



MBAA-RMD  
NOVEMBER 14, 2017



# IOT IN THE BREWERY SETTING

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A POC DEVELOPMENT OF IOT MONITORING IN A NON-AUTOMATED BREWHOUSE AND HOW IT IS USED FOR IMPLEMENTING CRITICAL CONTROL POINTS

WHY? BECAUSE WE HAVE A COMPLETELY MANUAL BREWERY! DO YOU?

IF YOU DO, THIS PRESENTATION MAY BE PERFECT FOR YOU!

-BROUGHT TO YOU BY A WHOLE BUNCH OF PEOPLE AT CMB AND FATHYM

# WHAT IS CRAZY MOUNTAIN?

-TO ANSWER THE WHY WE NEED TO KNOW THE WHAT

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- Small production brewery that started in the Vail Valley, inc. 2010
  - Specific Mechanical
- Expanded to Denver in the 471 Kalamath facility in August 2015
  - Installation date 1996, one of 3x SRSS installed in US
- Two locations, two very different brewhouses (20bbl 2x vessel; 50bbl 3x vessel)(fermenters... don't ask)
- Neither have any automation (pay attention here)... both truly craft breweries
- 12 full time offerings (can, keg, bottle, PET)
- 3-4 seasonal offerings(mixed can/bottle, keg, PET)
- Specialties large bottle format program in Edwards- 1x week (750mL bottle, keg)
- At the moment about 8 contracted brew contracts during our growth phase (cans, kegs)
- Estimated 200-250 SKU's to work with!
- A LOT of oversight!!!!

# SOLUTIONS NEEDED AT CMB-QUESTIONS FIRED AT ME BY THE IOT TOUR MEMBERS!!!!

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- Quality oversight ← People
  - Overnight/Weekend eyes-on process
  - Is data collection robust?
  - Alerts for out-of-tolerance conditions (all) ← Process
- Real time data analysis ← Inventory
- Inventory control

# WHAT IS IOT?

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- The **Internet of things (IoT)** is the network of physical devices, vehicles, and other items embedded with electronics, software, sensors, actuators, and network connectivity which enable these objects to autonomously collect and wirelessly exchange data.
- Experts estimate that the IoT will consist of about 30 billion objects by 2020.
- A way to monitor process without effecting the 'craft'
- "Then, I said, let us begin and create in idea a State; and yet the true creator is necessity, who is the mother of our invention."
  - Plato, book 2 of *The Republic*

# WHAT IS FATHYM?

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- The Fathym end-to-end innovation framework ecosystem is designed to simplify IoT, from hardware and data ingest to data visualization and app creation.
- Fathym's sensor, smart hub and data ingest capabilities connect machinery, enabling customers to monitor previously inaccessible real-time data.
- Fathym's cloud stores collected data, where it is analyzed and reported using flexible visualization tools personalized for each customer's dashboards.
- The Fathym dashboards offer a full suite of features to enable enterprises to drive efficiencies and boost productivity.
  - Critical data is easily viewed through maps, bar charts and gauges to visualize and interpret business-critical data. Rules and alerts are easily created, implemented and adjusted.
  - <https://fathym.com/>

# DASHBOARD VISUALIZATION

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<http://iot.fathym.com/applications/cmb/?partId=374c8e5d-a5ad-434b-9a50-288e978e6fcf>

# POC PHASE SUBLEVEL PLAN

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- Build in oversight of personnel miscues
  - FV temp control settings
  - FV volumes from KO
- Build in oversight of equipment that is could cause manufacturing downtime
  - Boiler
  - Glycol
- Real time data gathering and analysis
- Need for cost \$\$ sensitivity (brewers are cheap)
- Lots of stainless (WiFi signal block?) and wet environment



