



Welcome to Champagne Coding!!!

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together with



Agenda

17:00 - 17:30 Food and mingling 🥂

17:30 - 18:30 Introduction to case and workshop 🎤

18:30 - 20:00 Hands-on 🧑

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Azure Data Platform:

<https://aka.ms/learn-azure-data>



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+ Microsoft Azure



We post the latest announces about **free events for the developers** in Norway on our official Twitter account

@MSDevNo



Data Science for a Better World.

May 5, 2022

Forskningsparken Oslo

hosted by



WOMEN IN DATA SCIENCE
OSLO

See widsoslo.com for more information:)

Agenda

Intro to Redpill Linpro Analytics & Unifai

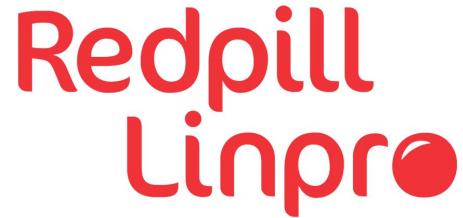
Time Series - What is it? Industrial-specific challenges

From Excel to the Cloud - Introduction to Databricks

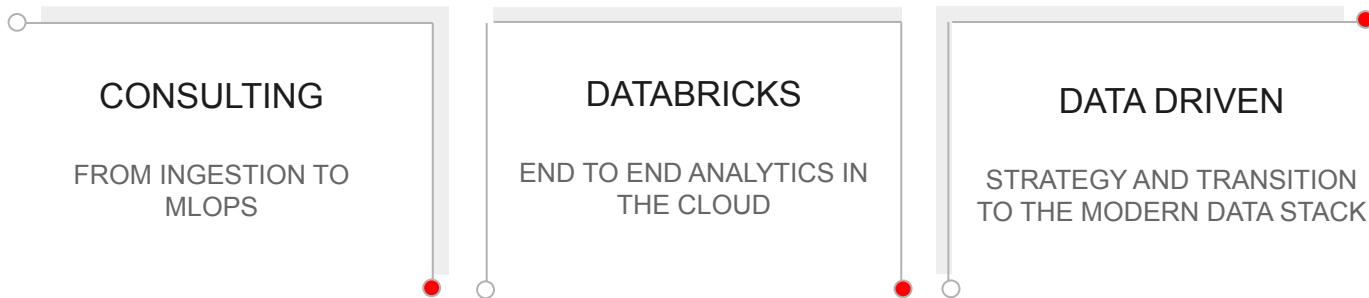
Workshop - introduction to heat pumps & the challenge

sponsored and supported by

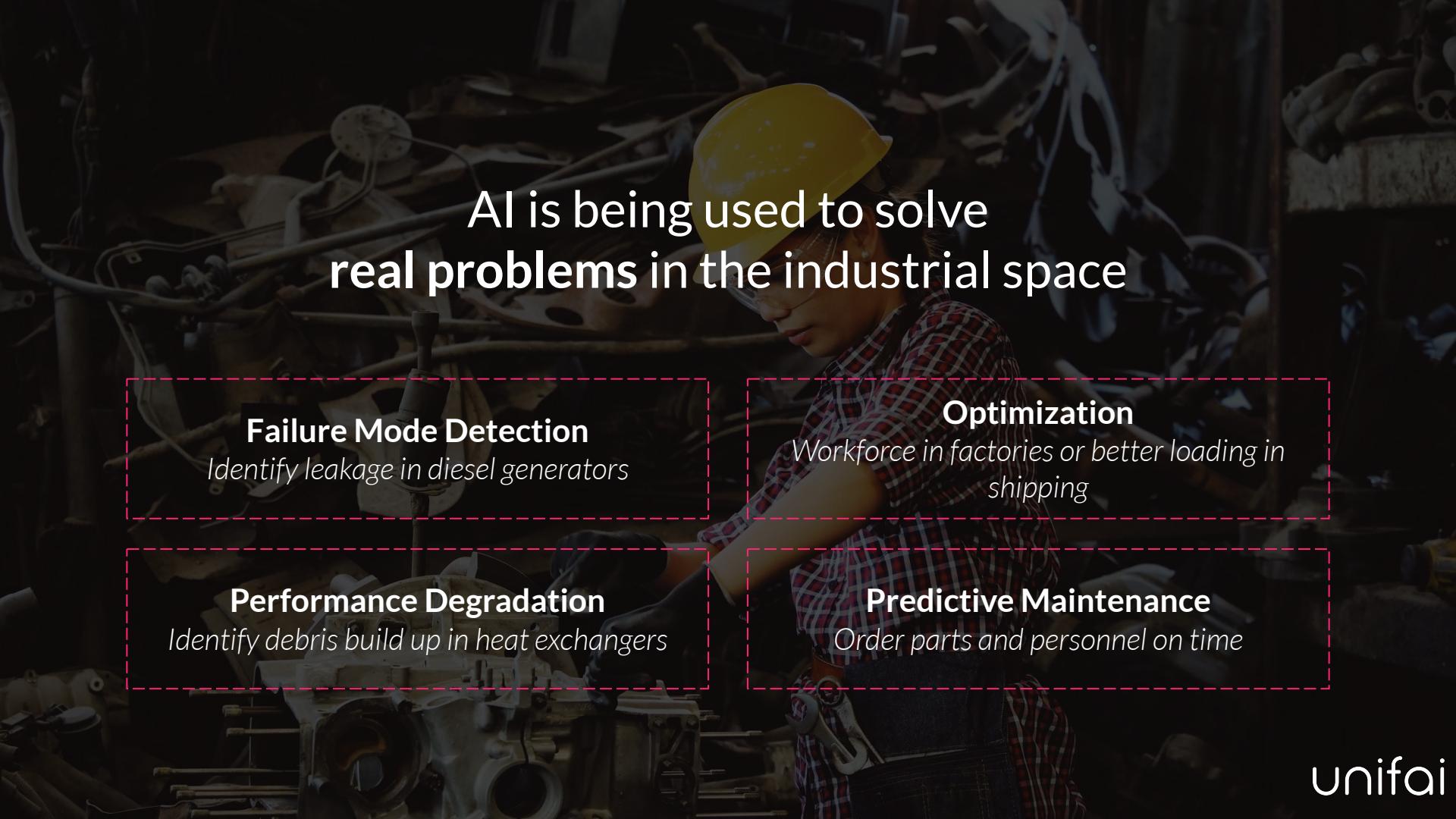




ANALYTICS





A woman wearing a yellow hard hat and a red and white plaid shirt is kneeling down, working on a complex piece of industrial machinery. She is holding a wrench and appears to be performing maintenance or repair work. The background is filled with various mechanical components, pipes, and metal parts of the machine.

AI is being used to solve real problems in the industrial space

Failure Mode Detection

Identify leakage in diesel generators

Performance Degradation

Identify debris build up in heat exchangers

Optimization

Workforce in factories or better loading in shipping

Predictive Maintenance

Order parts and personnel on time

80%

industrial analytics time is spent
preparing data.



Missing knowledge

Data scientists don't typically know
engineering principles



Lack of tooling

Engineers don't have the tools to
prepare their own data



Inefficient processes

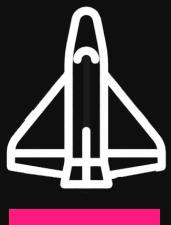
Business processes don't support
knowledge sharing

What do we need to launch our AI rocket?

