



Tech Exploration Lab  
Hyper Innovation

# Innovation and Tech Exploration Lab Progress Update

The event will begin shortly -

Please stay muted at this time, and  
we invite you to introduce yourself  
in the chat!

# Agenda

## **Introductions and Overview**

## **Introduction to the Tech Exploration Lab**

## **Highlights from the Dairy Innovation Challenge**

## **Progress Updates and 2021 Plans**

- **Accelerating Startups and New Tech Solutions**
- **Playspace for Shared Learning, Development, and Testing**
- **Testing, New Business Models, and Generating New Insights**

## **Advancing New Use Cases and Developing Talent**

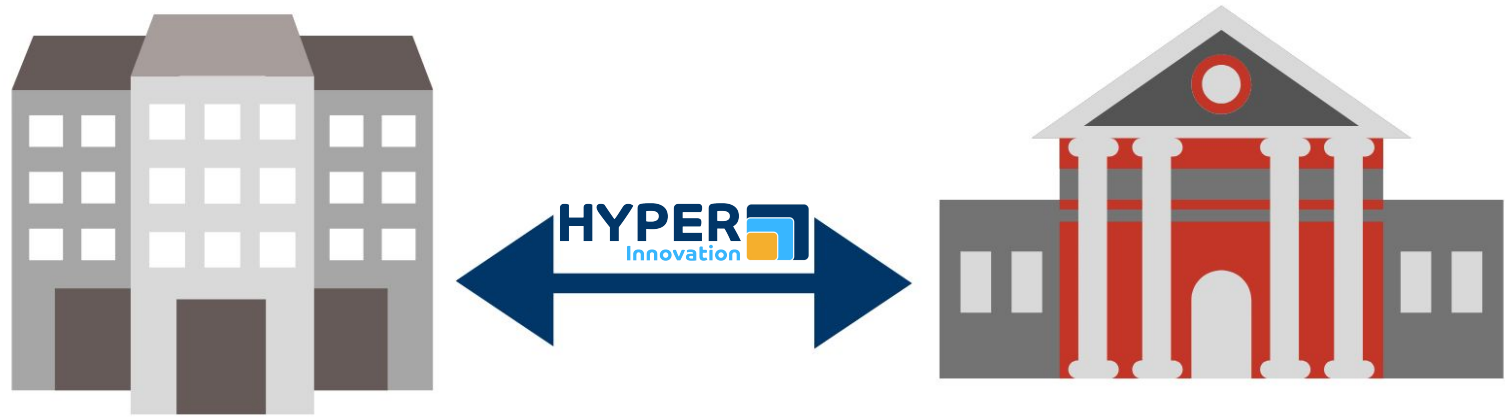
## **Open QA and Discussion**





An Innovation-as-a-Service agency that bridges the gap between complex, real-world problems to solve and innovative, executable solutions to drive growth and value.





It can be difficult for companies to communicate pain points and create value efficiently with universities, startups and innovation ecosystem partners.



# Hyper Innovation Tech Exploration Lab

A digital playspace focused on connecting corporate/startup industry problems to solve to multidisciplinary university talent for shared learning, hands-on experience, and talent development.

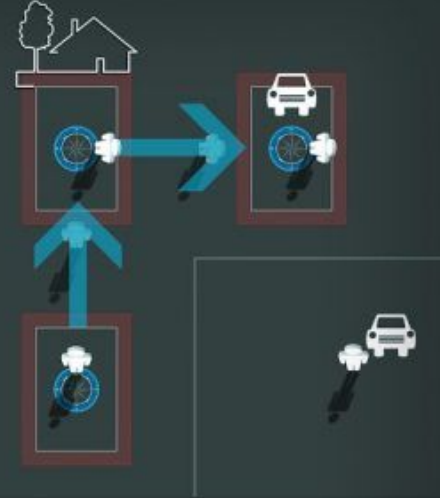
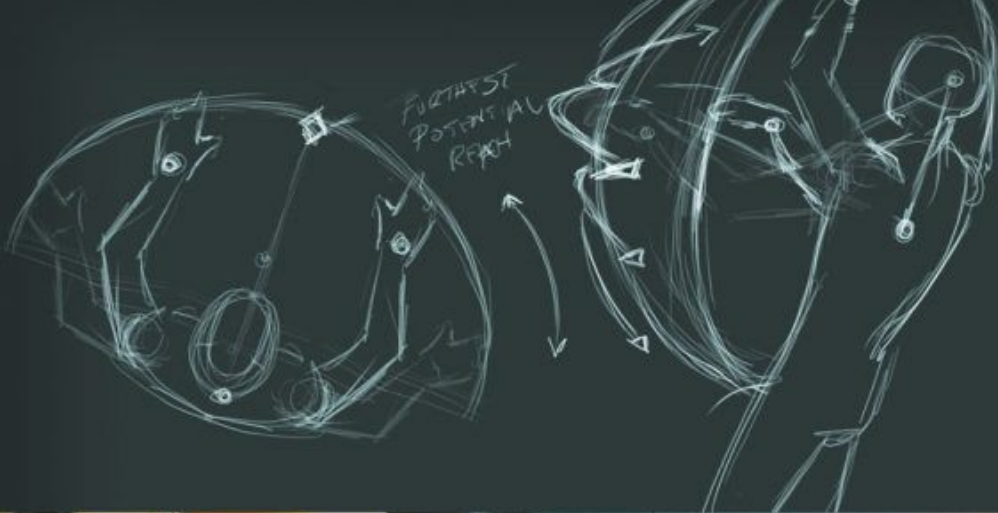




FROM WHERE WE WERE ...







