Plenary Talk: Data Science and Management as a driving force for the Commonwealth of Pennsylvania Industrial Hemp Engine Initiative

Presenter: Prof. Dr. Les Sztandera, Thomas Jefferson University
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Part 1: Terrene Hemp Report

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Professor   *Industry Expert, Textile Engineer + Strategist*

Thomas Jefferson University   *Chief Innovation + Sustainability Officer, Hemp Black*

Part 2: An Insight into the NSF Supported Research

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Computational Social Science Lab, Wharton School, University of Pennsylvania

Thomas Jefferson University

Prof. Dr. Les Sztandera

Prof. Dr. Les Sztandera is Tenured Full Professor of Computer Science at Thomas Jefferson University in Philadelphia, Pennsylvania. He specializes in Artificial Intelligence, Data Mining and Knowledge Discovery, and Data Analytics. For over 30 years now, since 1993, consecutively appointed at full time professorial positions, Dr. Sztandera has successfully carried out research grants as PI, co-PI, or Senior Investigator, and subsequently published the results in peer-reviewed journals on: image processing for myocardial perfusion scans to investigate the blood supply to the heart (American Heart Association), analyzing data for textiles (LEHP), using Genetic Algorithms in molecular design of novel fibers (US Department of Commerce / National Textile Center), utilizing Artificial Intelligence and Computational Chemistry in undergraduate science education (National Science Foundation), as well as private industry grants on ethnographic and survey research and secondary data analysis in preventing cognitive decline in older adults, as well as patients suffering with dementia. The current Data Science and Management Commonwealth of Pennsylvania Industrial Hemp Engine initiative builds logically on his prior work as academic researcher and professor.

- *Partnering with* Computational Social Science Lab at Wharton School, University of Pennsylvania, our approach is to achieve a holistic view of the entire Hemp ecosystem.

- *Areas of focus*:
    - *Operations, innovation, transportation, inventory levels, production, schedules, diversity, farming, and research.*

Thomas Jefferson University

200+ Graduate & undergraduate programs
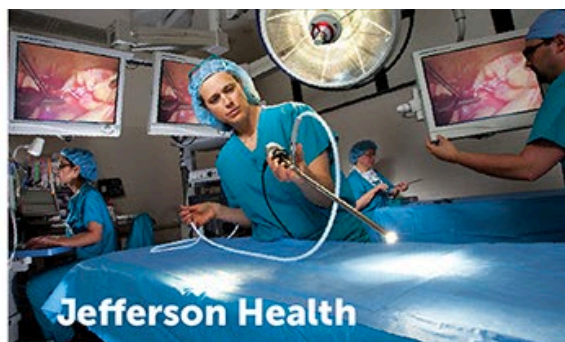
8,200+ Students (full/part time)

76,630 Alumni

17 NCAA Division II teams

Over **$201 million** in sponsored research awards

1,000+ Patents for new drugs, software innovations, medical devices & diagnostic tools

Data is FY22 – updated January 2023

Jefferson Health

4,615 Credentialed physicians (2,141 are employed)
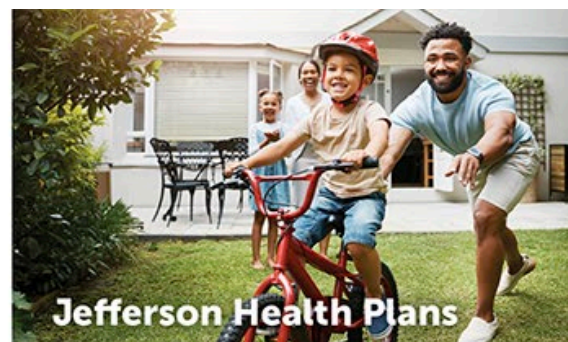
9,300 Nurses (full/part time)

50+ Outpatient and urgent care locations

4 Magnet® designations
- Albert Einstein Medical Center
- Jefferson Abington Hospital
- Jefferson Health – New Jersey
- Thomas Jefferson University Hospitals