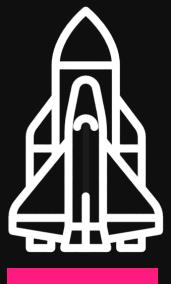


GOAL

the guidance



ALGORITHM
the structure



COMPUTER
the engine



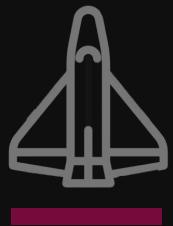
DATA
the fuel

What do we need to launch our AI rocket?

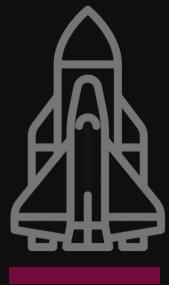


GOAL

the guidance



ALGORITHM
the structure



COMPUTER
the engine



DATA
the fuel

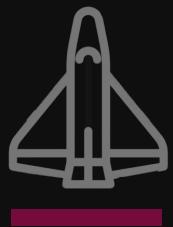
Unrefined fuel won't launch a rocket.

Lack of processed data is the Achilles heel of industry.

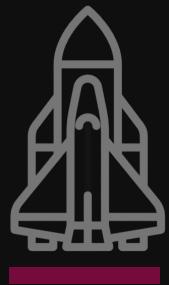


GOAL

the guidance



ALGORITHM
the structure



COMPUTER
the engine



PROCESSED DATA
the fuel



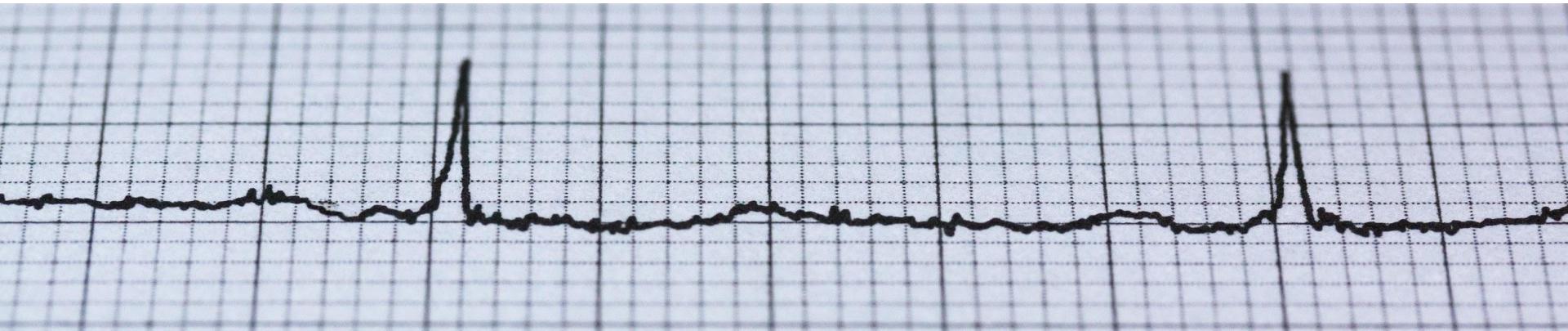
Labeled data is a foundational component of great AI.

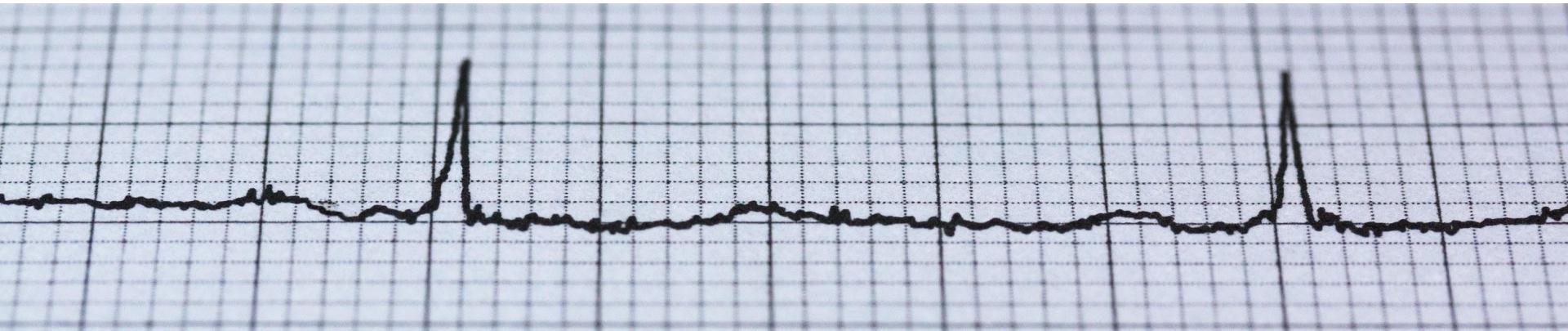
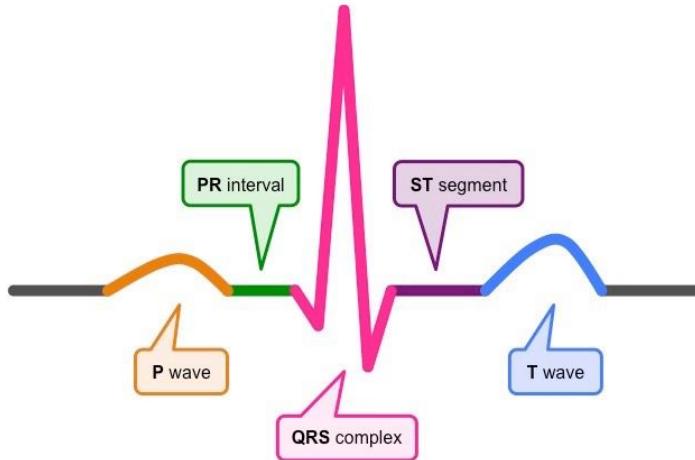
Building labeled data requires experts.
Those experts require tools.
Leveraging the data requires infrastructure.

Time series?

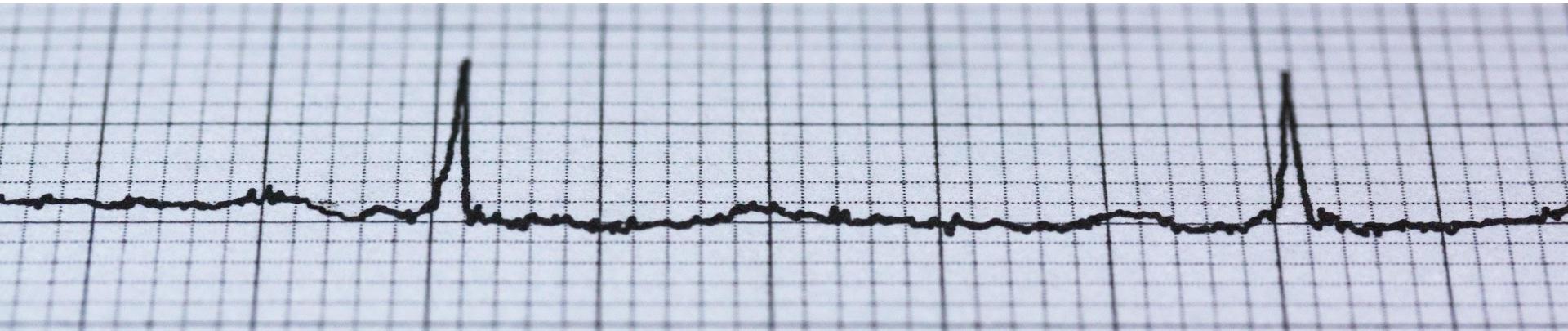
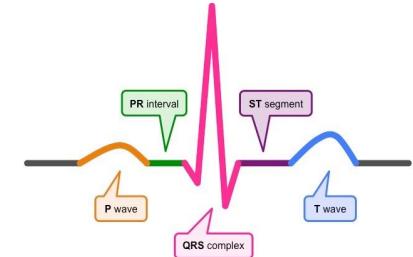


Let's take an example of a time series that we all are familiar with.





