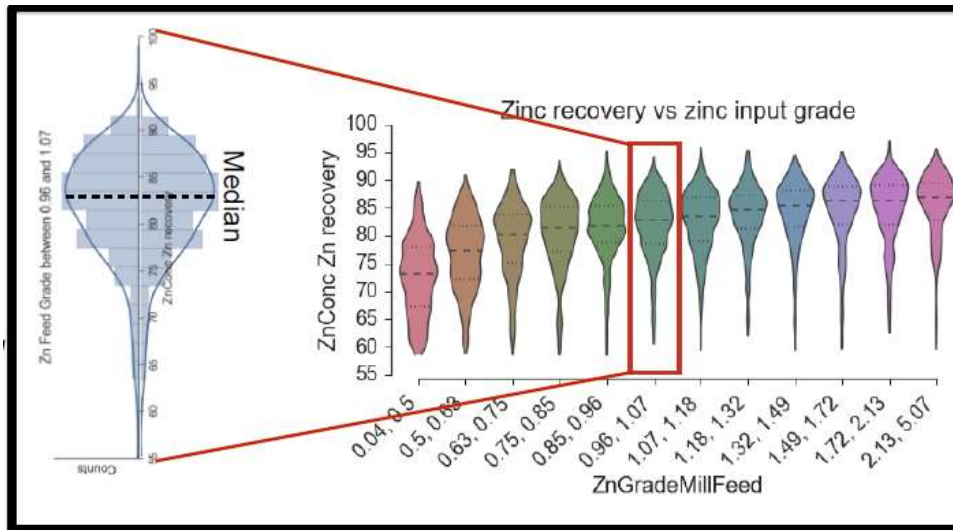
RebuildCostvHrsViz



RebuildRepairRatio

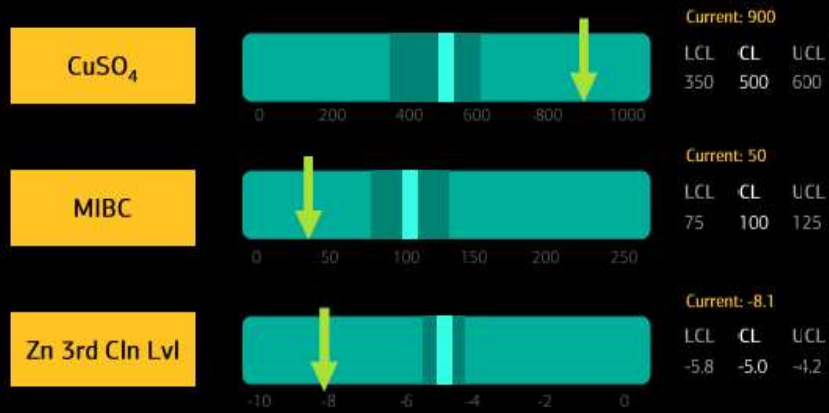


Projects-Mill Predictive Analytics



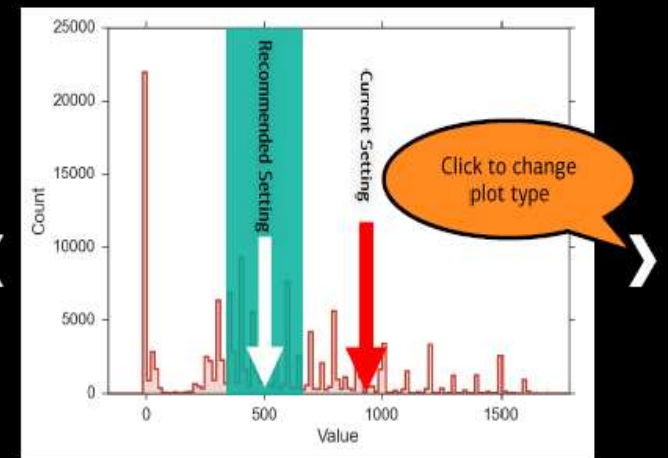
Attention :	Grade:	Recovery:
CuSO4 to Zn Cond	Pb: 78% +/- 2%	92% +/- 1%
MIBC to Zn Cond	Zn: 58% +/- 2%	82% +/- 2%
Zn 3rd Cleaner Cell Lvl	Cu: 27% +/- 5%	54% +/- 5%

Recommended Control Changes:

