NUvention:
Transportation

November 29, 2016

TEAM

Ryan Callaghan
MS Engineering Design Innovation
2017

Meenu Satiya
MS Engineering Management
2017

Yilin Wang
MS Engineering Design Innovation
2016

Moein Hassineni
PhD Transportation Systems Analysis and Planning
2020

Sanjana Srinivasan
MS Engineering Design Innovation
2017

ADVISORS

Jason Schmitt
Special Advisor to the Board of Directors,
EPIC Academy Charter School

Linsey Rubenstein
Vice President of Information Technology
The Boeing Company

Iqbal Arshad
Former Senior Vice President Engineering,
Global Product Development,

PROBLEM

Increasing Air traffic

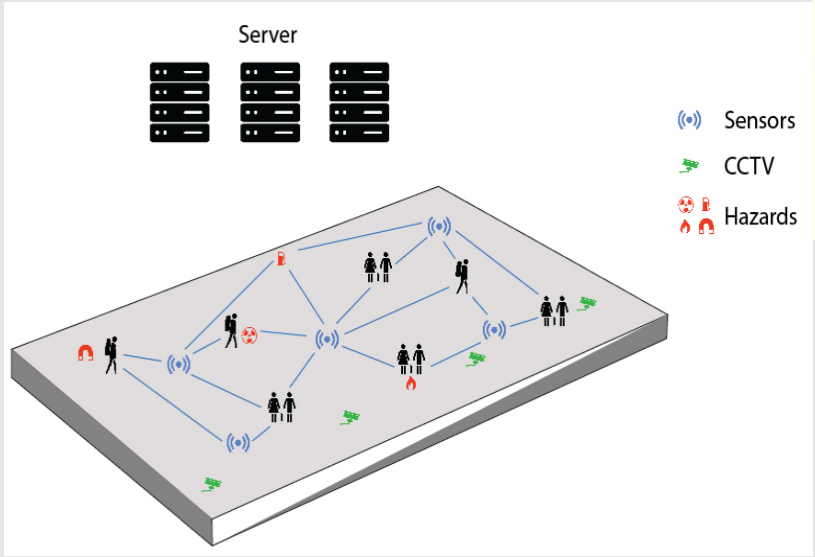
More congestion at the airport terminals

"Airports are among the
”MOST VULNERABLE"
soft target and likely always will be.”
– CBC News

“Attackers may have exploited relatively **LIGHT SECURITY** at the **ENTRANCE** to the arrivals hall.”
– CNN

SOLUTION

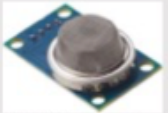
- Sensor based trackable security system.
- GRID network system across whole airport.