# Tech Exploration Lab:

## A Plug and Play Resource



### People

University Talent

Startups

Corporates

Strategic Consultants

Technical and Design  
Resources



### Tools and Assets

Simulators and  
Real-world Test Beds

Data Sets

Cloud Infrastructure



### Frameworks

Challenges

Incubators

Learning Labs and Lean  
Experiments

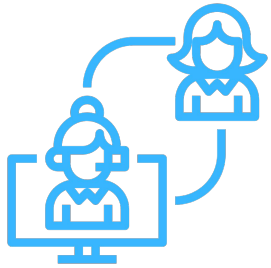
Workshops

Tailored Accelerators





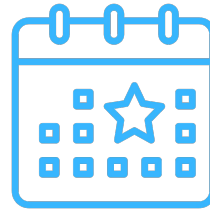
The Tech Exploration Lab is an open innovation and shared learning opportunity for university, startup, and corporate collaboration.



Mentors and  
Technical  
Resources



Industry Projects,  
Testbeds, Tailored  
Accelerators



Virtual  
Demonstrations,  
Challenges, Live  
Showcases



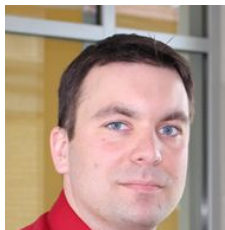
Early Stage Idea  
and Startup  
Advising



# Tech Exploration Lab Advisory Group



**Sandra Bradley**  
Hyper Innovation



**Kevin Ponto**  
UW-Madison



**Tyler Waite**  
Holos



**Rich Fischer**  
CUNA Mutual



**Mike Grall**  
Talus Solutions



**Richelle Martin**  
Winnow Fund



**Josh Garity**  
Candorem



**Jeff Glazer**  
UW L&E Clinic



**Ken Sarnstrom**  
American Family  
Insurance



**Kurt Malueg**  
Kohl's



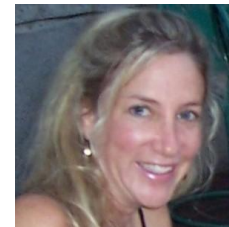
**Brad Chandler**  
UW-Madison



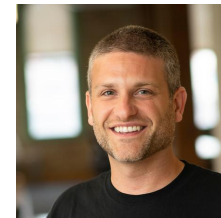
**Brian Wiegand**  
Spin Live



**Dave Sachse**  
Midwest Perks



**Fran  
Greenman-Schmitz**  
Strategy Solutions



**Jonah Turner**  
Molson Coors  
Beverage Company



# Digital Health Advisors



**Sandra Bradley**  
Hyper Innovation



**Jeff Glazer**  
UW L&E Clinic



**Dr. Tim Bartholow**  
Neugen



**Matt Younkle**  
Pythonic AI



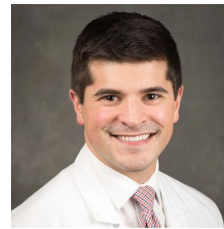
**Kevin Ponto**  
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**Dr. Bob  
Holland**  
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**Dr. Sameer Mathur**  
UW-Madison



**Dr. Peter  
Kleinschmidt**  
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**Kay Plantes**  
Plantes Co.



**Fran  
Greenman-Schmitz**  
Strategy Solutions



**Rock Mackie**



**Kerra Guffey**  
Forward Health Group



**Joe Rizk**  
MATTER Health



**Mike Grall**  
Talus Solutions



Interest from Diverse  
Companies





# Interest from Multi-Disciplinary Students



# Tech Exploration Lab

## Progress Update -

### Fall 2020



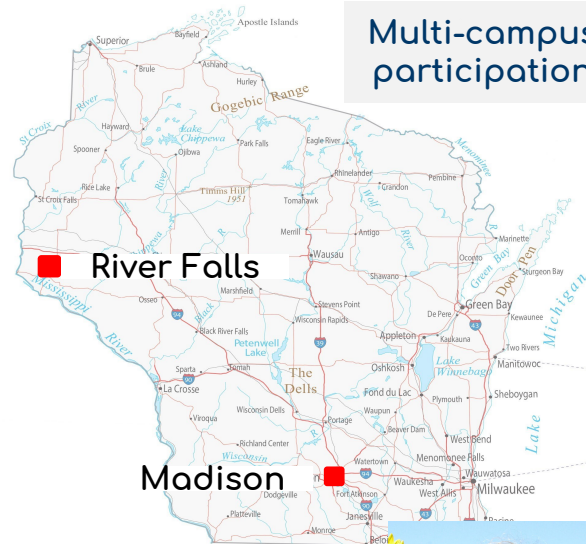


# Fall 2020 Dairy Innovation Challenge

## In partnership with the Dairy Innovation Hub at UW Madison:

- Identified the pain points of Wisconsin's top industry
- Developed a challenge, with framework and tools for execution
- Facilitated the Challenge alongside the Dairy Innovation Hub
- Showcase on Nov 17, 2020
  - 7 competing teams
  - Over \$10,000 in cash prizes
  - Projects ranging from bioengineering yogurt to gamification of milk consumption and utilizing IOT on farms to monitor calves