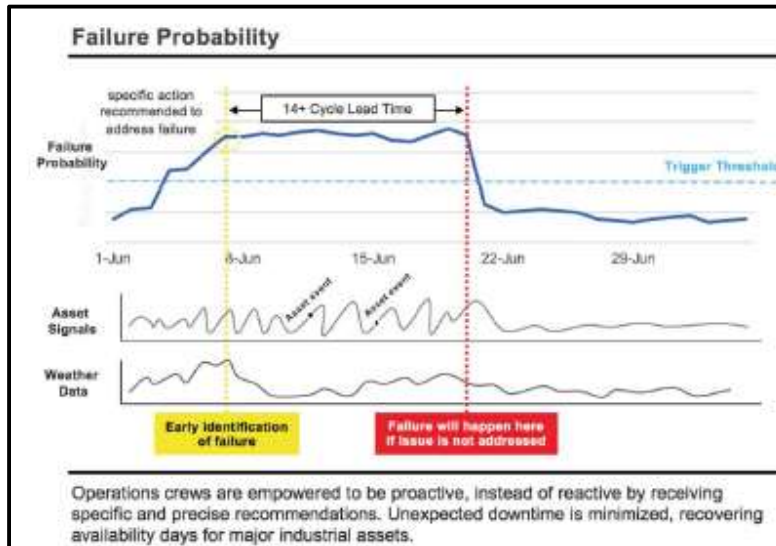


CuSO4 to Zn Cond

Historical distribution: Comparison to previously seen values



Projects-Predictive Maintenance UG Equipment



SENSOR DATA

- ✓ - Brake Accumulator Pressure
- ✓ - Brake Pump Pressure
- ✓ - Payload
- ✓ - Engine & Vehicle Speed

WORK ORDERS

Brake Accumulator Failure Model

UPTAKE INSIGHT

Identify early sign of wear in accumulators. If unmonitored, can cause brakes to fail or lead to high PM costs.

Projects-Mobile Data Capture

9:23 AM 95%

Create Document PreOp Safety Checklist

THE DOE RUN COMPANY | 150⁺ YEARS

THE DOE RUN COMPANY

PRE-OPERATING SAFETY CHECKLIST MOBILE EQUIPMENT

May 24, 2018 09:18

Andrea Derril

LOCATION 300

SHIFT

1

MACHINE

327

HOUR METER READING 26854

9:24 AM 95%

Create Document PreOp Safety Checklist

CHECK ALL THAT APPLY	OK	BO	NA
TIRES/WHEEL LUGS	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>
BELTS/HOSES	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>
ENGINE OIL	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>
HYDRAULIC OIL	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>
FUEL	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>
RADIATOR	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>
BRAKE FLUID LEVELS	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>
INSTRUMENTS	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>
LIGHTS	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>
MIRRORS	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>
HORN/BACKUP ALARM	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>

App by Developer: Kenneth Bravley

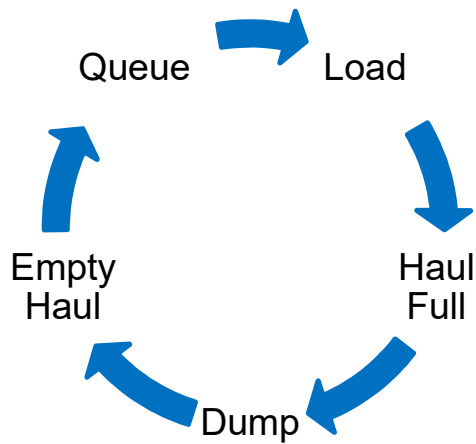
NAME

NO

TYPE IN SIGN



Projects-Fleet Management



9:26 AM 95%

< Back Welcome, ademl MST Region: ...

Menu	
Loading	00:00:01 ✓
Cycle	00:00:07
Spotting/Hanging	00:00:07 ✓
Loading	00:00:01 ✓
Cycle	00:00:08
Spotting/Hanging	00:00:09 ⚙
Loading	00:00:00
Cycle	00:00:09
Spotting/Hanging	00:00:00
Loading	00:00:00
Cycle	00:00:00