TSL2561 Luminosity Sensor

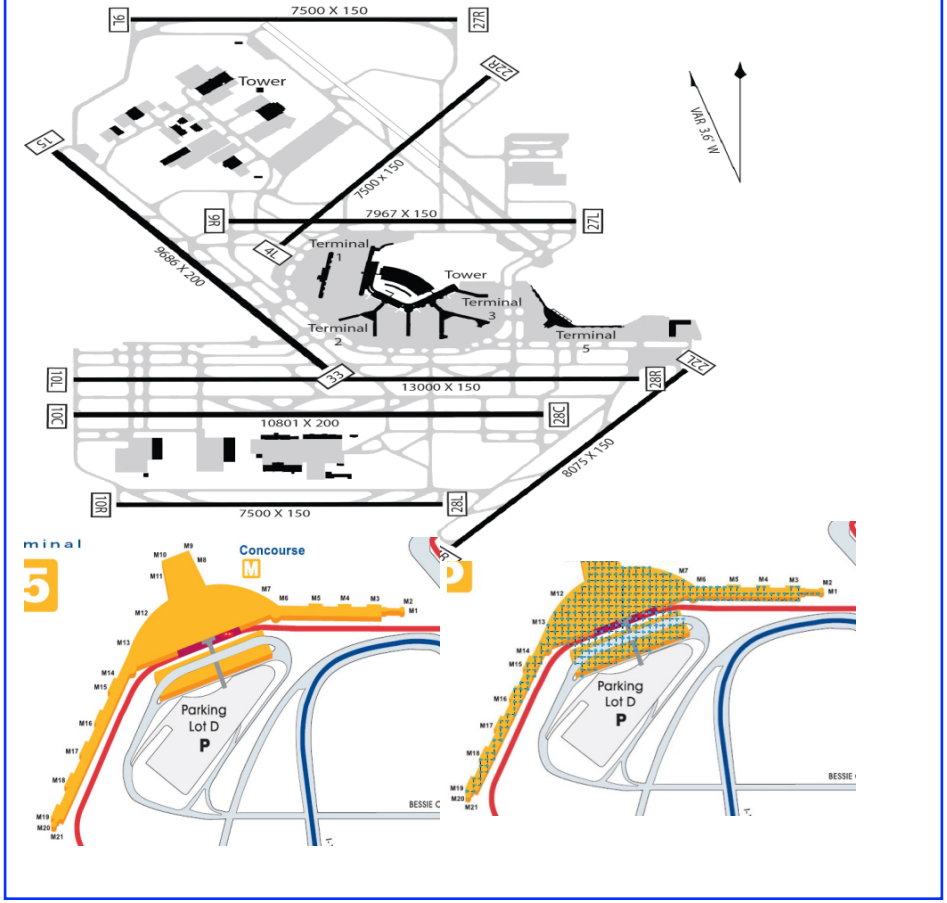
MQ-3 Semiconductor Sensor for Alcohol

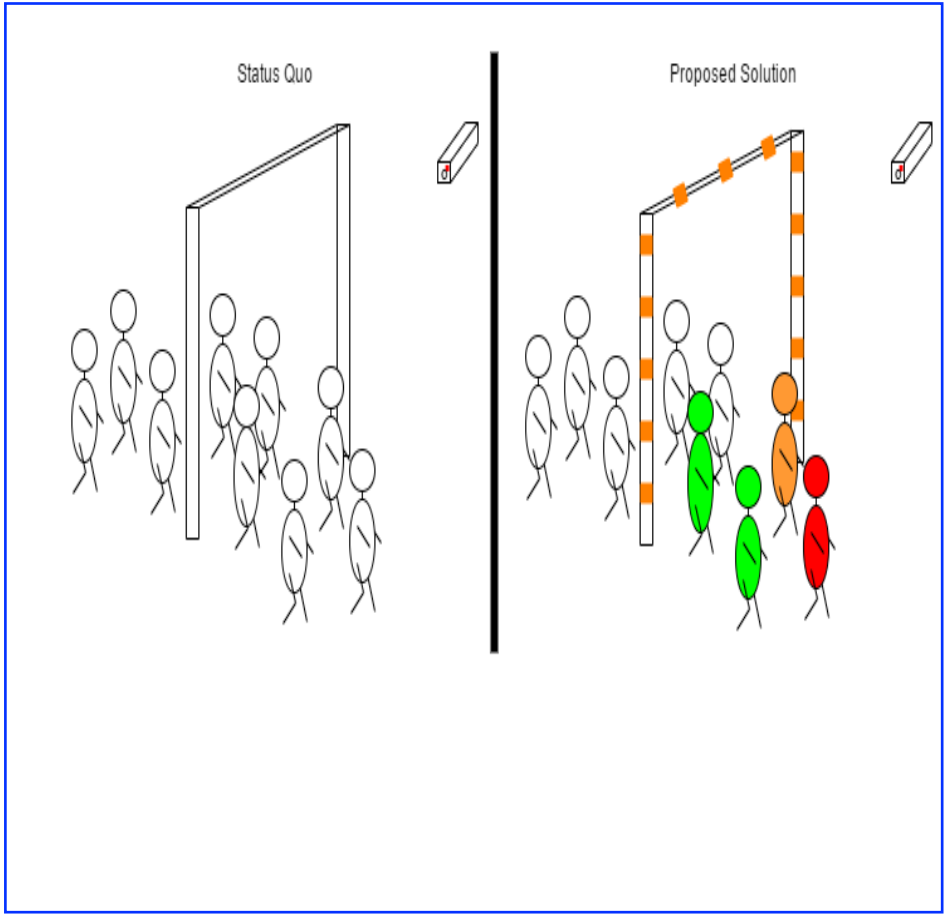
MQ-2 Semiconductor Sensor for Combustible Gas



