

What is **Predictive Al/loT** How to achieve this – quickly and cheaply – in your Space





connect data · visualize predictive insights · deliver value

- Presented by:
- Rory Armes
- November 28 Montreal

			Setting:
te RT AVG BF/MIN 18 419:33 PM 4446	19.84	Trimmer Performance RT AVG BF/I SEP 10, 2018 44000 PM	4.040
0 B	F/HR 100,000 AVG 47,517 ▼ -6.1%	0 AV	G BF/HR 100,000 AVG 47,912 ▼ -89,4%
AVG RT 18 4:19:33 PM	Run Rate AVG SHIFT SEP 08, 2018 3:53:43 AM	Run Rate AVG RT SEP 10, 2018 4:40:00 PM	Run Rate AVG SHIFT *** SEP 08, 2018 4:21:57 AM
744 AVG BF/MIN	793 AVG BF/MIN	5,094 avg be/hr	53,324
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	0.270 7 -9.3%	pct_of_boards_sft (2X6)	0 -100.0%



I tend to ramble – I hope this is not our story together **Please Ask Me Questions**







A Partnership Between BID Group and Cumul8

My career evolving from video games to VFX/3D conversion of Hollywood films to finally big data predictions

But realized I was missing the specific knowledge



INDUSTRY EXPERTISE

With over 30 years of experience in the Forest Products industry, BID Group has the engineering and operational expertise to help you get the most out of your devices, systems, and solutions.

Cumul8 brings together the 'fast to excitement' and 'ease of use' philosophies learned from years of game production with the sheer volume of VFX data for technology to quickly deliver predictive insights and assist human judgement.





TECHNOLOGY PLATFORM





The first of its kind and representing a transformative shift for the Forest Products



First what do I mean by Al/loT

What is a general sense of what it takes to create results





There Will Be Winners and Losers on This Journey

Al/loT investment will becoming more and more important to your internal/external solutions

Al/IoT is to industrial companies what Henry Ford did to manufacturing

This is what a companies digital transformation will feel like

Before:

Easter morning 1900: 5th Ave, New York City. Spot the automobile.



Source: US National Archives

After Ford revolutionized the assembly line:

Easter morning 1913: 5th Ave, New York City. Spot the horse.



Source: George Grantham Bain Collection

One just has to get started – to just invest time in the unknown.



But the transformation is going to happen much faster In 2004 Netflix barely existed and Blockbuster dominated By 2011 Blockbuster had declared bankruptcy Blockbuster did not invest in STREAMING

Before streaming

After streaming





Do not have instant expectation of value or preconceived concept of what success looks like



The hype of a Magical AI Future is Paralyzing Companies It is stopping the investment of a digital transformation

The Big Data Problem

A massive amount of big data is being produced by the rapid expansion of IoT devices and sensors.

How can the deluge of performance data and information generated by these devices be analyzed?

The skill set necessary to solve these challenges does not reside in most companies.

The sheer volume of data created by devices and sensors connected to the Internet of Things (IoT) will increase to a mind-boggling level. The challenge is how to reliably store and access the vast live data, which is necessary before any predictions can occur.

This data holds extremely valuable insight into what is working well and what is not, pointing out conflicts that arise and providing high-value insights into new business risks and opportunities as correlations and associations are made. It is simply impossible for humans to review and understand all the terabytes of machine data.

The problem has moved from understanding the definition and value of IoT and artificial intelligence to the tactical. In other words, HOW TO MAKE IT WORK.



OK what do we mean by AI: Understanding AI capabilities that are reachable today

Al is a prediction tool.

Prediction is using information you have to generate information you don't have.

The current generation of AI is a long way from the intelligent machines of science fiction.

Prediction is intelligence – getting useful information faster to allow for insight.

Al predictions enhance human judgement.





Ajay Agrawal World-renowned expert in the business of AI



Economic AI vs. Science Fiction AI Model





The AI Journey



How Big Data Platform **Components Work** Together



Connect Data

The challenge to getting value from data is the ability to collect, clean, and store vast amounts of disparate data. Oper8 does this in one cloud-based platform.



Sentinel – Deliver Al

Sentinel is the data science layer overseeing all data collected in Oper8 and provides insights through tools such as projections and prediction models.



Envision Editor – Novices feel like data scientists The Envision Editor allows users to transform data into something useful without having to hire coders. Data models using disparate sources are easily

created for export as new KPIs.