0 Near (0)

000 Points

07:33:32 Time Left

3 Cycle

NA No Options Selected

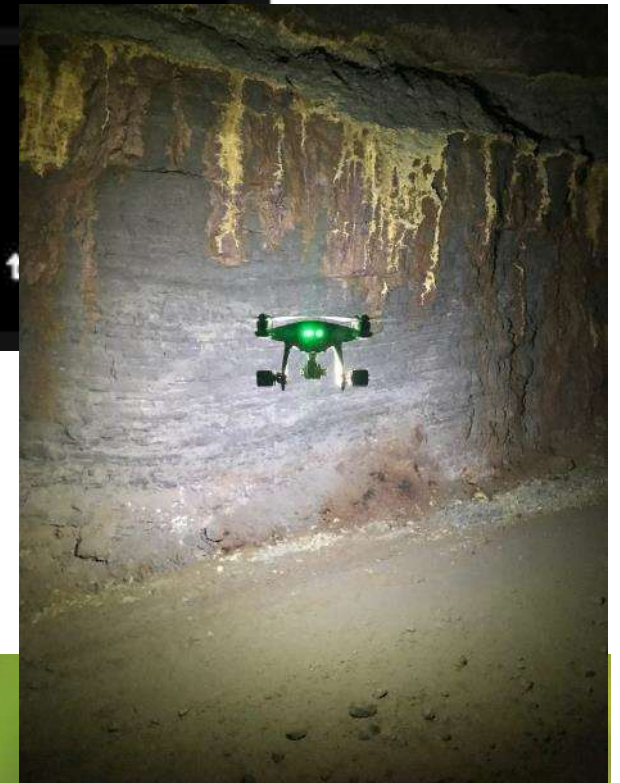
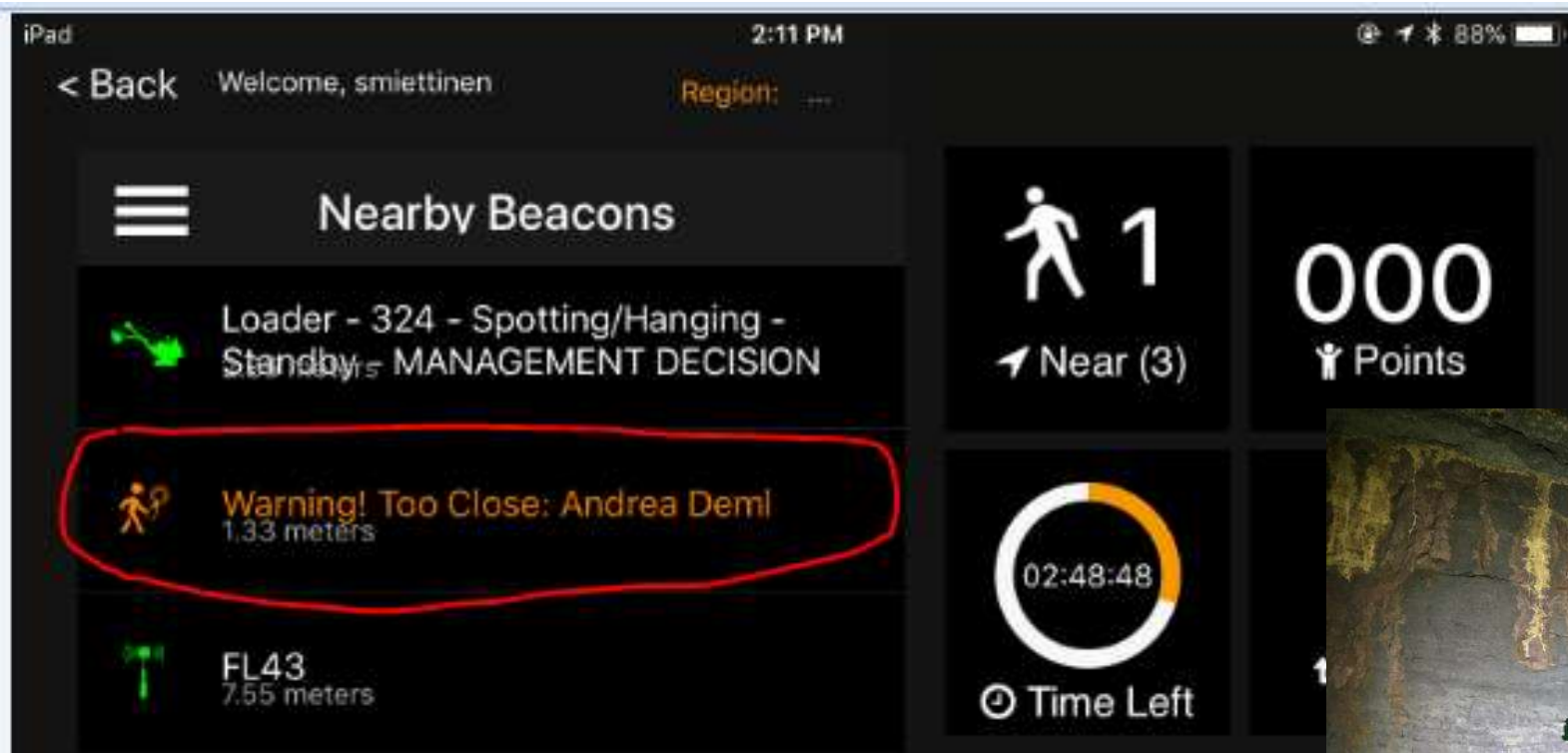
NA No Options Selected