Multi-campus participation



LACIE SCHROEDER  
Project Manager,  
Hyper Innovation



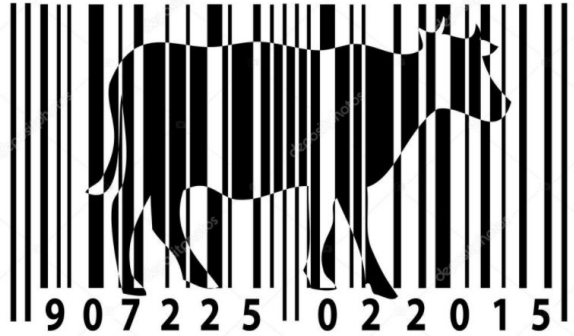
Best of Show:  
Extending the  
Shelf-Life of  
Wisconsin Dairy  
Products



Extending the  
Shelf-Life of Yogurt  
Using Natural  
BioActives

By Varsha Swaminathan

Best of Show:  
Encouraging Dairy  
Consumption by  
Wisconsin Students



Encouraging Dairy  
Consumption  
Through Online  
Gaming

By Ash Maheshwari  
Rleigh Powers  
Taylor Rauenhorst

Best of Show:  
Utilizing IOT and  
Robotics to Enhance  
Farm Operations

Internal Composition of Final Product



- Blue Lines- Respiration Detection Technology
- Black Lines- Temperature Detection Technology

Finished Product Sketch

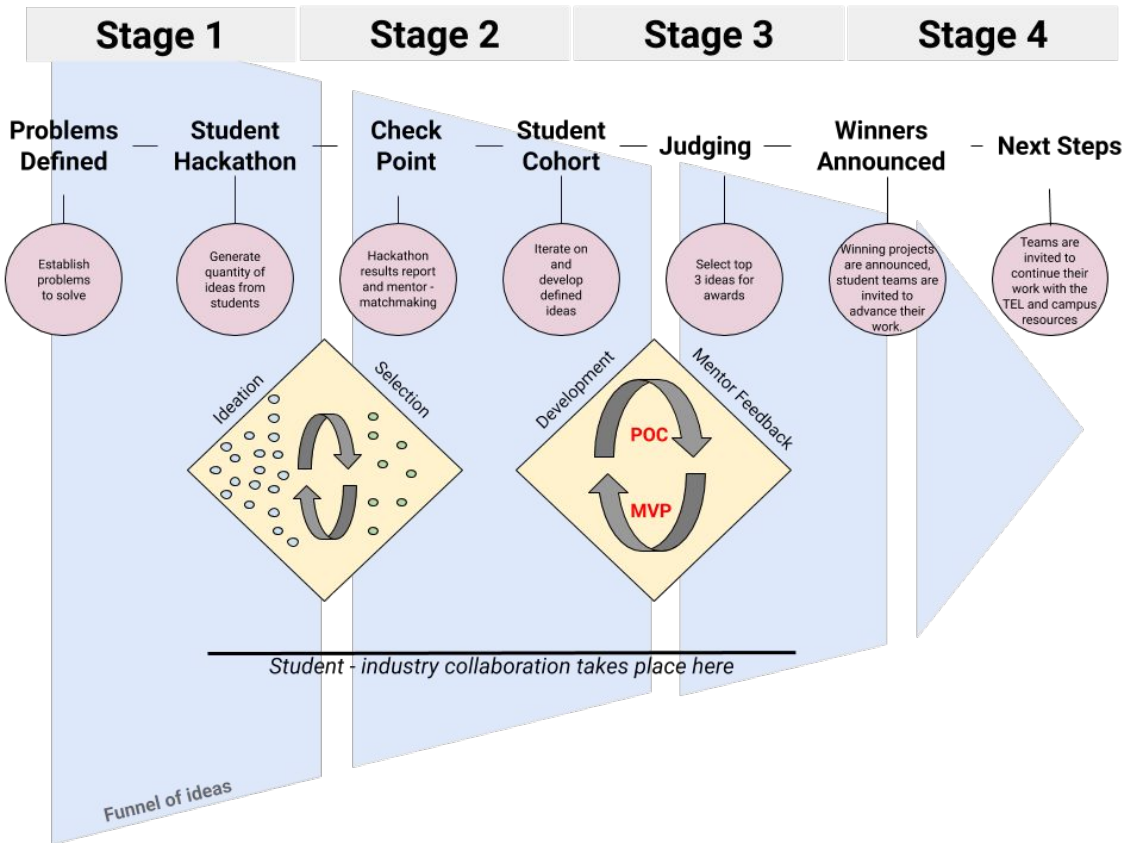


Calf Therm  
(A Non-Invasive Septum  
Ring)

By Ash Maheshwari  
Rleigh Powers  
Taylor Rauenhorst



# The Challenge Framework



- Students opt-in to participate in the hackathon
- Most promising ideas are encouraged to join the student cohort
- Student teams are formed for the cohort, and paired with an industry mentor
- Finished projects are judged and voted on by a panel of industry professionals
- Winners are invited to continue their work with the Tech Exploration Lab and other campus resources



## Dialogue and QA:

- Questions about Challenges and our execution strategy
- Discuss potential Challenges for different industries
- Give input on continued work in Spring





# Hyper Innovation Digital Health Test Bed

The Digital Health Test Bed more efficiently develops and tests new technology solutions with unique technology, data, and expert resources.