Discovery Board – Visualize and explore data The Discovery Board provides the full flexibility to visually explore real-time and historical data through easy-to-create dashboards, as well as scheduled reports, alerts, and event logs.





cumul8.com



Unique and easy method for Achievable AI to show value quickly **Envision Editor**

The Secret Sauce – Envision Editor Patent Application Filed

- Node-based editor allows existing live data to be used for building models and creating new KPIs for analysis
- The process for creating these models is simplified for non-programmers
- Puts the power of creating predictive models into the hands of those with industry knowledge and are now only limited by their imagination





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With Data in One Spot – Now it is Possible to Imagine The Value Based KPI's The goal of this "Big Data/AI" Thing – is a Value-Driven Approach







Return on Invested Capital (ROIC)



Determining Gradex skip downgrade cause Example 1

One of many insights from a fully connected turnkey mill

Over the last 50 boards, count the number of b that were downgraded due to skip (specific pla machine output that 'scratches' the boards) and as a percentage





op_3

aarda	BF (Trimmer) 1
poards	BF/HR
aner	LRF T/O (BF/ft ³)
	Sawmill - Piece Count
id show it	То
	Merch - Stems
	OLI - Logs
	Trim - Boards
	Stacker - Packs
	Uptime % Summary
	Merchandizer
Operator Export	OLI
·	TBL

Sawmill - Productio	on (CU)	Trimloss (%)	Slash Nom Vol. (%) Slash Bds	Bins Available	Bins Full	Bds Rejec
BF (Trimmer)	18,199	2.6	0.2	6	25	1	80
BF/HR	1,941		Merch (stems)	OLI (Logs)	Trimmer (Bds)	Stacker Info	
LRF T/O (BF/ft ³)	8.9	Pieces/Min	0.3	0.7	3	Bundles/HR	12
Sawmill - Piece Co	unt	Speed chain Dis	44	26	8	Tiers/Min	2
	Total Count	Avg Gap/LugFill	114.7	20.3	43	Cycle Time (m)	C-1
Merch - Stems	183	Last 10 Minutes	Stems / Min	Logs / Min OCT 11, 2018 4:22:47 PM	Boards / Min	Sawmill - Speed	Info - 10 Mi
OLI - Logs	369		5.5	0 20.0	0 150		Boards
Trim - Boards	1,630	Physical info		Green Sorter		Merch	61
Stacker - Packs	3	BF/Board	11.2	% 2x4	31.6	OLI	0
Uptime % Summary	1	Avg Diameter	8.0	% 2x6	18.8	Trimmer	0
Merchandizer	5	Avg Length	16.4	% 2x8	1.0	Stacker	D-î
OLI	3	Daily BF Production		Total Production (Last 200 shifts inc	cluding night and weekend)		
TBL	3		Γ	397		Day since 0 am	A-1
Trimmer	4	10000		193		Week	B-î
Stacker	E-1	5000 01:33:20 PM	02:56:40 PM 04:20:0	-10 2018-09-20 2018-09-26	2018-10-02 2018-10-08	Month	C-1
Window C	lose	multiply Multiply		op_5 op-keep			
	BF (Trimmer) BF/HR LRF T/O (BF/ft ³) Sawmill - Piece Cou Merch - Stems OLI - Logs Trim - Boards Stacker - Packs Stacker - Packs Uptime % Summary Merchandizer OLI TBL Trimmer Stacker	BF/HR1,941LRF T/O (BF/ft³)8.9Sawmill - Piece CountSawmill - Piece CountTotal CountMerch - Stems183OLI - Logs369Trim - Boards1,630Stacker - Packs3Uptime % Summary3Merchandizer5OLI3TBL3Trimmer4StackerE-1	BF (Trimmer)18,1992.6BF/HR1,941Pieces/MinLRF T/O (BF/ft*)8.9Pieces/MinSawmill - Piece CountSpeed chain DisMerch - Stems183Last 10 MinutesOLI - Logs369Physical infoStacker - Packs3BF/BoardUptime % SummaryAvg DiameterMerchandizer5Avg LengthOLI3Daily BF ProductionTBL3Daily BF ProductionStackerE-1Daily BF ProductionOut3Daily BF ProductionOut3DailBackerE-1Daily BF ProductionOut3BackerBackerOut44BackerE-1BackerOut44Backer5Backer5Backer5Backer5Backer5Backer5Backer5Backer5Backer5	BF (Trimmer) 18,199 2.6 0.2 BF/HR 1,941 Merch (stems) LRF T/0 (BF/ft ³) 8.9 Pieces/Min 0.3 Sawmill - Piece Count Speed chain Dis 44 Merch - Stems 183 Lat 10 Minutes 9 OLI - Logs 369 11.2 114.7 Merch - Stems 1,630 Physical info 9 Stacker - Packs 3 BF/Board 11.2 Uptime % Summary Avg Diameter 8.0 Merchandizer 5 Avg Length 16.4 OLI 3 10.4 10.4 10.4 Stacker E-1 10.4 10.4 10.4 OLI 3 10.4 10.4 10.4 OLI <t< th=""><th>BF (Trimmer) 18,199 2.6 0.2 6 BF/HR 1,941 Merch (stems) OLI (Logs) LRF T/0 (BF/ft³) 8.9 Pieces/Min 0.3 0.7 Sawmill - Piece Count Speed chain Dis 44 26 Total Count Avg Gap/LugFill 114.7 20.3 Merch - Stems 183 Let 10 Moules Let 10 Moules Let 10 Moules OLI - Logs 369 Physical info Green Sorter Stacker - Packs 3 BF/Board 11.2 % 2x4 Vptime % Summary Avg Diameter 8.0 % 2x8 OLI 3 Titll 3 Total Count Stacker Merchandizer 5 Avg Diameter 8.0 % 2x4 Vptime % Summary Avg Deadetin Total Count Stacker Stacker 0LI 3 Title 3 Total Count Stacker <td< th=""><th>BF (Trimmer) 18,199 2.6 0.2 6 25 BF/HR 1,941 Merch (stems) OLI (Logs) Trimmer (Bds) LRF T/0 (BF/ft*) 8.9 Pieces/Min 0.3 0.7 3 Sawmill - Piece Count Speed chain Dis 44 26 8 Total Count Avg Gap/LugFill 114.7 20.3 43 Merch - 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Determining overall rate of vibration over the last 30 seconds Example 2 – this mill was really having bearing challenges





