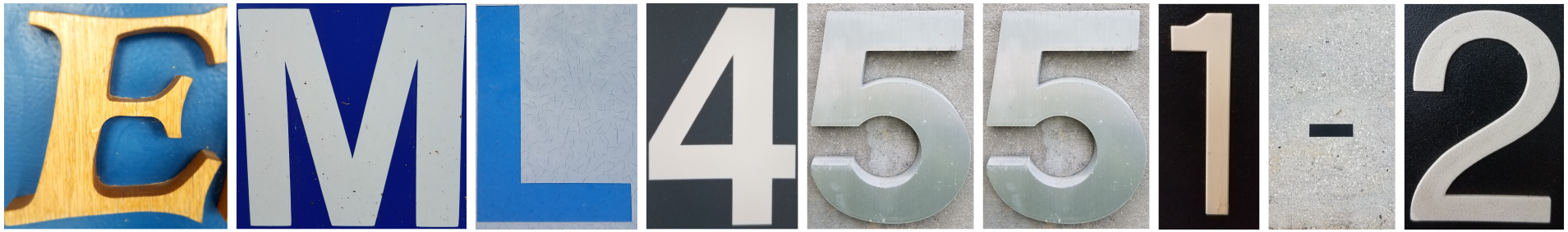


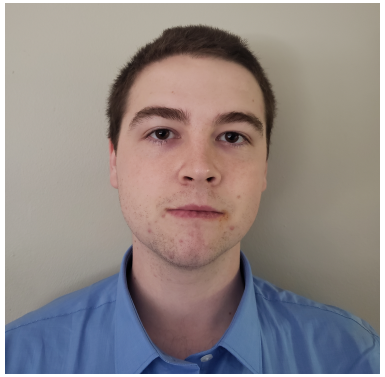
Energy Demand Reduction for FSU's Central Utility Plant

Group members: Edgardo Cordero, Alec Schoengrund, Steven Decker, Mira Meyers, Keaton Zargham, and Juan Villalobos

Team Introductions

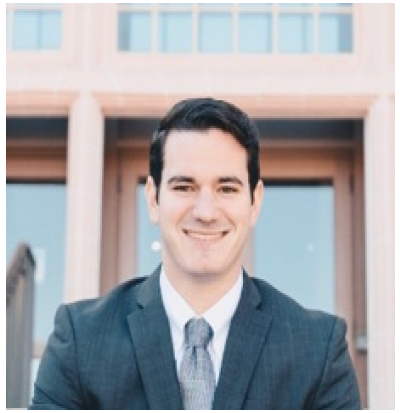
Edgardo Cordero
Project Manager

Steven Decker
HVAC Engineer



Alec Schoengrund
Mechanical Design Engineer

Mira Meyers
Quality Control Engineer



Keaton Zargham
Data Analyst

Juan Villalobos
Energy Auditor

Sponsor and Mentor

Cameron Griffith, Solutions Advisor
LEED AP, CEM, CDSM

Dr. Juan Ordonez, Professor
Thermodynamic Optimization of
Advanced Energy Systems

Objective

To research, study, evaluate and propose a project that reduces the CUP facility's Electric Utility bill by reducing peak demand and/or the overall electric consumption to generate a financial payback to FSU.