## Customizable options for:

- AWS Cloud Computing
- De-Identified Data Sets
- Simulated EHR Environments
- AI-Driven Insights



JOE BASHTA  
Strategic  
Director, Hyper  
Innovation



# Hyper Innovation Digital Health Test Bed

We ingest raw data in any format as a single file upload or as a connected database.

The screenshot displays the user interface of the Hyper Innovation Digital Health Test Bed. On the left is a teal sidebar with a user profile for 'Eric Sun' and a menu including 'Data Warehouse', 'Import Data', 'Import File', 'Connect Database', 'All Tools', 'Predictions', 'Data Mining', 'Neural Network', 'NPL', and 'Dashboard'. The main area is titled 'Data Warehouse' and features a grid of data source icons: PostgreSQL, CSV (highlighted with a blue box and the number '3'), EXCEL, JSON, ORACLE, MICROSOFT SQL SERVER, MONGODB, HDFS, CASSANDRA, and SPARK. Below this grid is an 'API' icon. At the bottom, three data sets are listed: 'Casino' (Imported on Dec. 13, 2018, 7:25, 8.7M), 'Crypto\_Price' (Imported on Dec. 18, 2018, 4:29, 8.7M), and 'SportAnalytics' (Imported on Dec. 18, 2018, 4:30, 8.7M). Each entry has an 'OPEN' button. A search bar and navigation icons are located in the top right corner.



# Hyper Innovation Digital Health Test Bed

We have customized dashboards and features as required.  
Example: Viewing an EHR.

The screenshot displays a web-based EHR interface within a Windows Internet Explorer browser window. The browser address bar shows the URL: `http://wkrnmbapp01/epicWeb/common/epic_main.asp?menu=chartreview&sub=snapshot`. The interface includes a sidebar menu on the left with options like 'Admin', 'MAIN MENU', 'Home', 'Data Analysis', 'Browse Data', 'Dashboard', 'New Connection', and 'Recent Connection'. The main content area is titled 'Atrius Health - Windows Internet Explorer' and shows a 'Patient Snapshot' for a patient named 'Xbaldidocious, Fuzzy\*'. The patient's demographic information includes Age 5 yrs, Sex M, DOB 1/1/06, and MRN 70450825. The 'Problem List' on the left includes conditions like DM (diabetes mellitus), Down's syndrome, and ENROLLED - COPD PROG (NOT DX, FOR PROB LIST). The 'Allergies/Contraindications' section on the right lists allergies such as PENICILLINS (PENICILLINS) Hives, NUTS (TREE NUTS), CATS (CATS), NSAIDS, and AMOXICIL-CLARITHROMY-LAMISOPRAZ. A central graphic of a doctor is overlaid with the text 'Clinician validation and review'. The 'Medication List' on the right shows various medications including untyML (50-50) Subcutaneous Suspension, Insulin NPH & Regular Human (HUMULIN 50/50) 100, and Fluoxetine (PROZAC) 10 mg Oral Capsule. The 'Health Maintenance' section at the bottom left shows a list of screenings like HEARING SCREENING (4 YEARS), (HEDIS) HEPATITIS B (0-18 YEARS), and (HEDIS) POLIOMYELITIS, all marked as 'Completed'.

**Admin** **Database** **DASHBOARD** **Logout**

**MAIN MENU**

- Home
- Data Analysis
- Browse Data
- Dashboard
- New Connection
- Recent Connection
- Notifications

**Atrius Health - Windows Internet Explorer**

http://wkrnmbapp01/epicWeb/common/epic\_main.asp?menu=chartreview&sub=snapshot

**Epic** **Clinicals**

Select an encounter: No encounter selected

**Xbaldidocious, Fuzzy\*** Age 5 yrs Sex M DOB 1/1/06 MRN 70450825 Allergies Penicillins, Nuts, Cats, H\* TEST PA1\* MILLER, JAMI\* LOC CAMBRIDGE MyChart On

**Patient Snapshot**

**Problem List**

- DM (diabetes mellitus)
- bhn
- Down's syndrome
- Adjustment disorder with depressed mood
- ENROLLED - COPD PROG (NOT DX, FOR PROB LIST)
- ANTICOAGULANT LONG-TERM USE
- ANTERIOR CHAMBER IMPLANTATION CYSTS
- GENETIC SUSCEPTIBILITY TO HEMACHROMOTOSI
- GENETIC SUSCEPTIBILITY TO HEMACHROMOTOSI
- Family planning, emergency contraceptive counselin
- Rheumatoid arthritis
- Paronychia or onychia of finger
- Down's syndrome
- UNSPECIFIED BACKACHE - lower back
- ENROLLED - ANTICOAGULATION SVC (NOT DX, FOR PROB LIST ONLY)
- GENETIC SUSCEPTIBILITY TO HEMACHROMOTOSIS