			m	ght_VDAE_Bt	ht_VDAE_3rd_R	ht_VDAE_Top Rig	ght_VDAE_Top Rig	t_VDAE_3rd_Arb Ri	Right
				0.0112	0.01366	0.01121	0.487008	0.0755906	15:00:00
			7	0.0112	0.01366	0.01121	0.487008	0.0755906	15:00:01
			7	0.0112	0.01366	0.01121	0.487008	0.0755906	15:00:02
			7	0.0112	0.01366	0.01121	0.487008	0.0751968	15:00:03
				0.0112	0.01366	0.01121	0.487008	0.0751968	15:00:04
				Chain Conveyor 403 - Motor 1	0.01366	0.01121	0.487008	0.0751968	15:00:05
28, 2018 8:02:51 AM and Acknow (enumeration)	Motor 1 - Temperature ···· SEP 28, 2018 8:02:51 AM	Motor 1 - Overload Count SEP 28, 2018 8:02:31 AM	Motor 1 - Elapsed Run Time ···· SEP 28, 2018 8:02:31 AM	Motor 1 - Elapsed MWHr SEP 28, 2018 8:02:21 AM	0.01367	0.01121	0.487008	0.0751968	15:00:06
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6:40 AM 08:00:00 AM 08:00:00 AM 08:00:00 AM 08:00:00 AM 08:00:00 AM	4 07:56:40 AM 08:00:00 AM	07:46:40 AM 07:50:00 AM 07:53:20 AM	0 AM 07:40:00 AM 07:43:20 AM	38 07:30:00 AM 07:33:20 AM 07:36:40	0.01366	0.01121	0.487008	0.0751968	15:00:16
			1	0.0112	0.01366	0.01121	0.487008	0.0751968	15:00:17
			7	0.0112	0.01366	0.01121	0.487008	0.0751968	15:00:18
			7	0.0112	0.01366	0.01121	0.487008	0.0751968	15:00:19
			7	0.0112	0.01366	0.01121	0.487008	0.0751968	15:00:20
			7	0.0112	0.01366	0.01121	0.487008	0.0751968	15:00:21
			7	0.0112	0.01366	0.01121	0.487008	0.0751968	15:00:22
			7	0.0112	0.01367	0.01121	0.487008	0.0751968	15:00:23
			7	0.0112	0.01367	0.01121	0.487008	0.0751968	15:00:24

CUMUL8





Pellet producer looking for chain prediction Example 3

Project Description

The company produces wood pellets, which are used for biomass energy. As a 24/7/365 operation, any downtime has a significant impact on revenue. Their equipment is currently monitored at an individual machine level, but they would like a more holistic way to predict and prevent downtime.

Cumul8 Implementation

To alert operational personnel to take preemptive action, the company required the prediction of conditions leading to a critical conveyor malfunction that results in an average of 16 hours of downtime per quarter. Cumul8 was able to retrofit an existing facility by connecting to multiple existing data sources, building models, and creating dashboards within two-weeks.

Customer Savings Example

The company has the potential to significantly save on costs with Cumul8 deployed across all seven of their facilities. Savings of over \$3.5 million due to lost production and maintenance costs would not be possible without the predictive capabilities of the Cumul8 platform.



Below: Sample Data Pipeline





cumul8.com

The evolution to kiln production and asset health Example 4







IoT is something allows us all to move quickly to expand insight

Combined IIoT hardware and software solution developed by Cumul8 for open residual/waste bins

- Using data, increase efficiencies and better manage costs related to waste disposal
- Similar solutions do not yet exist
- Sonic sensor hardware connected to Oper8 platform detects when a bin is getting full
- Cellular and wi-fi connectivity







IoT Example – Sonic Sensor in a Dumpster









Just Some Quick Examples to get the Ideas flowing

It is about quick to value



- They key point is that you can delivery your knowledge in complete solutions
 - Get away from long, consultations
 - Pick your TOP 5 and then imagine the solution
- It is not just about new value comes in taking RETRO locations and making them feel new
 - Blending IoT/AI/Middleware to bring fast value





From the imagination time to execution

- Taking away the problem of collection and visual value
- thinking of an IoT solution is rather easy

Thank You

Questions?



UBIQUITOUS – EASY - AFFORDABLE