Loading 00:00:33 327

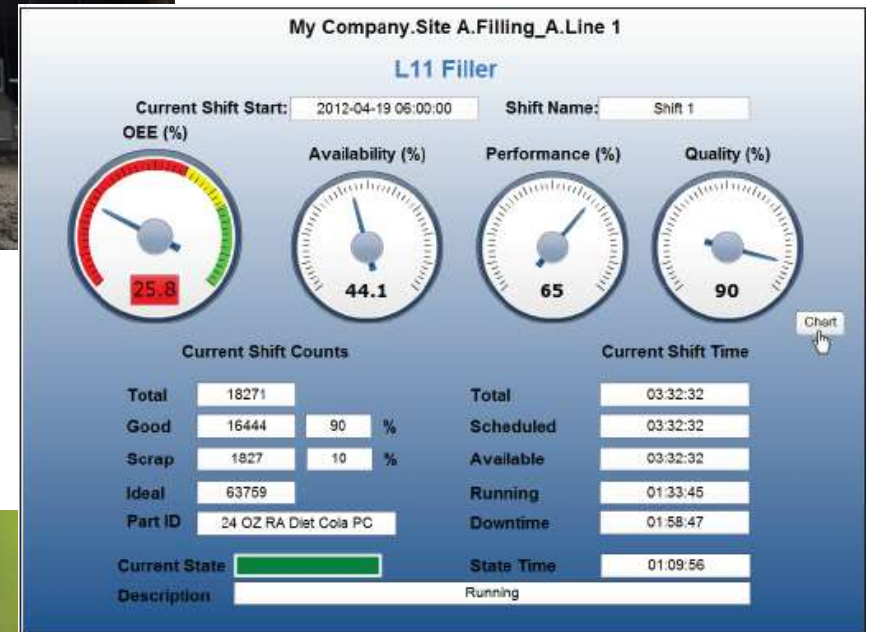
Ready 00:00:33 Primary Ore Mucking

Spotting/Hanging 00:00:08 TAP TO START LOAD

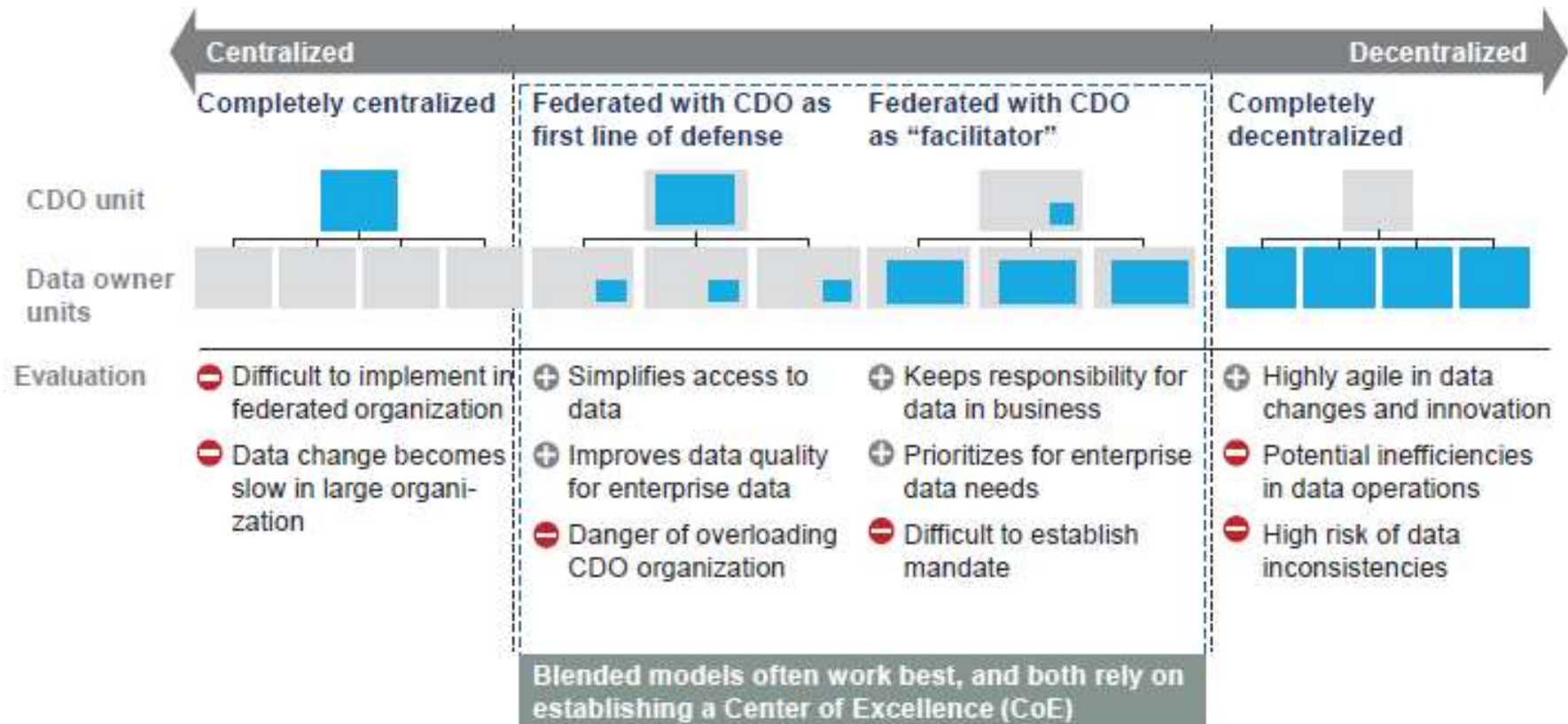
Projects - Safety



Projects-Light Rail with Factory Talk Metrics



Set an Appropriate Organizational Structure



SOURCE: McKinsey

Find a Data Scientist/Translator



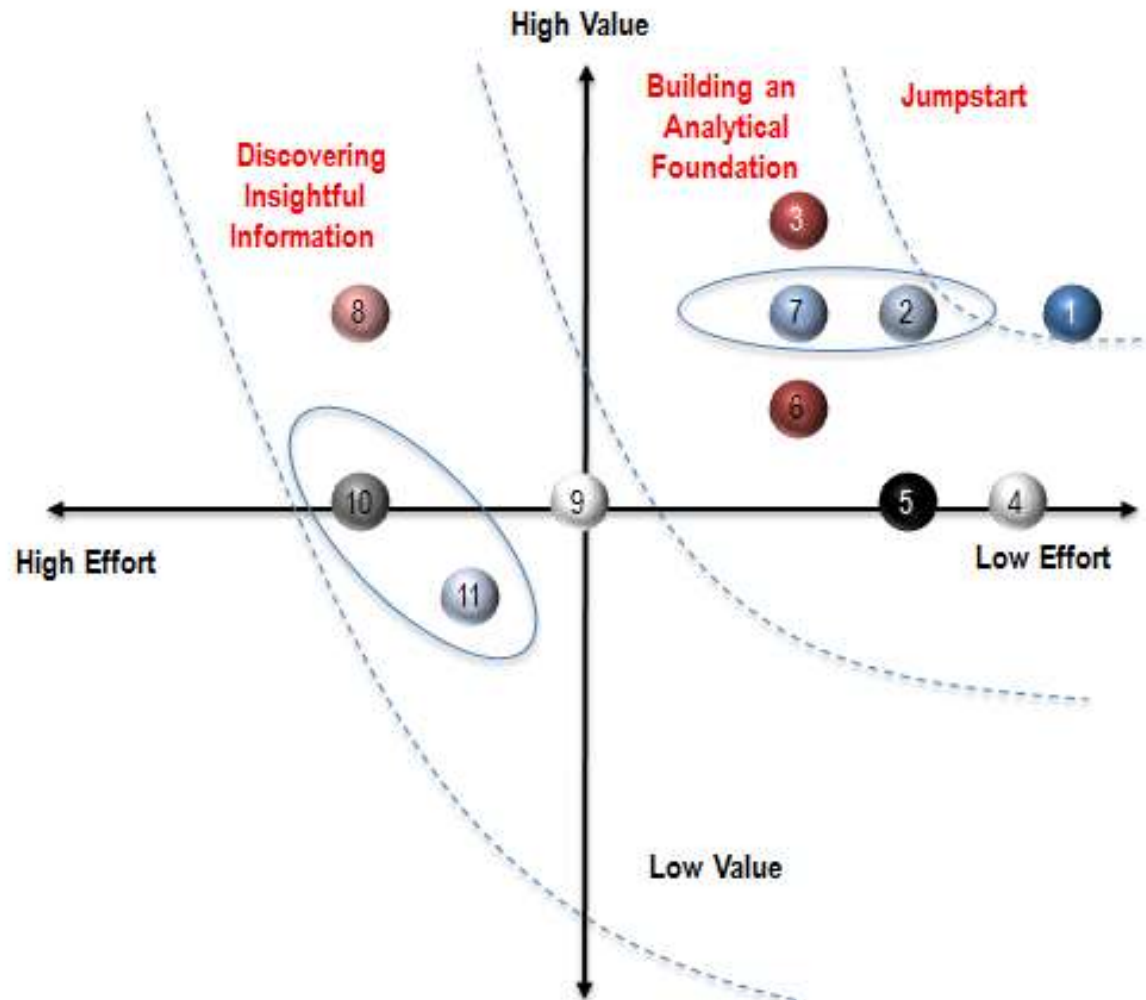
Find a Committed Champion



Assign the Right People to the Team



Find the Right Use Cases

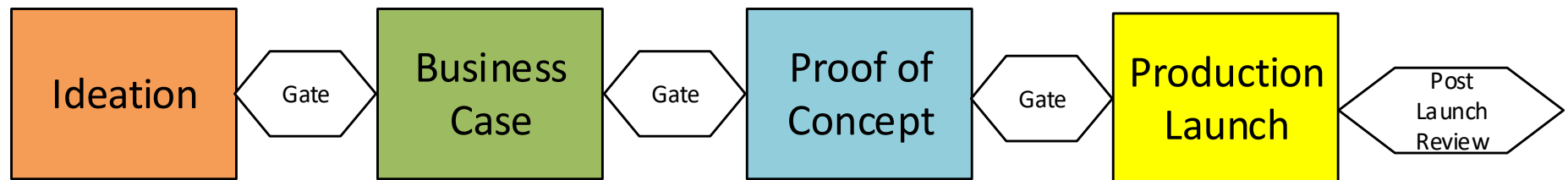


Find Funding

- Find creative ways to finance technology purchases
 - Include cost of new OEE system in a large light-rail implementation
 - Fund drone and mobile data entry projects from IT savings from reducing ‘lights on’ projects
- Structure agreements with partners in novel ways
 - Gainsharing
 - Fixed fee Proof of Concepts (PoCs) with no-cost software licenses
 - Payment only required on decision to proceed
 - Cost of PoC refunded over life of system

Work with the Right Partners/Contracts

- Find the right partners
- Start with smaller, staged investments
- Prove technology through Proof of Concept before signing long-term deals
- Be specific in expectations in the Statement of Work
- Provide time in the schedule for legal review!
- Require blind tests on predictive analytics PoCs
- Try to be fair



Use Flexible Technology Platforms

- Have 'sandboxes' available to try new technology
 - Virtual machines
 - Cloud storage
- Get agreement with IT on standards for PoCs vs. production systems
- Know what data you already have and use it
- Plan for scale-up early on