Is it normal though?

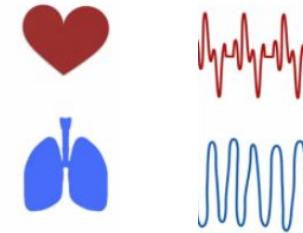


I'm not qualified to say!
What might a doctor say?



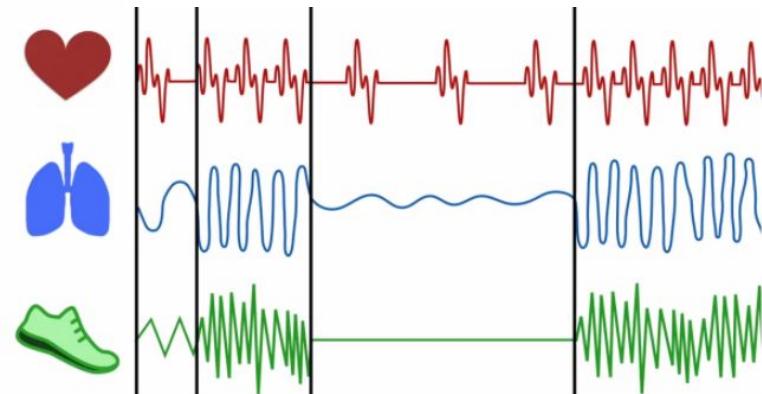


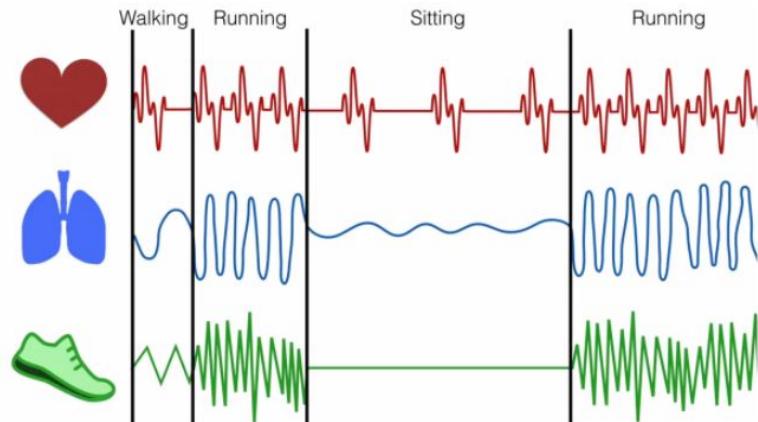
“We need more data.”



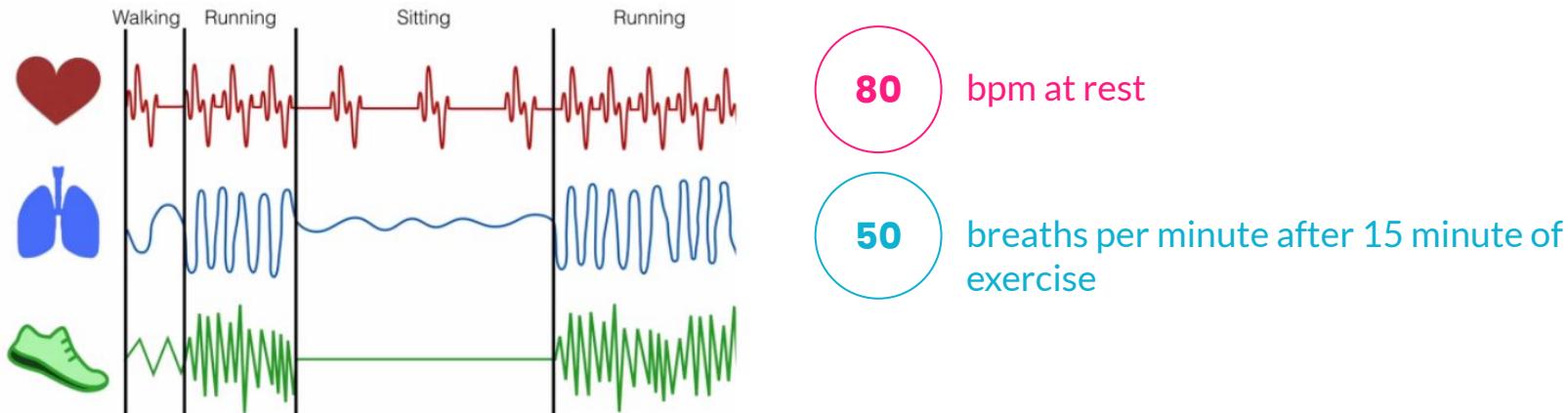


“What about movement?”