Project Background

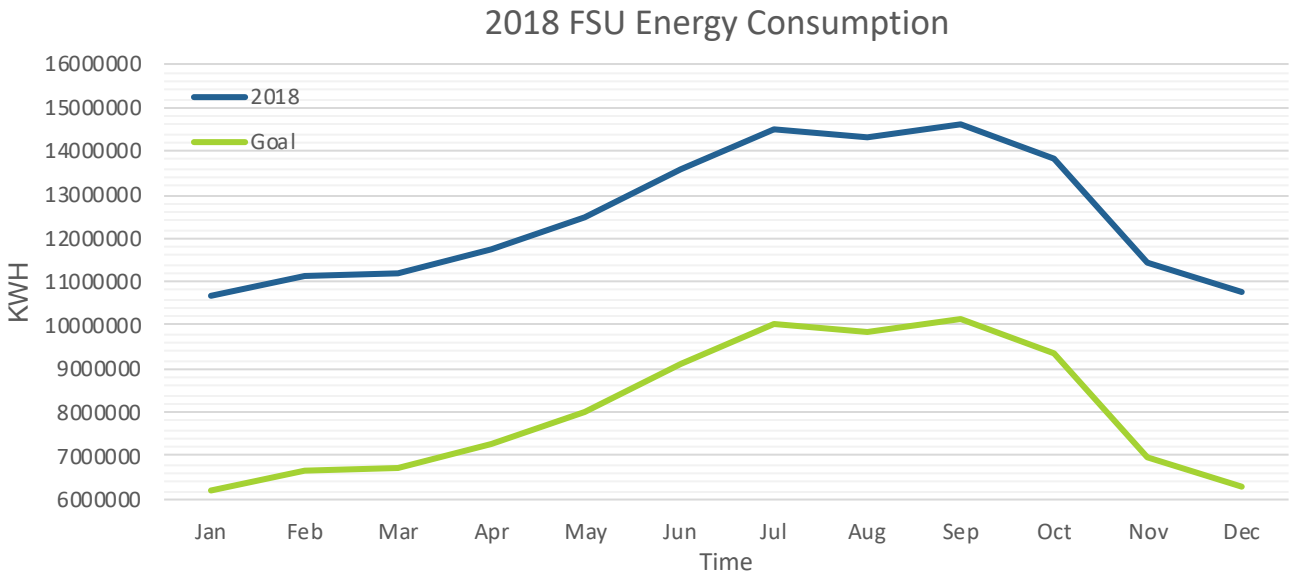
Large scale operations such as Florida State University spend Millions of dollars on utilities each year.