Engage End-Users

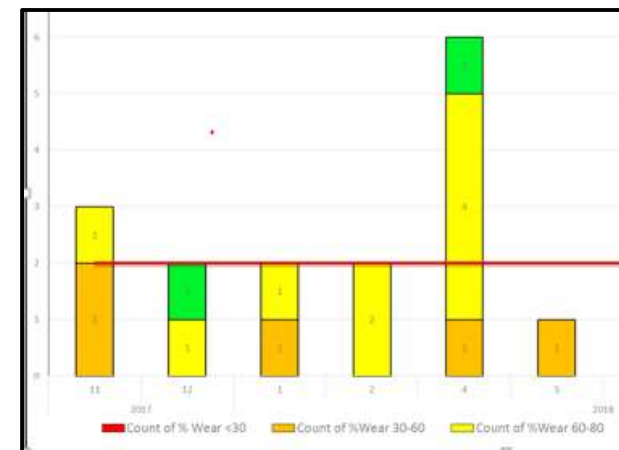
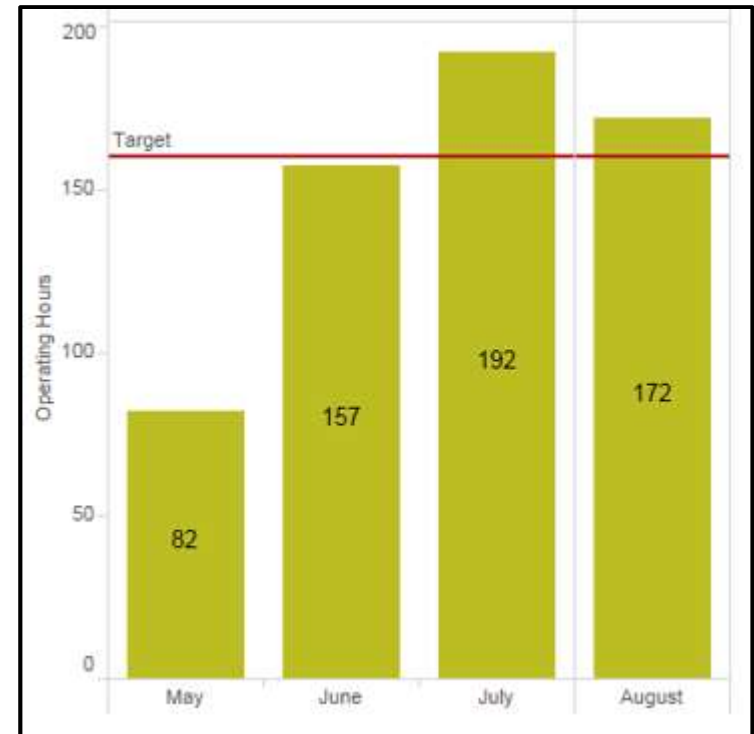
- Understand your stakeholders/build relationships
- Involve stakeholders throughout the process
 - Requirements gathering
 - Validating data “reasonableness”
 - Lessons learned
- Get technology into users hands
- Ensure predictive analytics isn’t a black box
- Don’t use analytics only to punish employees
- Provide assistance on making decisions on what to do based on the data provided

Engage Middle and Upper Management

- Use a steering committee as a platform to educate executives on analytics