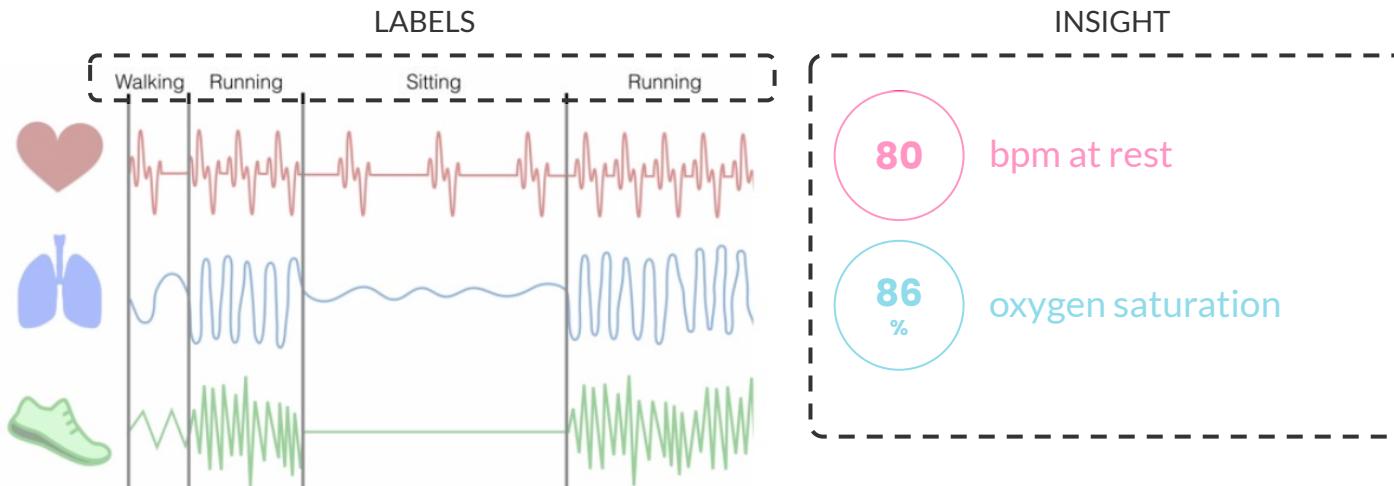




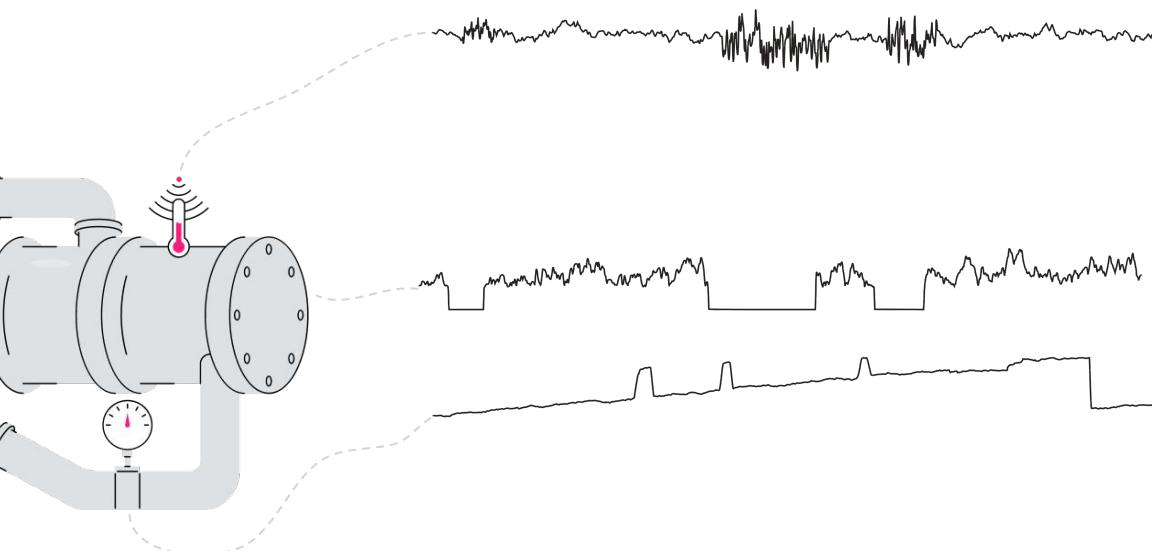
We can break down the signal into **different sequences** allowing us to draw interpretable conclusions from the data.



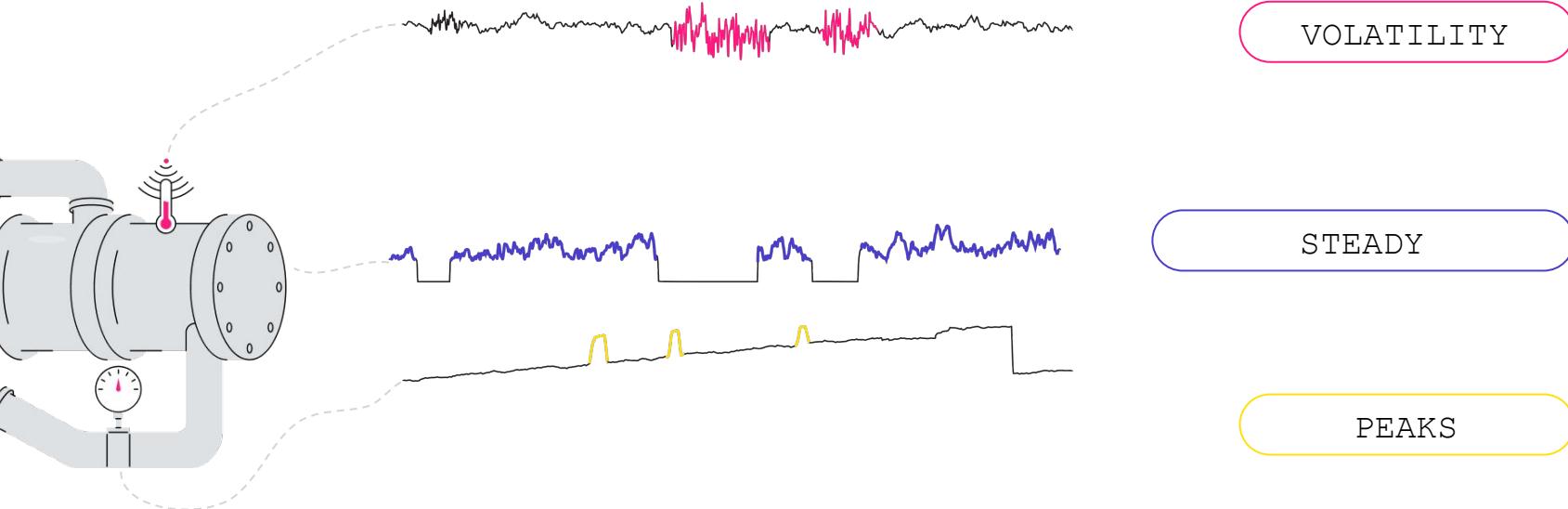
These labels can result in insight and diagnosis.



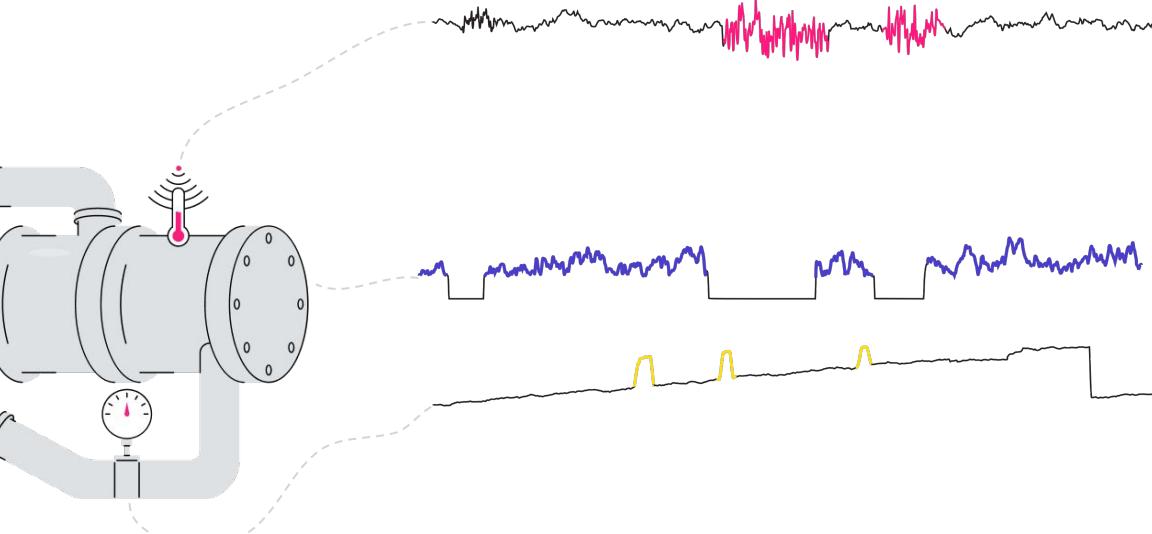
The same is true for equipment data.