# POC STAGE 1A DEVELOPMENT

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- 1. Fermenter Temp Alert
  - Repurpose from existing weather monitoring equipment
  - Inexpensive thermo-sensor connected to a phone broadcasting wifi to basestation/dashboard
  - Can monitor FV temps on dashboard -and-
  - Old thermo-control system seems to be non-calibrated (varies from FV to FV)



server@fathym.com



Mon, Oct 9, 2:09 AM

(Pilsner Temp Alert) Temp is outside the range

Tuesday 2:13 AM

(Pilsner Temp Alert) Temp is outside the range

Tuesday 8:48 AM

(Boiler temp alert) The boiler temp has dropped below 150



Text Message

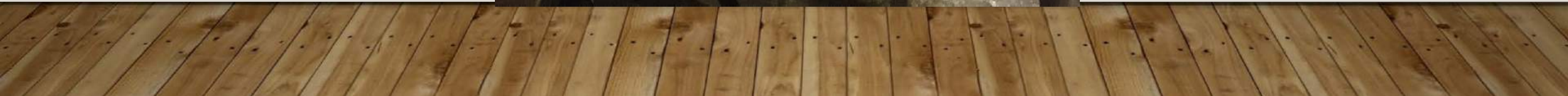




# POC STAGE 1A DEVELOPMENT

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- 2. Fermenter Volume (Depth)
  - No existing equipment to determine KO volume from whirlpool to FV
  - Simple sonar distance locator connected to BT broadcasting



# POC STAGE 1B DEVELOPMENT

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- 1. Boiler Sensor Alert
  - 20 yr old boiler oversight is critical
  - Guts have already been replaced this year
  - Water level sensor has already been replaced this year
  - Boiler has its ups-n-downs
  - Downs are baaaaaaaaaaaaaaaaaaaaaaaaaaaaad
  - IR temp monitor connected to phone broadcasting wifi (alert to phone text)



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Saturday 9:42 PM

(Boiler temp alert) The boiler temp has dropped below 150 degrees.

Yesterday 12:45 AM

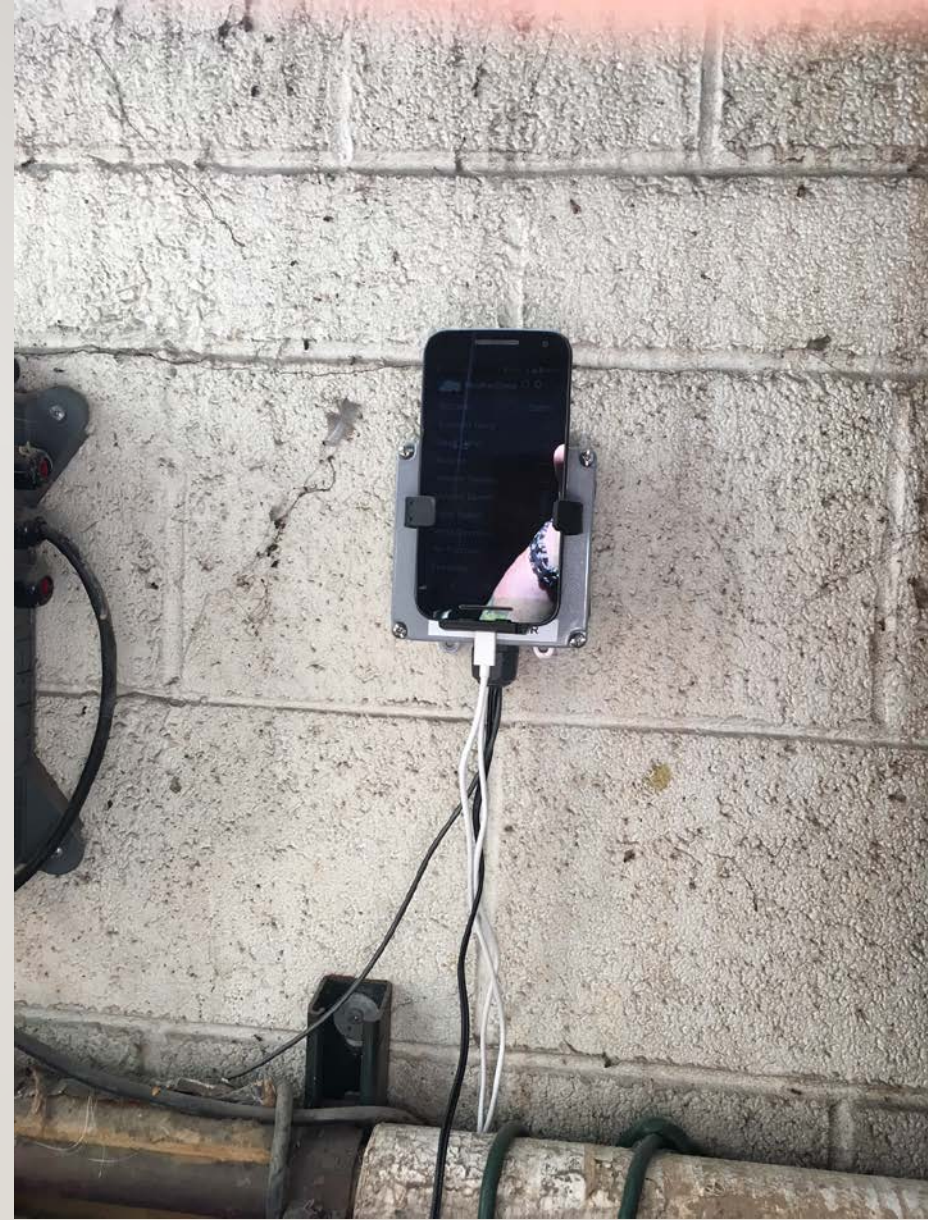
(Boiler temp alert) The boiler temp has dropped below 150 degrees.