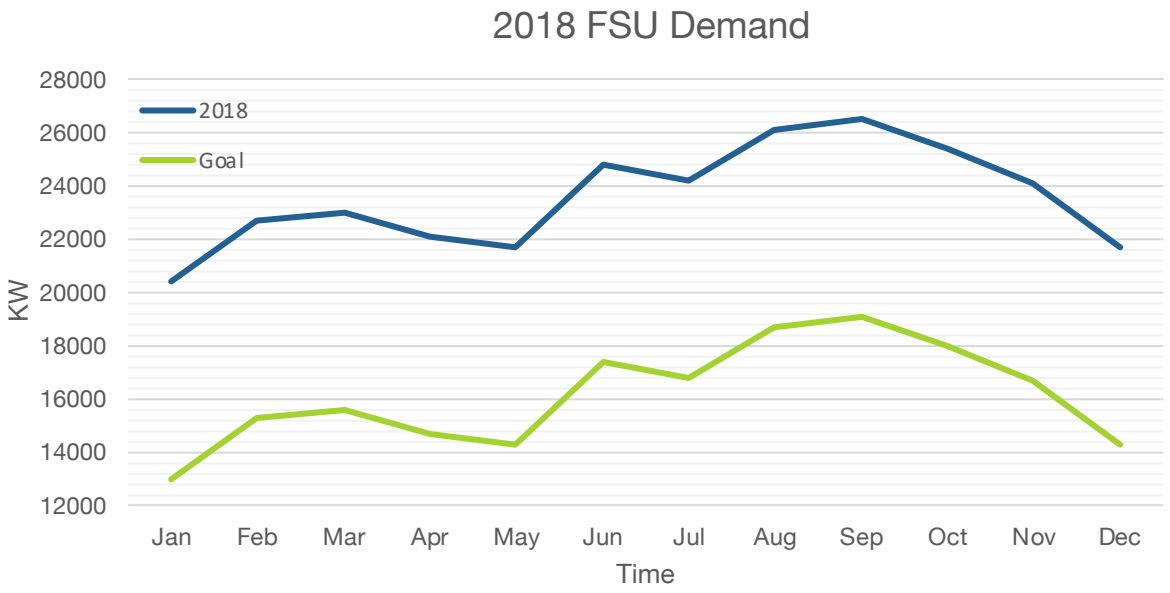
FSU's Current Standing

- FSU spends roughly $22 million per year on utilities.
- Total of 3 boilers
  - Used to either heat campus directly or to supply re-heat for comfort cooling
  - 1 - 2 in use, 1 is redundant
- Total of 21 chillers
  - Campus requires a maximum of 80% of these chillers on the hottest days
  - Minimum of 1 – 2 in winter
  - Recently replaced three 25-year-old chillers with 4 new chillers
  - Recently overhauled 19-year-old chillers