**Allergies/Contraindications**

- PENICILLINS (PENICILLINS) Hives
- NUTS (TREE NUTS)
- CATS (CATS)
- NSAIDS Anaphylactoid reaction
- AMOXICIL-CLARITHROMY-LAMISOPRAZ
- SULFADIAZINE Hives

**Clinician validation and review**

**Medication List**

- untyML (50-50) Subcutaneous Suspension 100 None Entered
- Insulin NPH & Regular Human (HUMULIN 50/50) 100 Test
- untyML (50-50) Subcutaneous Suspension
- Insulin NPH & Regular Human (HUMULIN 50/50) 100 1 ml
- untyML (50-50) Subcutaneous Suspension
- Insulin Glargine (LANTUS) 100 untyML Subcutaneous Solution 1 vial
- Fluocortone 0.025 % Topical Cream 15 tubes
- Clonazepam (KLONOPIN) 0.125 mg Oral Tablet, Rapid Dissolve testing refreshable
- Cetirizine (ZYRTEC) 1 mg/mL Oral Solution testing
- Acetaminophen (CHILDREN'S TYLENOL MELTAWAYS) 80 mg Oral Tablet, Rapid Dissolve prn for pain
- Bupropion HCl 300 mg Oral Tablet Sustained Release 24 hr testing DO NOT FILL
- Bupropion HCl XL 300 mg Oral Tablet Sustained Release 24 hr TESTING DO NOT FILL - XL Designation
- Lisinopril 40 mg Oral Tablet Take 1 tablet daily
- Lorazepam 0.5 mg Oral Tablet testing only do not fill
- Fluoxetine (PROZAC) 10 mg Oral Capsule 1 capsule daily; do not stop without consulting clinician
- Lisinopril 20 mg Oral Tablet permy, c
- Simvastatin 10 mg Oral Tablet Take 1 tablet every evening for cholesterol
- Albuterol Sulfate (PROAIR HFA) 90 mcg/Actuation Inhalation Take 1-2 puffs every 4 to 6 hours as needed
- HFA Aerosol Inhaler
- Epinephrine (EPIPEN) 0.3 mg/0.3 mL Intramuscular Pen EpiPen is chosen not twin

**Health Maintenance**

- HEARING SCREENING (4 YEARS) Completed
- (HEDIS) HEPATITIS B (0-18 YEARS) Completed
- (HEDIS) DIPHTHERIA-TETANUS-PERTUSSIS Completed
- (HEDIS) POLIOMYELITIS Completed
- (HEDIS) MEASLES/MUMPS/RUBELLA (1-5 YEARS) Completed
- (HEDIS) VARICELLA (1-18 YRS) Completed

**Patient Lists**

- ASTHMA BTRPEDS (552)
- TEST (1616)
- TEST (183)
- TEST (3841)
- TEST (92)

# Hyper Innovation Digital Health Test Bed

We have customized dashboards and features as required.  
Example: Plugging in a Remote Patient Monitoring Dashboard.



# Accelerating Startups with the Digital Health Test Bed

## Use Case: Accessing Large Data Sets for Product/Solution Testing

**Opportunity:** Pythonic.AI requires large amounts of data to train algorithms.

### Questions to be Answered:

How can we locate, secure and transfer data that meets their requirements?

What unique requirements do they have and what challenges does that pose?



DEVIN KESTELL  
UW-Graduate  
Student  
Statistics



# Accelerating Startups with the Digital Health Test Bed: Pythonic.AI

## Process:

1. Understand what their data needs are?
  - Quantity and fast access
  - # of observations, granularity, data type
  - Where have they looked and what do they already have?
2. Locate and pull data sources.
  - Road blocks: permissions, costs and approvals.
  - Sources: WHA, I2B2, research journals, NGOs.
3. Format for the client and potentially run analysis
  - Clean, merge or unmerge, crosswalk.

## Next steps:

Work to find more text-based data sources.

Hospital Readmission Reductions ☆ ☁

File Edit View Insert Format Data Tools Add-ons Help [Last edit was on October 29](#) Database Example

100% \$ % .0 .00 123 Arial 10 B I S A

Facility Name											
A	B	C	D	E	F	G	H	I	J	K	L
Facility Name	Facility ID	State	Measure Name	Number of Disc	Footnote	Excess Readmis	Predicted Readr	Expected Readn	Number of Read	Start Date	End Date
SOUTHEAST AI	10001	AL	READM-30-HIP-	301		1.1787	5.5863	4.7392	20	07/01/2015	06/30/20
SOUTHEAST AI	10001	AL	READM-30-CAE	279		1.2361	14.5943	11.8065	46	07/01/2015	06/30/20
SOUTHEAST AI	10001	AL	READM-30-AMI	742		1.0446	15.2935	14.6404	116	07/01/2015	06/30/20
SOUTHEAST AI	10001	AL	READM-30-HF-I	1114		1.0453	22.3772	21.4082	252	07/01/2015	06/30/20



# Dialogue and QA:

- Give input on features and uses for customizing a Test Bed
- Discuss potential use cases and applications for different industries
- Give input on focus for continued work in Spring