5.6 million Outpatient visits

Data is FY22 – updated January 2023

Jefferson Health Plans

394,000 Total members

13,000+ Medicare members

7,900+ CHIP members

373,000+ Medicaid members

750 Employees

35+ Years of service

4★ Out of 5: Centers for Medicare & Medicaid Services star rating for Medicare plan performance and quality

Data updated June 2023

Thomas Jefferson University TerreneApp is for the Environment / Plant / People / Patient

DECGEN-480 Integrative Interdisciplinary Project undergraduate course Spring 2023 semester:

Emma Maddaluna-Graphic Design Communication, 2024
Lucy Chen-Business Management, 2023
Elian Castillo Martinez-Business Marketing, 2023
Sierra Freeman-Business Marketing, 2023
Christina Rodriguez-Fashion Merchandising & Marketing, 2023
Janely Tirado-Textile Product Science, 2025
Zoe Angud-Textile Product Science, 2025
Nzinga-Noni Williams-Textile Product Science, 2024

Guidance and Resource:
Dr. Les Mark Sztandera
Professor, New Product Development
Mark Andrew Sunderland,
Industry Expert/Textile Engineer
Thomas Jefferson University
Alumnus BS/MS

Fast fashion and sports/performance brands, either through material choices, supply chain allocation, or manufacturing processes, impact our planet's carbon footprint. Well-intended or not, "greenwashing" is part of our sustainable or environmental vocabulary. Who or what do we believe? A new industry of certifications, life cycle analysis, Environmental, Social, and Government (ESG) criteria, and green audits are part of the entrepreneurial landscape. How do we separate fact from fiction, science from marketing and branding? Education and information on how buying choices impact our planet is needed.

Society enters an app and AI interactive consumer spaces; coupled with social and environmental consciousness; how can we access trusted information which will allow consumers to make informed, educated decisions impacting people and the planet?

Development of DECGEN-480 app Terrene™ provides a graded standard based on a company's impact reports, sustainability statements, material origin, material health, and social and ethical manufacturing. Other key factors are sourced "carbon warning signs", from verified external sources and cited research. Information and data are organized to give users and consumers' access and understanding in an accessible app platform.

In Terrene™, our data is one component driving our user-friendly app. Educating users with the knowledge to make informed decisions based on their lifestyle or buying habits. Terrene™ provides information and research to present and future consumers on making their own carbon-neutral and socially responsible decisions. Capturing the purchasing attention of 21st-century consumers; Fashion, and Performance brands have access to demographic data for future analysis to match carbon-neutral and socially conscious consumers to past, present, and future purchases.