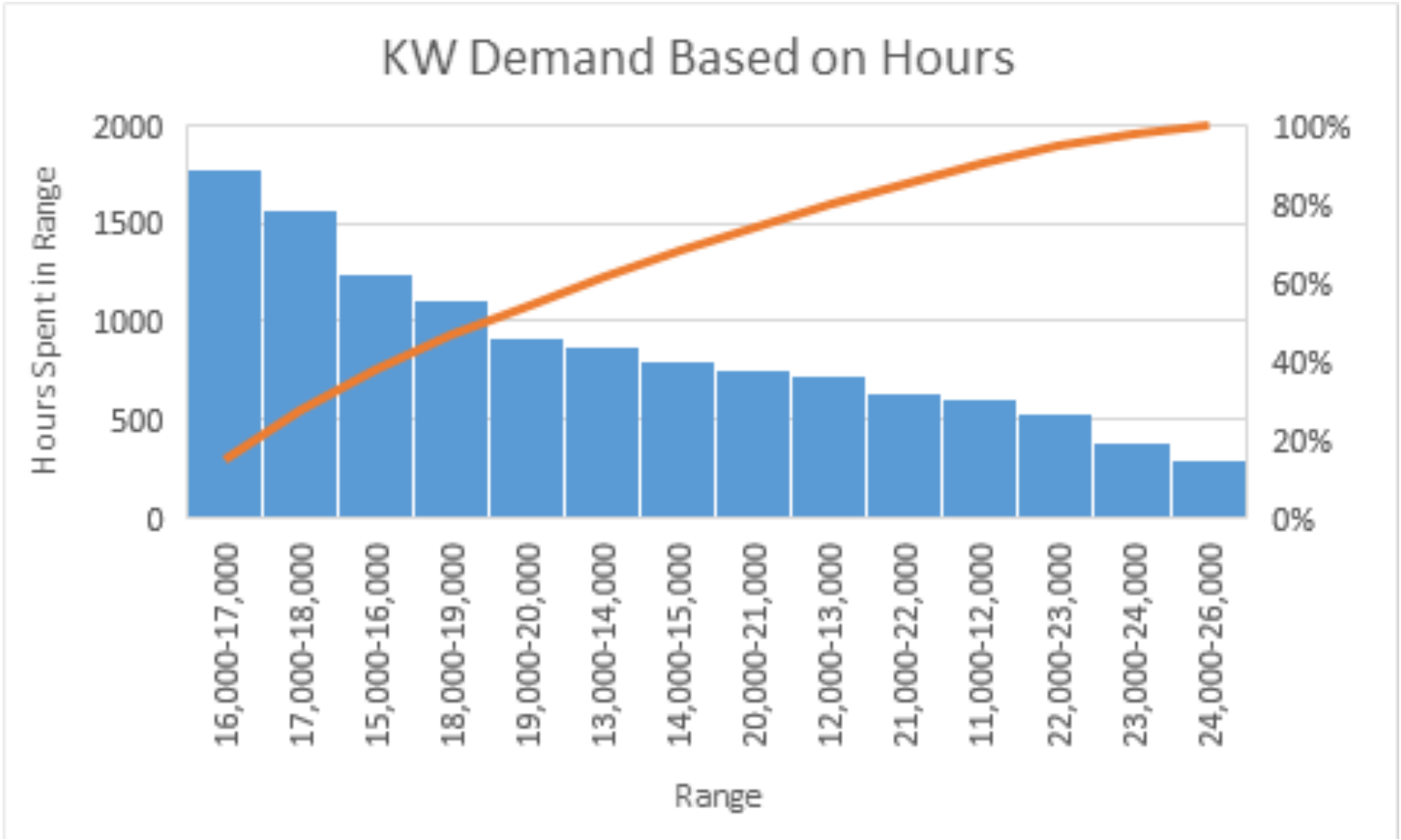
FSU's Central Utility Plant

- Leader of campus energy reduction initiatives.
- Provides utility services to the entire campus.
  - Electricity, steam, chilled water, etc.
  - All Chillers and Boilers connected via grid system
  - Underground 15kV system
- Chiller Plants account for 38% of total campus energy consumption





Cost of Usage	Demand Charge
$ 1,067,788.40	$ 285,600.00
$ 1,114,057.60	$ 317,800.00
$ 1,121,410.20	$ 322,000.00
$ 1,171,963.70	$ 309,400.00
$ 1,250,635.90	$ 303,800.00
$ 1,360,595.70	$ 347,200.00
$ 1,450,772.00	$ 338,800.00
$ 1,430,436.30	$ 365,400.00
$ 1,461,506.40	$ 371,000.00
$ 1,385,367.50	$ 355,600.00
$ 1,146,327.30	$ 337,400.00
$ 1,074,664.60	$ 303,800.00



Demand Range (kW)	Hours in this Range
11,000-12,000	612.8
12,000-13,000	726.9
13,000-14,000	868.9
14,000-15,000	805.5
15,000-16,000	1238.4
16,000-17,000	1782
17,000-18,000	1564.4
18,000-19,000	1111.7
19,000-20,000	917.4
20,000-21,000	754.1
21,000-22,000	637
22,000-23,000	531.7
23,000-24,000	386.8
24,000-26,000	293.3


customer
research
complex
data
assessment
probability
identification
process
risk
plan
analysis
planning
implementation
monitor
risk
performance
retention
impact
management
opportunity
assessment
cost
scope
treatment
plan
strategy
research
resources
important
risk
performance
sales

Key Goals & Assumptions

Reduce annual utility cost by at least 15%

Propose a solution that will have an ROI of 7 - 10 years.

Perform energy audits and data analysis of CUP

Formally present findings to Trane and FSU

No prototyping

No hard budget

No installation preventions

Markets

Primary Markets include **Florida State University** and **TRANE** as the main benefactors for the outcome of this project.

Possible **secondary markets** include medium to large corporate office buildings; other colleges, universities and institutions, government buildings, healthcare facilities, data centers and other commercial real estates.

Customer Needs

Need: Reduce peak load consumption

- Find a way to store energy during non-peak hours that then can be discharged during peak hours.