We can use data-driven methods to extract information quickly.



Leverage engineering knowledge to convert into insight.

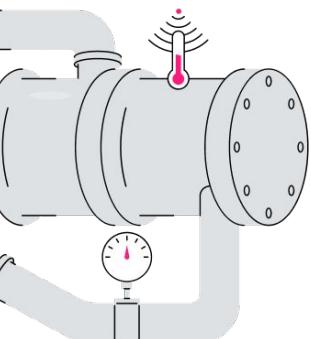


DIRTY SENSOR

STEADY OPERATION

BLOCKED

These interpretation layers allow operators to make decisions.



DIRTY SENSOR

10%
time

STEADY STATE

90%
time

BLOCKED

2%
time

EQUIPMENT HEALTH

80
/100

(A real dashboard would be a little more insightful.)

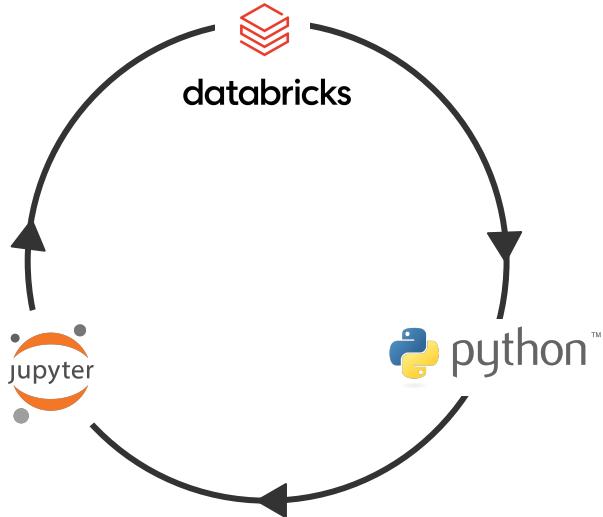
A lot of diagnostics and data preparation happens in spreadsheets and bespoke tools.

The image shows two side-by-side handwritten data logs for HVAC system performance monitoring. Both logs have a header row with columns: Mode, Time, Fan Speed, Measurement/Parameter, ΔP, Flow, Total Current, Indoor Current, and T(out supply to room). The first log, on the left, is titled "Temp Change" and dated 1/27/2020. It is labeled "Heating" and contains data points from 10:20 to 12:16. The second log, on the right, is also titled "Temp Change" and dated 1/27/2020. It is labeled "Cooling" and contains data points from 1:28 to 3:29. Both logs show temperature measurements in degrees Fahrenheit (°F) and pressure differences in inches of water (in. w.g.).

Mode	Time	Fan Speed	Measurement/Parameter	ΔP	Flow	Total Current	Indoor Current	T(out supply to room)
Heating	10:20	H	88°F					
	10:37	H	74°F					
	10:43	H	78°F					
	10:56	L	88°F					
	11:07	L	76°F					
	11:12	L	80°F					
	11:30	M	88°F					
	11:40	M	76°F					
	11:46	M	80°F					
	11:54	Q	88°F					
	12:03	Q	76°F					
	12:08	Q	80°F					
	12:16	Stop	test					