# Playspace for Shared Learning, Development, and Testing



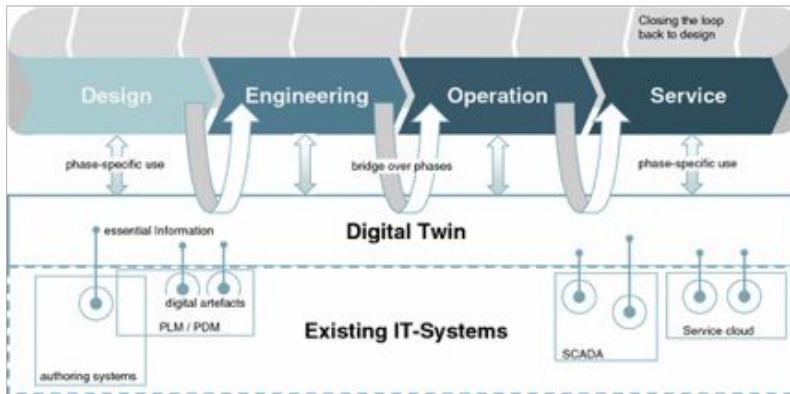


# Playspace for Shared Learning, Development, and Testing



## Virtual Sandbox:

- Simulate parts (or all) of a PoC or R&D using ML
- Use “Real” Data with Zero-Risk in a Virtual Environment
- Set Measurable Targets/Metrics
- Run Unlimited “What-If” Scenarios
- Test Hypotheses
- Discover Unknowns & Potential “Gotcha’s”



# Playspace for Shared Learning, Development, and Testing



## Benefits:

- Prove ROI (business case)
- Eliminate PoC / Pilot Budget Blowouts
- Data-Driven Results with Measurable Outcomes
- Actionable Insights with Greater Accuracy
- Translate Small-Scale Insights to Full-Scale Testing



# Playspace for Shared Learning, Development, and Testing: Injury Risk Prediction with NFL Data

## Scope:

We will look to analyze the nine player positions risk of injury on both natural and synthetic turf, injuries will be identified into four categories: ankle, foot, knee, toes.

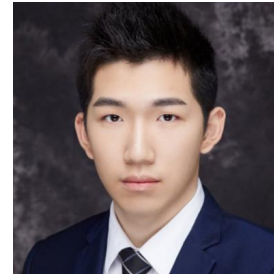
## Objective:

Identify whether one specific player position is more vulnerable to injury on synthetic or natural turf and examine factors that may contribute to injury.

## Outcome:

This a baseline model only as the sample size is small (100 reported injuries)

- Identify which of the nine player positions is most likely to sustain injury on synthetic or natural turf
  - Identify with 60-75% accuracy
- Identify which injury type each player position is most susceptible to on both synthetic or natural turf
  - Identify with 60-75% accuracy



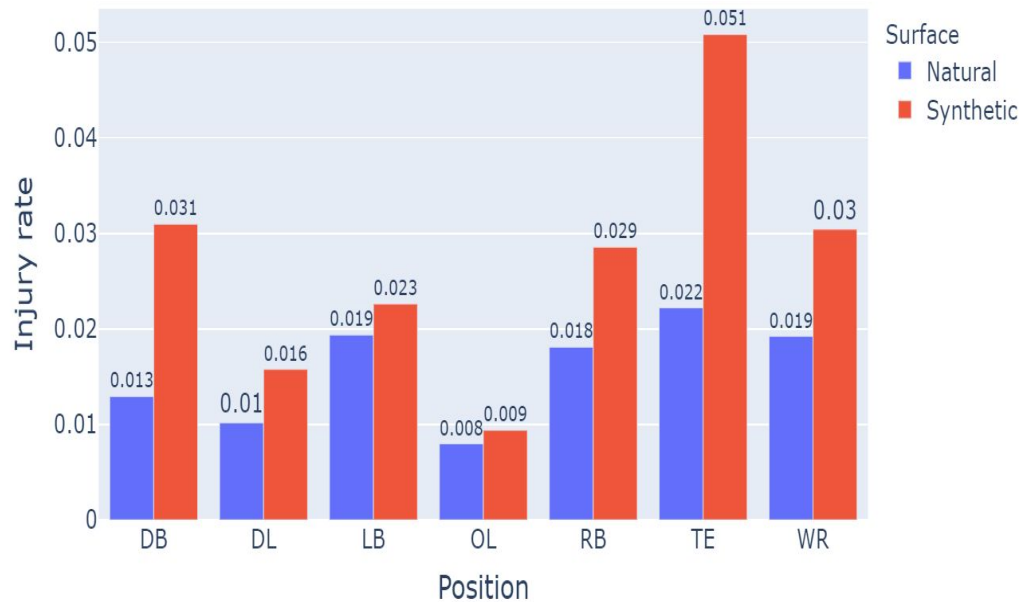
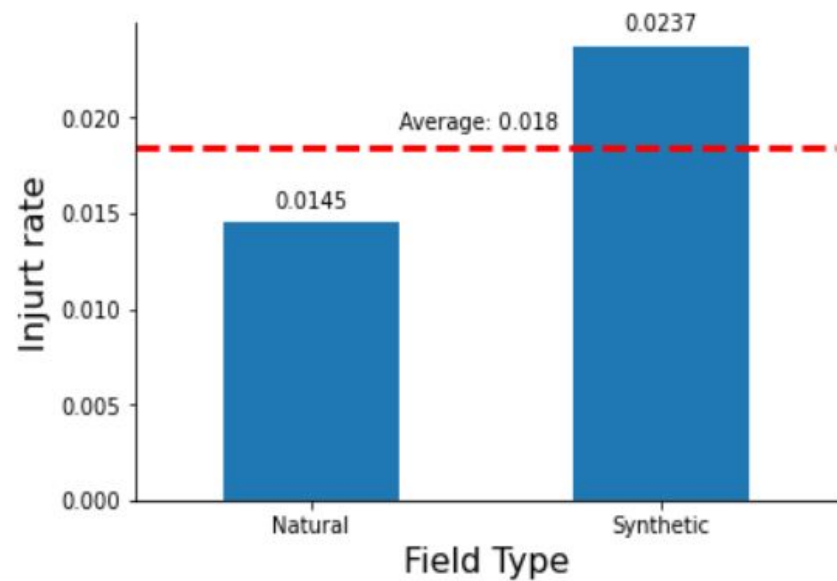
HAOMING CHEN  
Senior  
Computer  
Science