Compass Module 3-Axis HMC5883L

SOLUTION

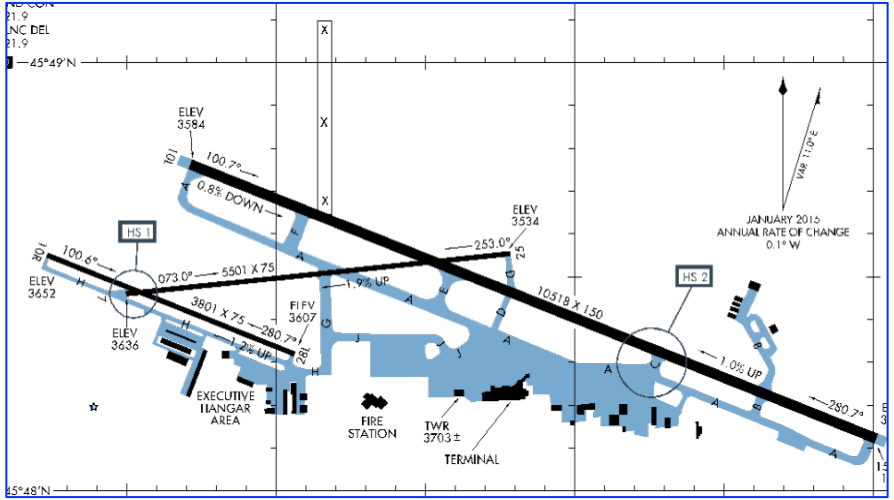




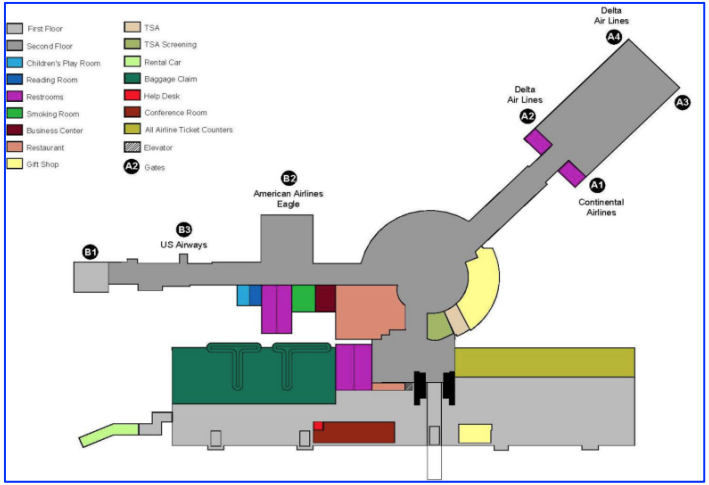
CHICAGO O'HARE AIRPORT Terminal 5

TARGET MARKETS

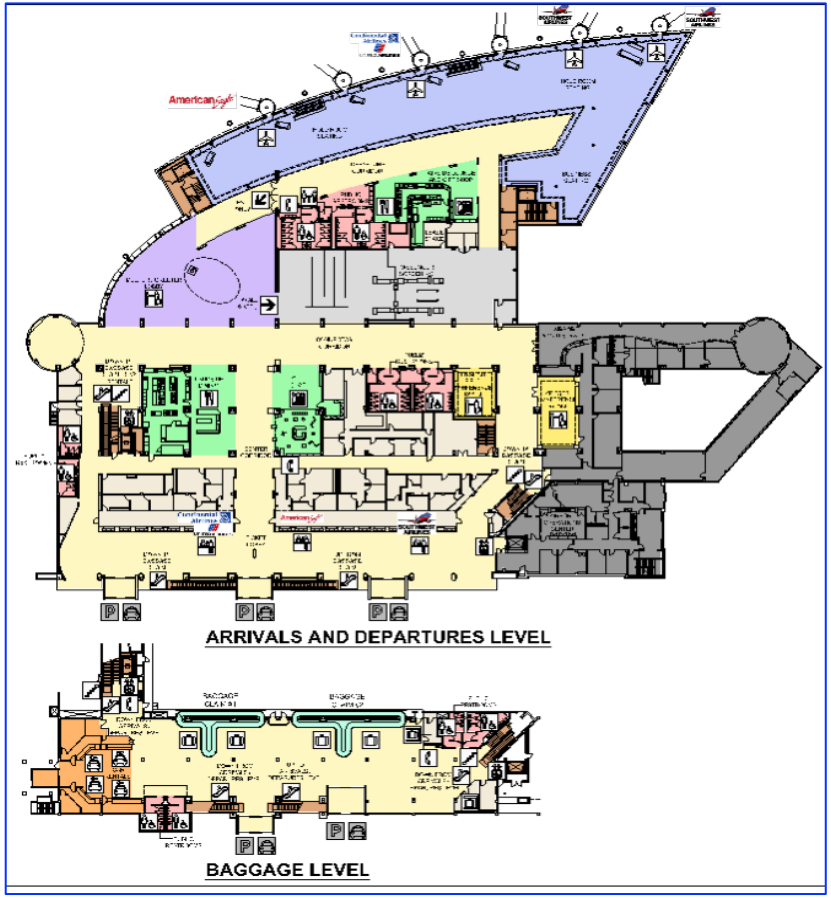
CODE	NAME	CITY	STATE
BTR	Baton Rouge International Airport	Baton Rouge	LA
BIL	Billings Logan International Airport	Billings	MT
AMA	Amarillo International Airport	Amarillo	TX
COS	Colorado Springs Airport	Colorado Springs	CO
ACY	Atlantic City International Airport	Egg Harbor Twp	NJ