Home		Insert		Draw		Page Layout		Formulas		Data		Review		View		Tell me										
Cut		Copy		Format		Merge & Centre		General		Normal		Bad		Good		Neutral		Calculation								
A1	fx TOAS	B1	C1	D1	E1	F1	G1	H1	I1	J1	K1	L1	M1	N1	O1	P1	Q1	R1	S1	T1	U1	V1	W1	X1	Y1	
		Min	Max	Sum	Avg		Min	Max	Sum	Avg	Min	Max	Sum	Avg	Min	Max	Sum	Avg	Min	Max	Sum	Avg	Min	Max		
4				Avg	Smp					Smp				Avg	Smp			Avg	Smp			Avg	Smp			
5	01/03/2020 19:16	71606	1080	102,6	-4,507		75,13	21,66	21,21	31,37	12,32	-3,887	-5,072	-1,886	35,36	28,13	22,72	34,96	34,27	34,19	21,75	20,3	19,75	4,876	5,111	0,062
6	01/03/2020 19:16	71607	1440	102,6	-4,52		75,13	21,66	21,13	31,47	12,27	-3,852	-5,072	-1,816	35,53	28,24	22,68	35,11	34,39	34,33	21,79	20,36	19,74	4,893	5,082	0,062
7	01/03/2020 19:16	71608	1080	101,4	-4,533		75,16	21,68	21,16	31,51	12,29	-3,746	-5,081	-2,009	35,63	28,37	22,78	35,26	34,52	34,46	21,79	20,38	19,79	4,468	4,724	0,062
8	01/03/2020 19:16	71609	1440	94,4	-4,533		75,16	21,69	21,21	31,6	12,16	-3,728	-5,055	-1,912	35,59	28,43	22,88	35,36	34,6	34,54	21,85	20,34	19,79	4,421	4,693	0,062
9	01/03/2020 19:16	71610	1080	94	-4,549		75,19	21,7	21,18	31,71	12,16	-3,622	-5,028	-1,93	35,4	28,44	22,87	35,45	34,72	34,68	21,91	20,36	19,81	4,419	4,739	0,087
10	01/03/2020 19:16	71611	1080	94	-4,52		75,19	21,72	21,18	31,86	12,09	-3,701	-5,019	-2	34,96	28,27	23	35,36	34,63	34,6	21,92	20,38	19,81	4,359	4,675	0,092
11	01/03/2020 19:16	71612	1080	94	-4,563		75,21	21,75	21,15	31,98	12,04	-3,746	-5,037	-2,124	34,59	28	22,98	35,18	34,44	34,39	21,93	20,42	19,79	4,33	4,635	0,095
12	01/03/2020 19:16	71613	1080	93,8	-4,563		75,23	21,75	21,07	32,06	11,92	-3,852	-5,072	-2,185	34,31	27,73	23,09	35	34,28	34,22	21,94	20,46	19,77	4,308	4,586	0,096
13	01/03/2020 19:16	71614	1440	94	-4,563		75,26	21,78	21,09	32,15	11,87	-3,913	-5,108	-2,291	34,12	27,5	22,99	34,83	34,1	34,06	21,99	20,5	19,77	4,266	4,552	0,097
14	01/03/2020 19:16	71615	1080	94	-4,563		75,27	21,79	21,1	32,2	11,8	-3,887	-5,161	-2,423	34,01	27,3	23	34,69	34	33,92	22,07	20,57	19,77	4,237	4,542	0,097
15	01/03/2020 19:16	71616	1080	94	-4,576		75,29	21,82	21,04	32,28	11,76	-3,958	-5,205	-2,511	33,92	27,15	23,03	34,57	33,88	33,79	22,08	20,57	19,76	4,211	4,509	0,097
16	01/03/2020 19:17	71617	1080	94	-4,563		75,3	21,86	21,03	32,28	11,73	-4,011	-5,25	-2,617	33,82	27,02	23	34,46	33,77	33,67	22,05	20,62	19,76	4,213	4,528	0,097
17	01/03/2020 19:17	71618	1080	94	-4,549		75,33	21,85	21,01	32,29	11,75	-3,994	-5,295	-2,741	33,73	26,91	23	34,36	33,69	33,54	22,06	20,62	19,77	4,182	4,506	0,098
18	01/03/2020 19:17	71619	1080	94	-4,576		75,34	21,86	20,95	32,31	11,71	-4,064	-5,339	-2,785	33,63	26,84	22,98	34,26	33,59	33,43	22,11	20,65	19,81	4,194	4,514	0,098
19	01/03/2020 19:17	71620	1080	93,8	-4,576		75,35	21,85	20,92	32,31	11,75	-4,064	-5,392	-3,543	33,57	26,79	23,03	34,16	33,53	33,38	22,1	20,7	19,81	4,186	4,487	0,098
20	01/03/2020 19:17	71621	1080	94	-4,576		75,42	21,87	20,94	32,29	11,76	-4,063	-5,444	-3,639	33,52	26,77	22,92	34,12	33,5	33,31	22,06	20,79	19,84	4,199	4,462	0,099
21	01/03/2020 19:17	71622	1080	93,8	-4,592		75,44	21,86	20,95	32,29	11,82	-4,109	-5,534	-3,799	33,42	26,63	22,88	34,05	33,43	33,23	22,07	20,77	19,88	4,206	4,453	0,099
22	01/03/2020 19:17	71623	1080	94	-4,619		75,46	21,87	21,02	32,28	11,75	-4,117	-5,57	-3,879	33,42	26,53	22,77	34	33,39	33,21	32,07	20,76	19,89	4,199	4,448	0,099
23	01/03/2020 19:17	71624	1080	94	-4,619		75,5	21,86	20,95	32,25	11,71	-4,064	-5,605	-3,826	33,4	26,46	22,77	33,97	33,34	33,2	22,11	20,78	19,93	4,204	4,431	0,099
24	01/03/2020 19:17	71625	1080	93,8	-4,619		75,52	21,85	20,95	32,26	11,75	-4,064	-5,623	-3,826	33,4	26,42	22,83	33,95	33,35	33,18	22,17	20,81	20	4,189	4,431	0,099
25	01/03/2020 19:17	71626	1080	94	-4,632		75,53	21,86	20,94	32,24	11,78	-4,106	-5,667	-3,852	33,35	26,38	23,04	33,11	33,3	33,09	22,15	20,77	20	4,181	4,451	0,099
26	01/03/2020 19:17	71627	1440	94	-4,632		75,54	21,86	20,95	32,31	11,71	-4,064	-5,652	-3,844	33,35	26,34	22,98	33,11	33,3	33,09	22,25	20,79	20,08	4,157	4,465	0,098
27	01/03/2020 19:17	71628	1080	93,8	-4,632		75,55	21,85	20,95	32,31	11,75	-4,064	-5,652	-3,844	33,35	26,33	22,98	33,11	33,3	33,09	22,16	20,88	20,08	4,15	4,455	0,098
28	01/03/2020 19:18	71629	1080	94	-4,632		75,57	21,86	20,95	32,31	11,75	-4,064	-5,652	-3,844	33,35	26,33	22,98	33,11	33,3	33,09	22,02	20,89	20,09	4,157	4,491	0,099
29	01/03/2020 19:18	71630	1080	93,8	-4,652		75,62	21,89	20,94	32,19	11,76	-3,932	-5,558	-3,808	33,37	26,31	23,03	33,19	33,33	33,11	21,88	20,98	20,1	4,181	4,496	0,099
30	01/03/2020 19:18	71631	1080	94	-4,648		75,62	21,92	20,94	32,19	11,78	-3,897	-5,676	-3,799	33,34	26,29	23,13	33,08	33,32	33,12	21,82	21,05	20,13	4,206	4,484	0,098
31	01/03/2020 19:18	71632	1080	94	-4,648		75,65	21,92	20,95	32,19	11,78	-3,897	-5,676	-3,799	33,34	26,26	23,12	33,08	33,32	33,12	21,87	21,05	20,17	4,196	4,451	0,099
32	01/03/2020 19:18	71633	1080	93,8	-4,675		75,66	21,93	20,95	32,18	11,82	-3,871	-5,717	-3,799	33,35	26,24	23,17	33,07	33,28	33,02	21,97	21,11	20,16	4,157	4,47	0,098
33	01/03/2020 19:18	71634	1080	94	-4,675		75,68	21,93	20,95	32,18	11,82	-3,873	-5,717	-3,799	33,36	26,24	23,17	33,07	33,28	33,02	21,97	21,11	20,14	4,153	4,482	0,098
34	01/03/2020 19:18	71635	1080	93,8	-4,662		75,69	21,93	20,89	32,18	11,8	-3,729	-5,676	-3,667	33,43	26,22	23,2	33,08	33,25	33,05	21,97	21,39	20,21	4,153	4,499	0,1
35	01/03/2020 19:18	71636	1080	94	-4,688		75,69	21,97	20,91	32,16	11,83	-3,649	-5,641	-3,508	33,39	26,23	23,12	33,02	33,22	33,06	21,99	21,39	20,09	4,191	4,496	0,099
36	01/03/2020 19:18	71637	1080	93,8	-4,662		75,72	21,97	20,85	32,15	11,85	-3,711	-5,614	-3,429	33,39	26,23	23,12	33,03	33,22	33,06	22,23	21,15	20,13	4,227	4,448	0,099
37	01/03/2020 19:18	71638	1080	93,8	-4,675		75,72	21,99	20,85	32,18	11,83	-3,729	-5,614	-3,407	33,38	26,26	23,12	33,08	33,22	33,06	22,22	21,67	20,09	4,189	4,474	0,099
38	01/03/2020 19:18	71639	1080	94	-4,675		75,73	21,99	20,82	32,18	11,83	-3,764	-5,641	-4,091	33,35	26,25	23,1	33,03	33,22	33,07	22	21,7	20,1	4,201	4,504	0,099
39	01/03/2020 19:19	71640	1440	93,8	-4,688		75,73	22,01	20,81	32,22	11,82	-3,711	-5,844	-3,622	33,45	26,21	23,15	34,15	33,39	33,24	22,01	21,78	20,15	4,235	4,55	0,099
40	01/03/2020 19:19	71641	1080	94	-4,688		75,73	22,01	20,82	32,22	11,82	-3,711	-5,844	-3,622	33,45	26,21	23,15	34,15	33,39	33,24	22,01	21,78	20,14	4,267	4,535	0,098
41	01/03/2020 19:19	71642	1080	94	-4,688		75,75	22,01	20,85	32,25	11,88	-3,525	-5,71	-3,904	33,46	26,22	23,29	34,26	33,37	33,21	22,09	21,81	20,13	4,273	4,506	0,097
42	01/03/2020 19:19	71643	1080	93,8	-4,688		75,76	22,01	20,84	32,26	11,88	-3,586	-5,71	-3,86	33,48	26,26	23,26	34,33	33,46	33,31	22,09	21,81	20,16	4,641	4,901	0,099
43	01/03/2020 19:19	71644	1080	96,6	-4,688		75,76	22,01	20,84	32,26	11,88	-3,586	-5,71	-3,86	33,48	26,26	23,26	34,33	33,46	33,31	22,09	21,81	20,14	4,671	4,947	0,099
44	01/03/2020 19:19	71645	1080	102,4	-4,704		75,73	22,03	20,79	32,29	11,73	-3,648	-5,764	-3,825	33,66	26,21	23,92	34,46	33,95	33,61	22,09	21,85	20,14</td			