ANDREW WALLNER  
Senior  
Kinesiology



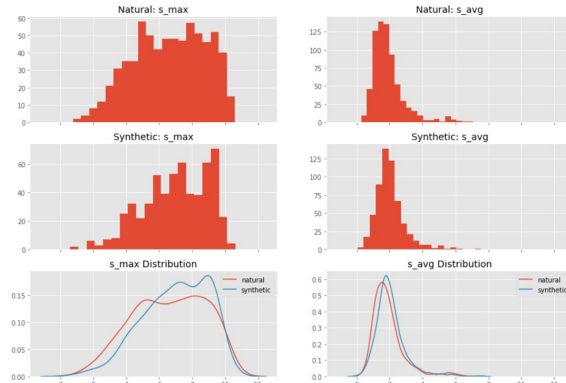
# Frequency of Injury



# Causes for Differences in Injury

## Movement (Speed):

DB



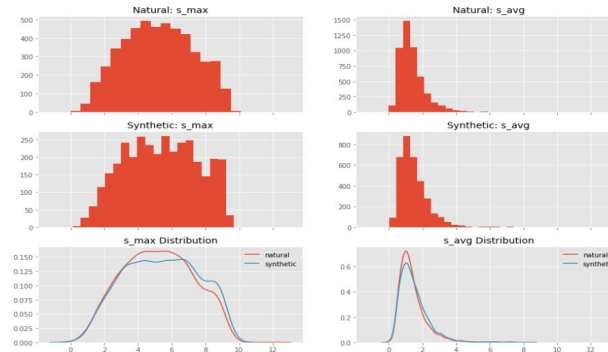
Observation for DB:

- A higher speed spike for synthetic turf
- Similar distribution of average speed on synthetic and natural turf

Hypothesis:

Higher speeds on synthetic turf could lead to an elevated risk of injury.

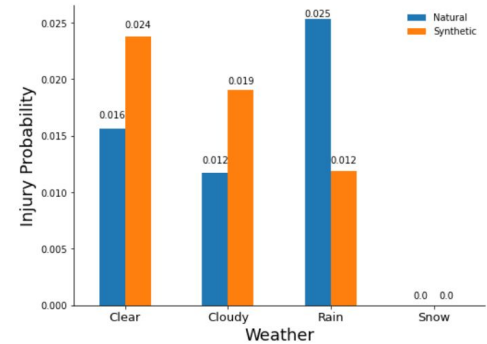
LB



Observation for LB:

- A higher speed spike for synthetic turf
- Similar distribution of average speed on synthetic and natural turf

## Weather:



Observation (Highest Probability of Injury):

- Natural turf: Rainy weather
- Synthetic turf: Sunny weather

Hypothesis:

The natural turf could be more slippery when it is raining?



# Next Steps

- Keep exploring the impact of surface on player's movement pattern (Speed, acceleration, orientation, distance)
- Use machine learning models to predict the injury given the temperatures, field type, stadium type, player movement, player positions, etc.
- Identify the factors most related to the injury by examining feature importance





# Dialogue and QA:

- Give input on ways to create shared learning opportunities, development and testing
- Discuss potential use cases and applications for different industries.
- Give input on focus for continued work in Spring.



# Testing New Business Models and Generating New Value

## Use Case: Using AI to Reduce Readmissions in Healthcare

**Opportunity:** WHA data sets on  
readmissions.

### Questions to be Answered:

- Can we predict readmission with  
basic demographic data?
- Does adding easily accessible chart  
data increase accuracy?