TerreneTM ability could highlight the best and worst performers, healthy materials, and brands making positive changes for people and our planet. TerreneTM seeks to partner with fashion and performance brands to work with and help identify challenges and opportunities for our health – "People & the Planet".
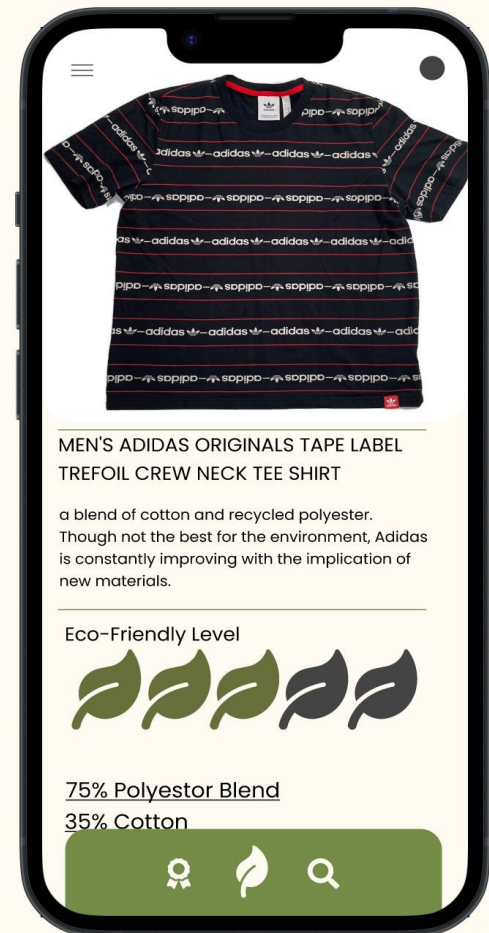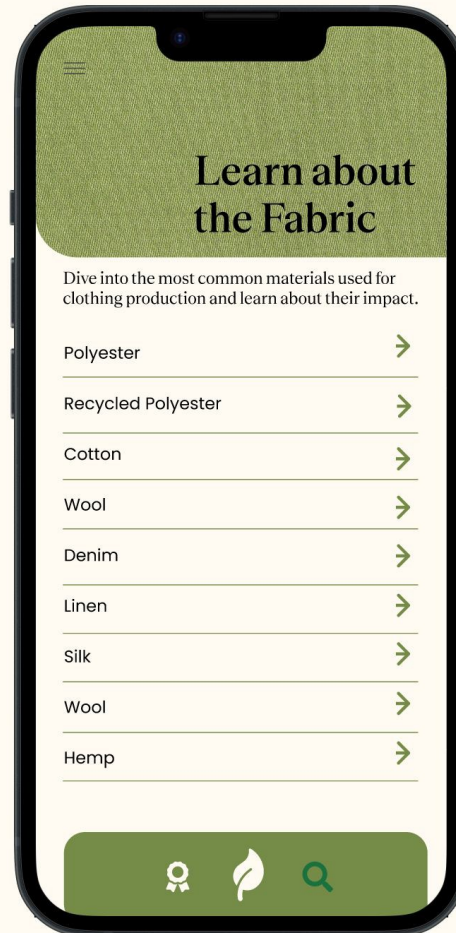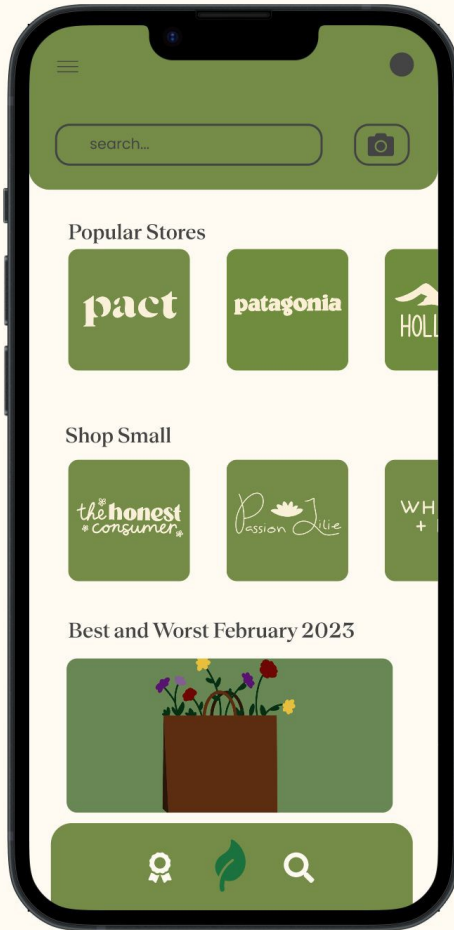
A new era of fabric, textile, fashion, and material certification is pushing brands to change, realign, and discover new technologies and sourcing strategies for the betterment of our planet, ourselves, and the impact on the environment.

Is this a call to action we all can agree on? How do the consumers respond? Who will lean on the supply chain to change / disrupt? What is the investment?

Challenges and opportunities ahead. New companies and technologies are born as part of this call to action.

Screen 1 — Home:

search...

Popular Stores

pact | patagonia | HOLL

Shop Small

the honest consumer | Passion Lilie | WH +

Best and Worst February 2023

Screen 2 — Learn about the Fabric:

Learn about the Fabric

Dive into the most common materials used for clothing production and learn about their impact.

Polyester	→
Recycled Polyester	→
Cotton	→
Wool	→
Denim	→
Linen	→
Silk	→
Wool	→
Hemp	→

Screen 3 — Product:

MEN'S ADIDAS ORIGINALS TAPE LABEL TREFOIL CREW NECK TEE SHIRT

a blend of cotton and recycled polyester. Though not the best for the environment, Adidas is constantly improving with the implication of new materials.