Need: Propose a merchantable, engineered solution to stakeholders

- Offer a feasible solution that FSU will invest in

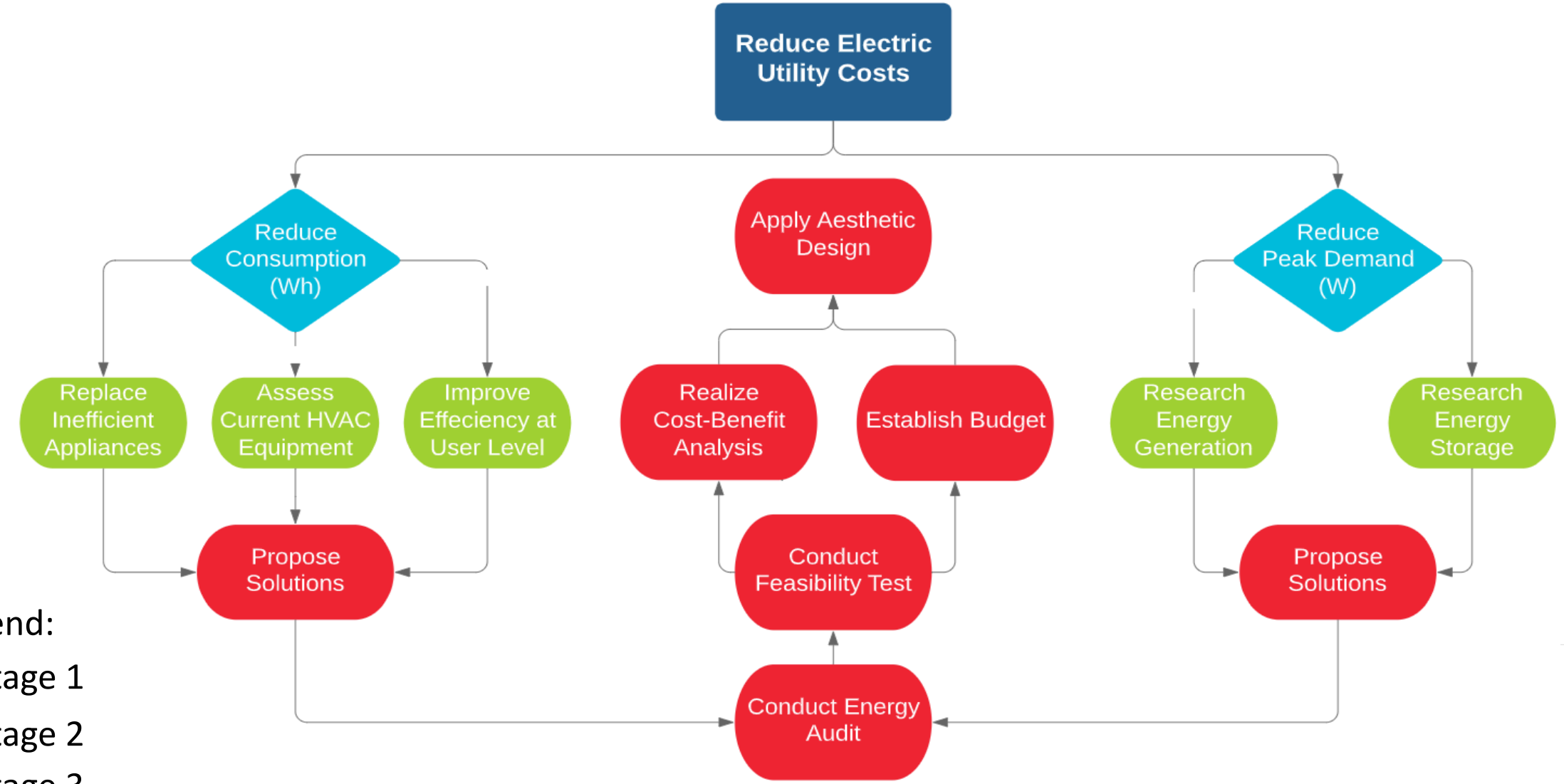
Need: Preferably, proposed solution should have an ROI of 7 years

- TRANE would like to see an ROI within 20 years and FSU typically invests in projects with a ROI of 7 –10 years

Need: The solution must be aesthetically pleasing

- The final product can include an artistic element or structure around it

Functional Decomposition



Legend:

- Stage 1
- Stage 2
- Stage 3

Preliminary Team Concepts

- Utilize solar panels to offset peak demand directly
- Charge Battery packs from grid during off-peak hours to discharge during peak hours
- Utilize thermal storage tanks to offset peak demand
- Introduce Innovative Speed Bump "SmartBump"

Five Most Important Points from this Lecture

1. FSU spends 22 million dollars on utilities each year. Analysis will project viable solutions.
2. The objective of this project is to save money at FSU's central utility plant by reducing the peak demand and/or overall consumption.
3. The team aims to propose solutions using existing technologies while also creating innovative ideas to solve these problems.
4. No physical prototyping will be done for this project.
5. The team will analyze demand and consumption at the plant, building, and user level in order to optimize every aspect of energy use.

Questions?

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Keaton Zargham	ksz17@my.fsu.edu
Juan Villalobos	jjv15b@my.fsu.edu

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