Yesterday 2:22 AM



Text Message







# POC STAGE 1B DEVELOPMENT

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- 2. Glycol Reservoir Temp Alert
  - Highly modified, 10/20 yr old system has its ups-n-downs
  - Downs are baaaaaaaaaaaaaaaaaaaaaad
  - Same set up as FV Temp sensor (alert sent to phone text)



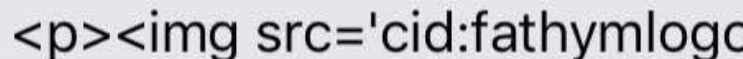
server@fathym.com



Saturday 3:37 PM

(Boiler temp alert) The boiler temp has dropped below 150 degrees.

Saturday 5:24 PM

(Glycol temp is above 38 degrees)  Glycol temp is above 38 degrees.

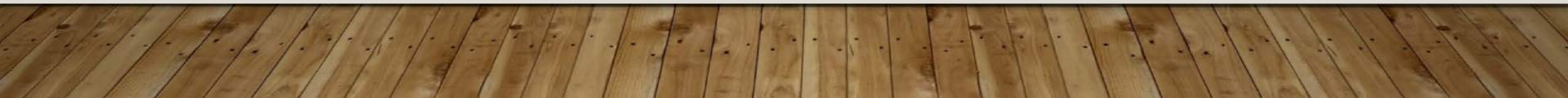
Saturday 6:40 PM

(Boiler temp alert) The boiler temp has dropped below 150 degrees.



Text Message





# STAGE 2 DEVELOPMENT- TBD

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- 1. Mostly Autonomous Quality Data Gathering
  - This won't be cheap!
  - Cloud storage and data massaging
  - a. Fermentation Velocities for Yeast Health
    - Measure volume of CO<sub>2</sub> emitted from blow-off- cheap
    - Density of wort measurement- not cheap and potentially contamination site
  - b. Machine Health (Accelerometer) on Pumps, Motors, etc.
- 2. Inventory control
  - QR scanned inventory streamed to ERP
  - Lot # tracking by phone app!
  - Eliminate need for excel spreadsheet tracking

# STAGE 2 DEVELOPMENT- TBD

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- 3. Off-site Temp monitor of product after it leaves the brewery
  - Disposable or returnable temp recorders
  - Deposit/refund system would help with monitor returns
  - Can download temperature conditions for transport of product
- 4. Malt silo fill alert
  - Only have small window for visual indicator and The Maths
  - Implementing similar sonar sensor as previously used for FV's
- 5. Integrate grist case digital mass scale to ERP quality monitoring

# Thank you!

- Melissa Bosak  
(melissa@crazymountainbrewery.com)
  - And the great CMB crew!
- George Greenwood  
(george.greenwood@fathym.com )
- Christy Szoke (christina.szoke@fathym.com )
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- John (john@weathercloud.co)
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