DEVIN KESTELL  
UW-Graduate  
Student  
Statistics



BEN CHIU  
Sophomore  
Computer  
Science



MATTHEW KRUEPKE  
Sophomore  
Marketing



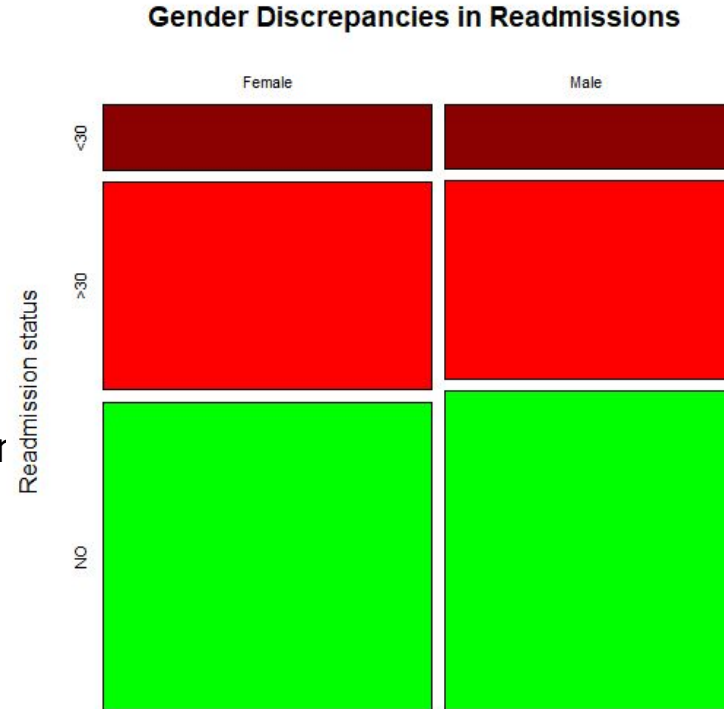
# How can we predict readmissions?

- Readmissions pose several problems for healthcare.
  - Worse health outcomes, increased costs, scheduling roadblocks.
  - A general indicator of a break down in care.
- Can we predict readmission with basic demographic data?
- Does adding easily accessible chart data increase accuracy?



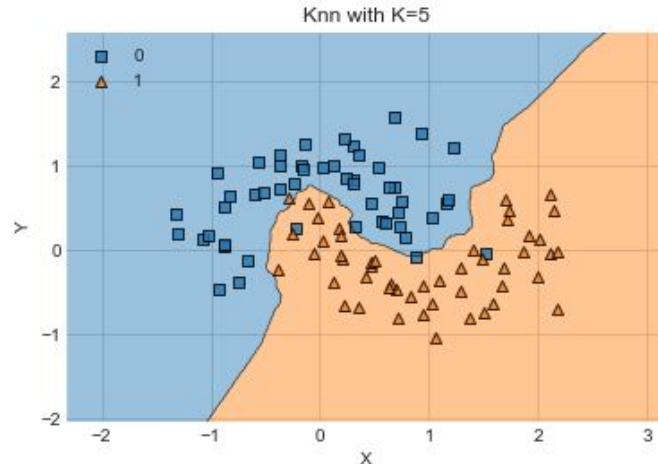
# Using AI to Reduce Readmissions in Healthcare

- Currently using regression. Accuracy of 44%.
- Pro's: Easy to run, compute and interpret. Simple data requirements
- Con's: Not as accurate as we'd like
- This method allows you to project readmission rates by population.

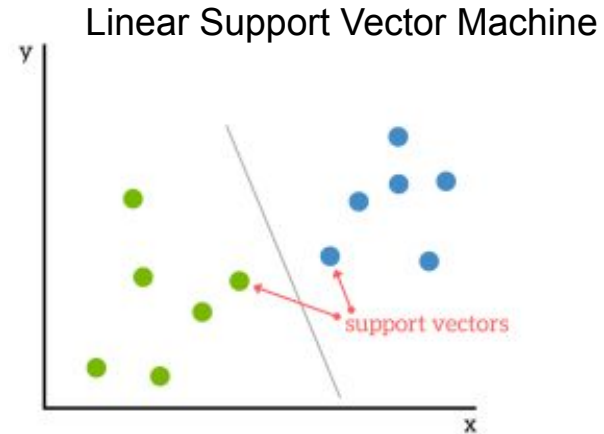


# Next Steps

- Utilize machine learning algorithms to increase accuracy at the expense of interpretability.
- Investigate which drugs predict readmission rates.



Source: Towards Data Science



Source: KDnuggets





# Dialogue and QA:

- Give input on ways to create new value and shared learning.
- Discuss potential use cases and applications for different industries.
- Give input on focus for continued work in Spring.



# Ways to Advance New Use Cases and Develop Talent

## Use Case: Virtual Reality

- Mentor multi-disciplinary students on industry projects or student-driven entrepreneurial ventures
- Sponsor projects based on identified opportunities for shared learning and talent development



KEVIN PONTO  
Professor  
UW-Madison



TYLER WAITE  
Co-Founder,  
COO  
Holos



# Dialogue and QA:

- Discuss ways to build a talent pipeline through collaboration with the Tech Exploration Lab.
- Discuss ways to pressure test new tech and develop new use cases.
- Give input on focus for continued work in Spring.



Wrap up

# QA AND NEXT STEPS

- Contact [sandra@hyperinnovation.com](mailto:sandra@hyperinnovation.com) by December 23rd to schedule a call/meeting to discuss a tech experiment, define a project or challenge, or sponsor an event or student activity relevant to you and your organization.
- Save-the-date for the Spring Kickoff on February 8 and Showcase on April 22

[hyperinnovation.com/tech-exploration-lab/](https://hyperinnovation.com/tech-exploration-lab/)