From **Excel to the Cloud**... How
can we make simple manipulations
available in a production
environment?





databricks

WHAT YOU NEED TO KNOW



THE MODERN DATA STACK

- One of the fastest growing analytics platform in the world
- Hosted in the cloud – pay as you go
- Support for all data types – batch and streaming
- Connect, pick and choose services
- Future-proof
- Start small, think big and scale



MAIN BENEFITS FOR ANALYTICS TEAMS

BEST OF TWO WORLDS

Data management and performance from Data warehouses with cheaper and more flexible storage from Data Lakes

SINGLE SOURCE OF TRUTH

One stop shop for all data, ensures consistency throughout the business and for every analytics case

END TO END ANALYTICS

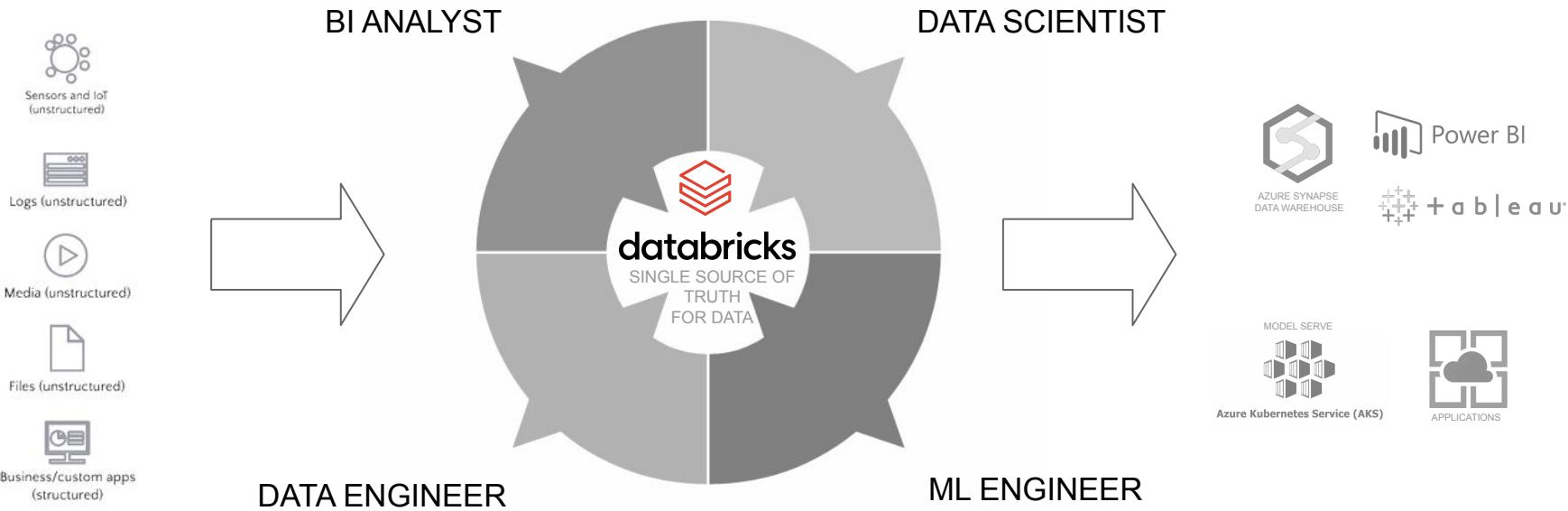
Collaboration and self service for all users across, so analytics teams can focus on solving problems, not infrastructure

UNDER THE HOOD

- Storage is decoupled from compute
- **Delta Lake** – for data management
- **Spark** – the Databricks workhorse
- **mlflow** – MLOPs, ensuring the ML lifecycle



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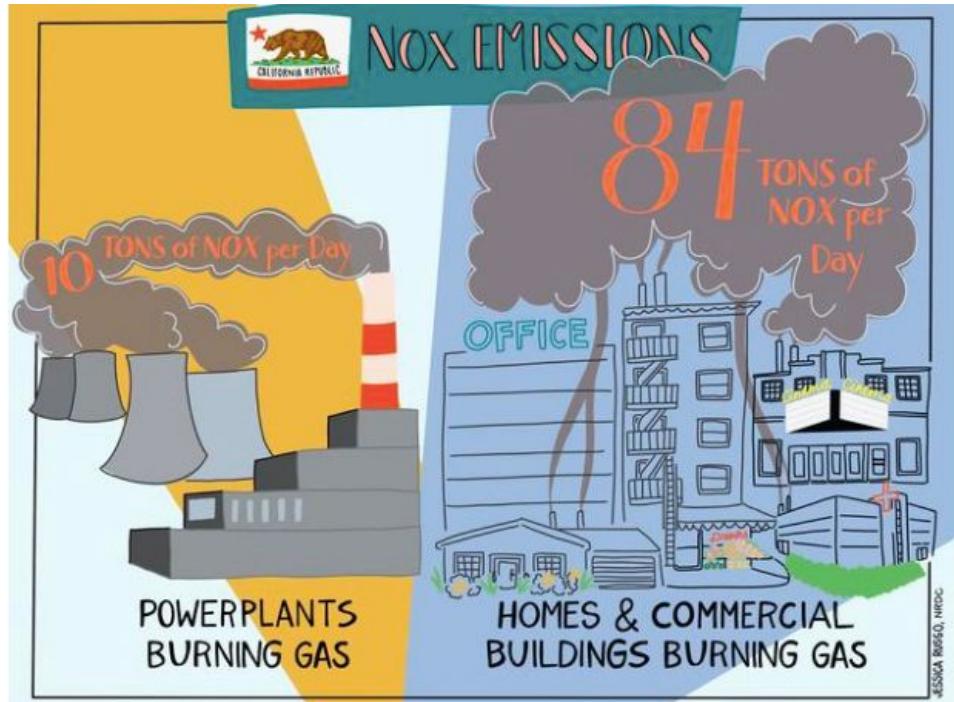
1.

2.

3.

Why should we electrify the heating sector?