Eco-Friendly Level

75% Polyestor Blend
35% Cotton

Thomas Jefferson University

Jefferson.edu

HOME OF SIDNEY KIMMEL MEDICAL COLLEGE

Data Science and Management as a driving force for the Commonwealth of Pennsylvania Industrial Hemp Engine Initiative

An Insight into the NSF Supported Research

Jeanne Ruane, PhD

Introduction

•Overview of the importance of Data Science in modern industries.

•Brief on how the power of data can revolutionize the Hemp industry in Pennsylvania

Data is generated every second, creating detailed data regarding farming, plant genetics, customers, suppliers, business-to-business activities, climate data, geolocation data, among others. Such data may include transactions, surveys as well as prices, and weather patterns. Using real-world applications from various industries, the goal is to bring together several types of data sources and techniques to create a data-driven strategy and data-driven decision making. The techniques will involve formulating research questions, developing relevant hypotheses, analyzing data and, most importantly, creating predictive and network models, drawing inferences and telling narratives, with a view of yielding actionable results. Designing a data science strategy for the NSF PA (National Science Foundation Pennsylvania) Industrial Hemp engine involves harnessing large datasets to derive actionable insights that can shape the future of hemp in Pennsylvania.

Grants and Collaborations

• Discussion of the NSF grant awarded to Pennsylvania State University.

• Highlighting the collaborative efforts led by University of Pennsylvania and Thomas Jefferson University.

The Power of Data Science

- •Definition of Data Science and its significance.

- •Benefits of data analysis to uncover hidden relationships and make predictions.

- •Emphasis on data-driven decision-making.

- Large and complex data sets now driven early every aspect of science and discovery. Scholars from virtually every academic field and discipline are using data to advance the frontiers of knowledge in ways never before thought possible.

- The solution is to follow a data strategy and create procedural playbook that allows for balance of risks and opportunities to pave strategic directions, new markets, business-to-business solutions, and growth strategies using data science, analytics ,artificial intelligence, and computer science.

Development Phase

•Discussion of the Data Science committee's role and key points of the committee's plan:

1   Types of data ingested.

2   Role of Machine Learning and AI in the process and the Data Science committee's role.

3   Role of Machine Learning and AI in the process.

BUILDING A ROBUST DATA INFRASTRUCTURE

Our Approach

Robust Data Infrastructure

Importance of a solid data foundation.

Discuss the development of data pipelines:

Data collection, processing, and matching systems.

Predictive Modeling and Future Forecasting

Our Vision

•Introduction to the predictive models we will build.

•The role these models play in forecasting the future development of the Hemp Industry.

Comprehensive Insights

- Our approach is to achieve a holistic view of the entire Hemp ecosystem.

- Areas of focus:

  - Operations, innovation, transportation, inventory levels, production schedules, diversity, farming, and research.

Development Phase

The Role of the Pennsylvania Industrial Hemp Engine's Data Science Committee.

DEVELOPMENT OF DATA INFRASTRUCTURE.

- To guide infrastructure design and understand the current state of hemp cultivation, market status, and educational efforts.
- help to forecast future hemp yields, market demands, and potential challenges.
- Establish a feedback loop where data collected from each stage is used to improve processes, products, and education programs continuously.

TYPES OF DATA INGESTED

- Agribusiness, Farmer Outreach and Policy
- Use Inspired Research and Development
- Translations of Innovation to Industry
- Innovation Leadership and Investment
- Partner Development & Stakeholder Engagement
- Workforce Education and Participation

ROLE OF MACHINE LEARNING AND AI IN THE PROCESS

- Advanced analytics, powered by Artificial Intelligence and Data Science, are used to optimize hemp cultivation by predicting growth patterns, understanding market trends, and ensuring efficient supply chain management.
- Encourage cross-functional collaboration among researchers, cultivators, manufacturers, and educators based on data-driven insights.

Wharton

Outcomes and Benefits

The PA Industrial Hemp Engine has an auspicious vision. Following are three components of this vision.

•Our vision of an integrated industrial ecosystem.

Discussion of how these insights guide infrastructure design.

What a successful ecosystem will encapture?

ACKNOWLEDGEMENTS AND QUESTIONS

Thanks to NSF and all collaborative institutions.