- Provide training on how to ask questions about the data
- Use frequent retrospectives to discover what isn't working
- Show the dollar impact of the change
- Plan upfront for success
 - Strong business case
 - Good communication strategy
 - Timing is everything!



Track and Report Progress



Track and Report Progress

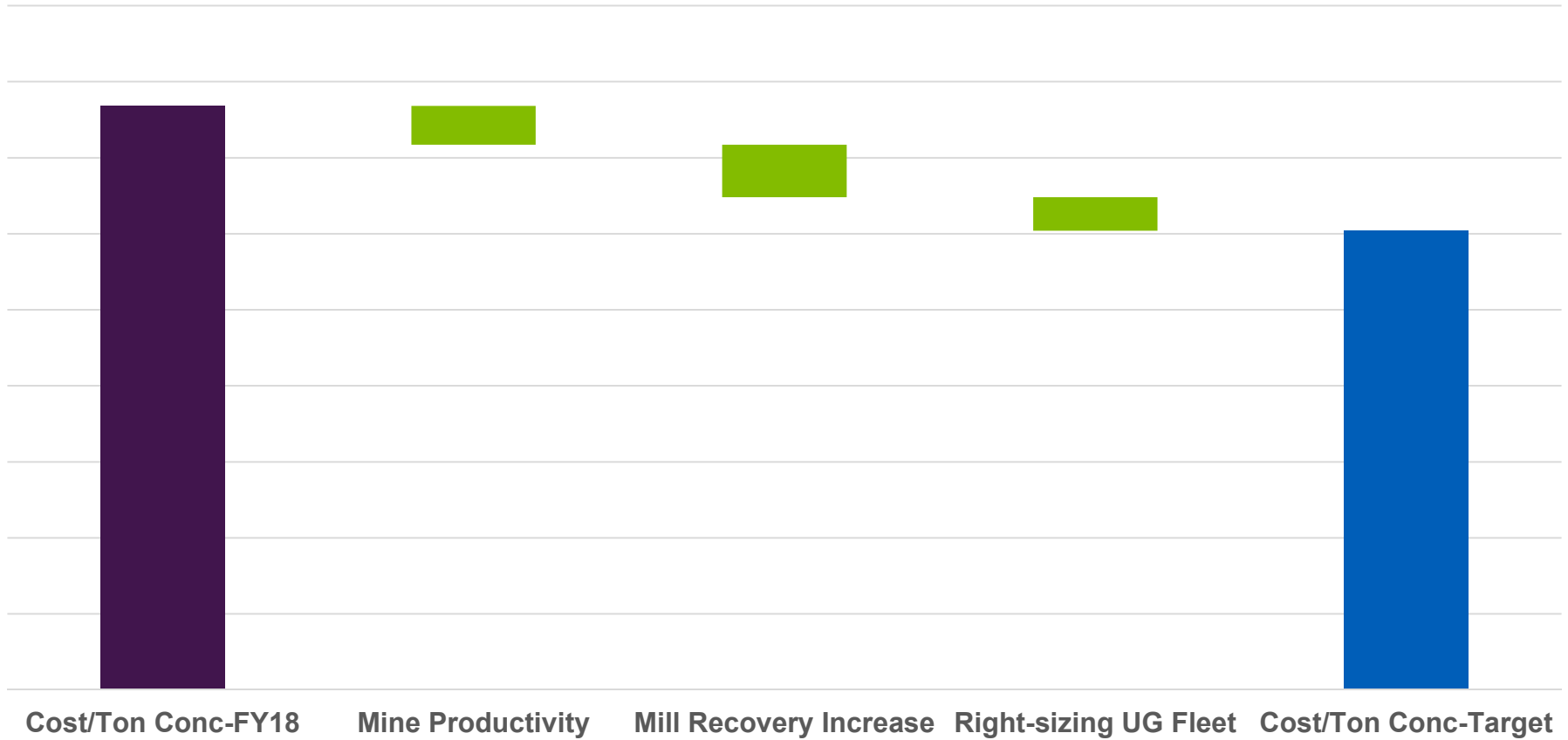
Opportunity	Possible Savings	Target Savings	Actual Savings	Realization Percentage
Reduce Operator Delays	\$ 300	\$ 200	\$ 100	50%
Reduce Tire Costs	\$ 200	\$ 150	\$ 160	107%
Optimize Equipment Replacement	\$ 500	\$ 250	\$ 220	88%
TOTAL	\$ 1,000	\$ 600	\$ 480	80%