- Residential buildings require a lot of energy to heat or cool spaces, circulate air, and operate lighting.
- Controlling system losses can offer large potential for energy savings in the short term; eg. by looking at...
 - Reduce oversizing using historical data
 - Weather forecasting
 - Match inputs to load
 - Maintain efficiency
- Vision to decarbonize heating sector in NY state

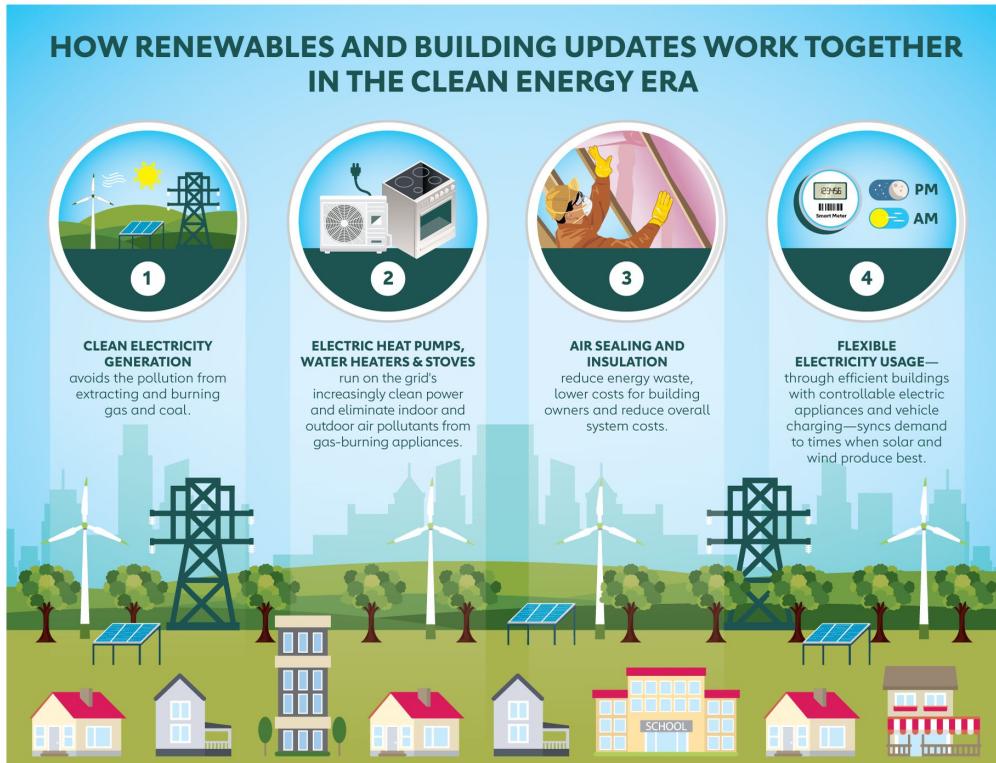


Jessica Russo, NRDC

<https://microgridknowledge.com/building-electrification-berkeley-nrdc/>

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Refrigerators vs. Heat Pumps

- The **transfer of heat from a low-temperature region to a high-temperature one** requires special devices called refrigerators.
- Another device that **transfers heat from a low-temperature medium to a high-temperature one** is the heat pump.
- Refrigerators and heat pumps are essentially the same devices; they differ in their objectives only.

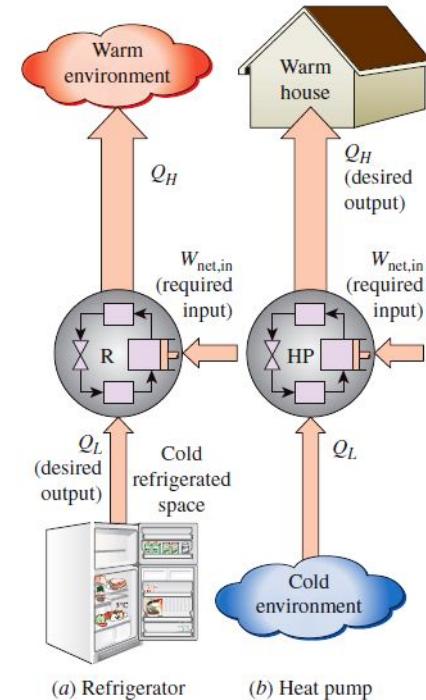
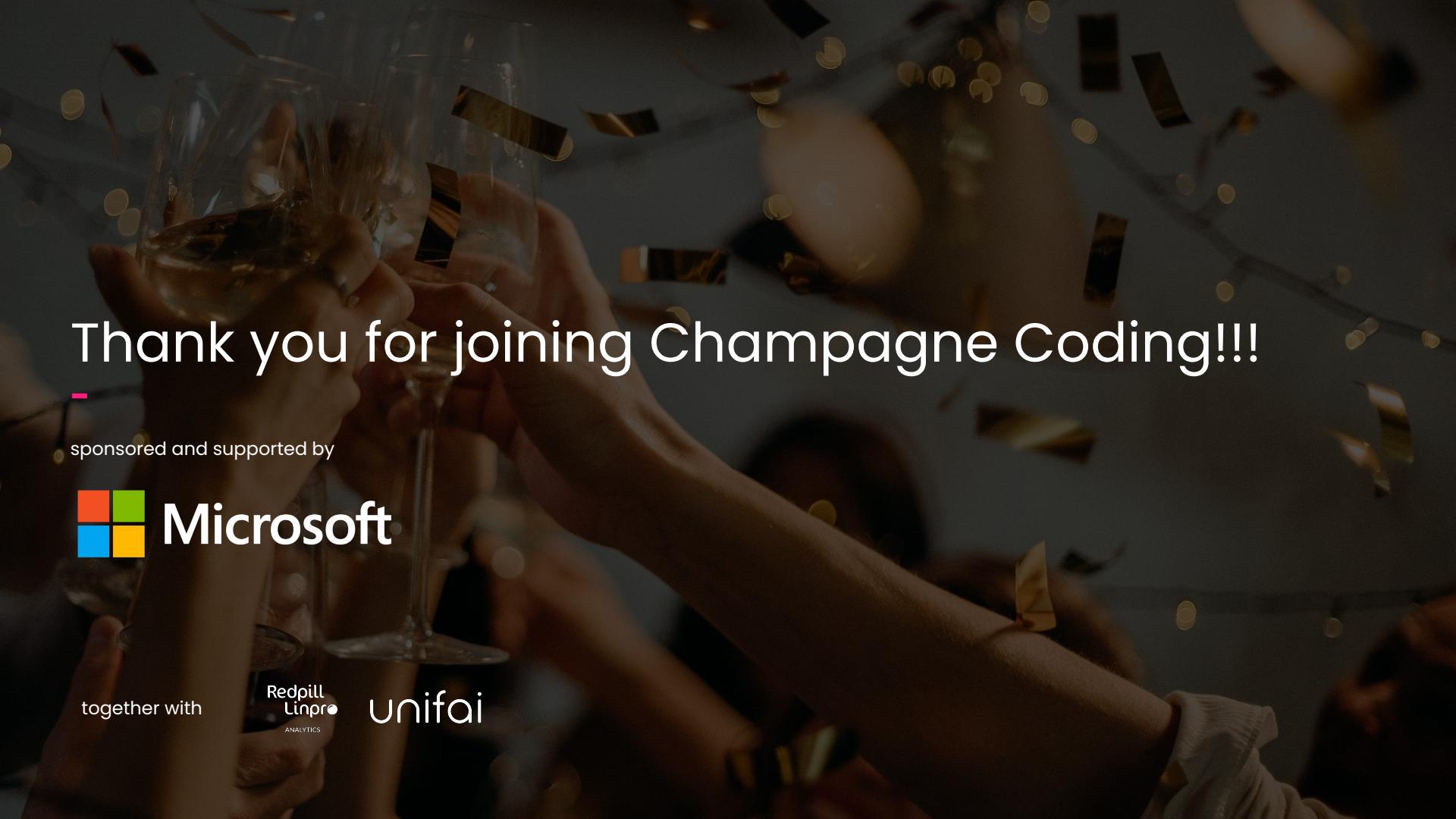


FIGURE 11-1
The objective of a refrigerator is to remove heat (Q_L) from the cold medium; the objective of a heat pump is to supply heat (Q_H) to a warm medium.



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