Position	Name	Points	Medals
1	Meshaeh Bennie	437	11 Gold, 54 Silver
2	Richard Mensah	317	1 Gold, 8 Silver, 34 Bronze
3	Francis Yawson	224	5 Gold, 28 Silver, 1 Trophy
4	Eric Adusei	218	1 Gold, 5 Silver, 26 Bronze

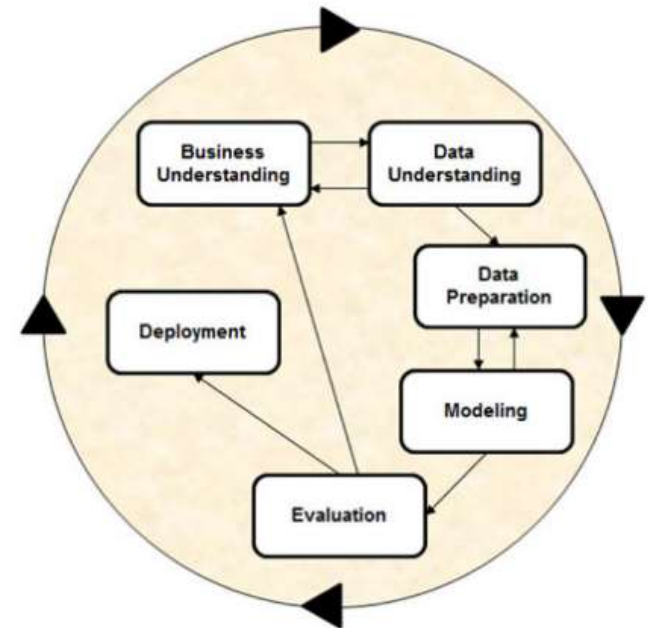
Next Steps

Analytics Roadmap



Unique Characteristics of Analytics Projects

- Business cases less defined
- Requires a new kind of methodology – more agile than waterfall; use of Proof of Concepts
- Data quality can be a major issue
- Need for data governance
- Options for delivery – centralized warehouse vs. self-service
- Options for tools – market constantly changing
- Close integration with IoT as data sources



Needed PM Skills for Analytics/Digital Transformation

- Cross-functional team management experience
- Business acumen
- Ability to see the big picture
- Data-driven thinking
- Ability to deal with ambiguity
- Technical skills
- Process development skills
- Soft skills-e.g. stakeholder analysis, collaboration, communication
- Organizational change management

Questions?

Denise Callahan

dcallahan@doerun.com

Ozzie Lomax - Lomax Marketing

Ozzie@lomaxconsultinggroup.com

Tracy Dencker

tdencker@ameren.com