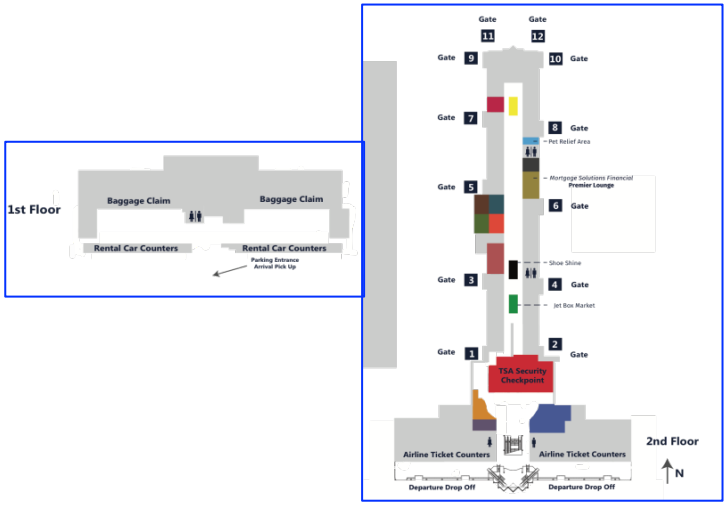
Billings Logan International Airport



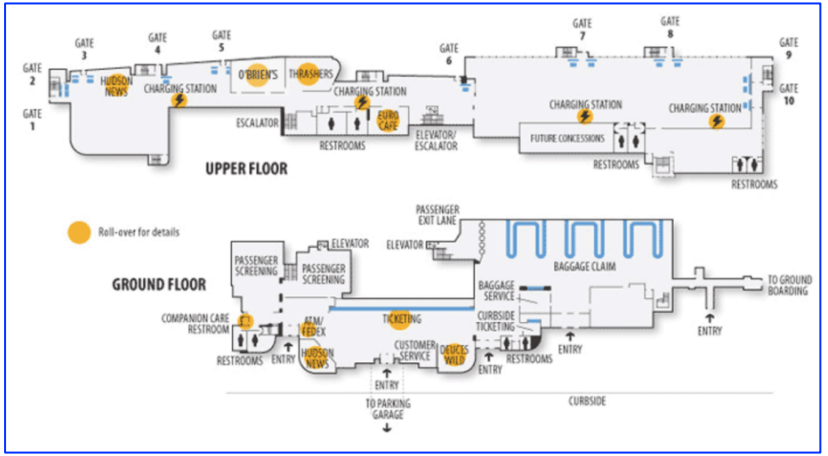
Baton Rouge Metropolitan Airport



AMARILLO INTERNATIONAL AIRPORT

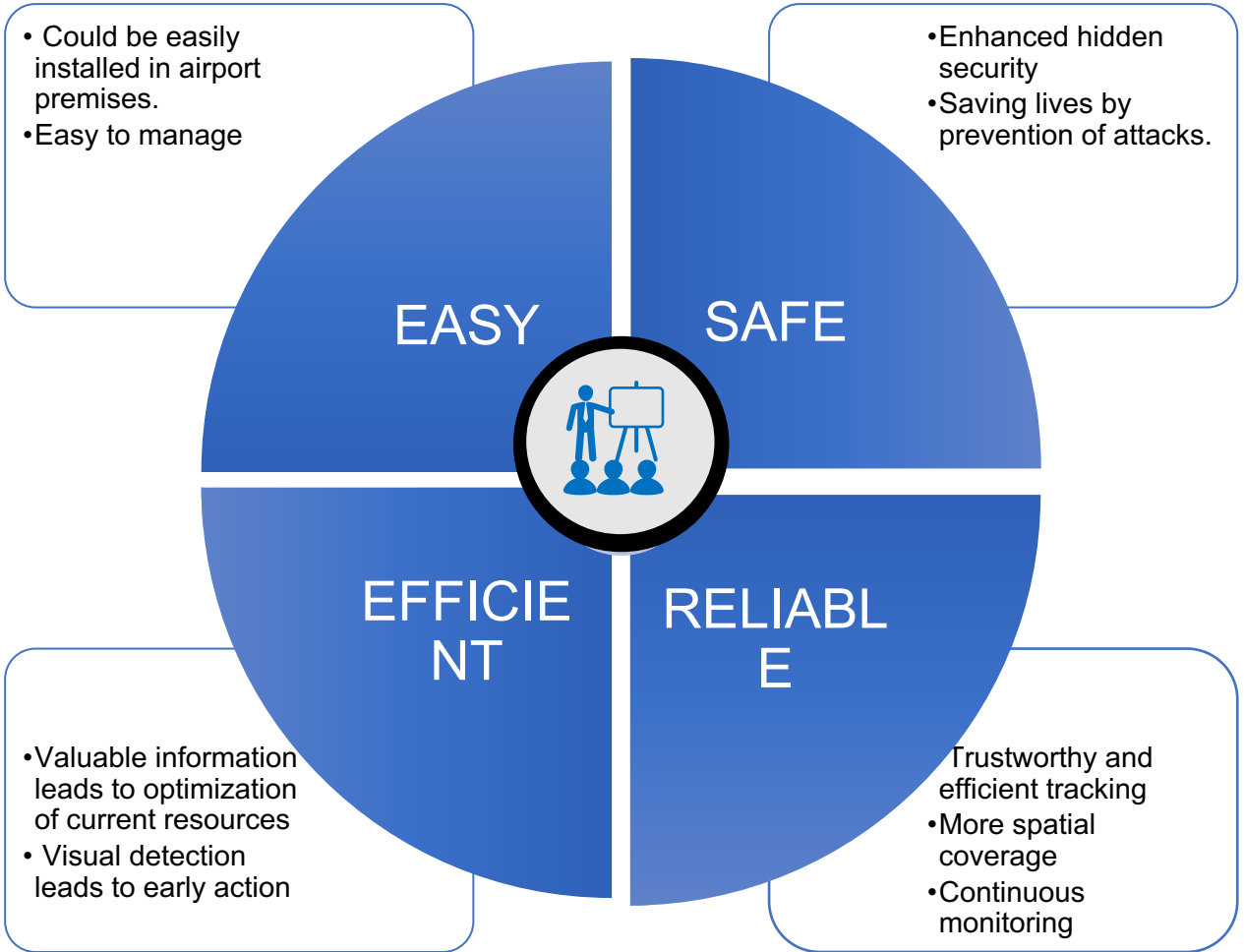


COLORADO SPRINGS AIRPORT



ATLANTIC CITY INT. AIRPORT

VALUE PROPOSITION



VALUE CHAIN

SUPPLIERS

- Sensor Suppliers
- Server Suppliers

PRODUCT DEVELOPER

- Tracking Software
- Product Development
- Maintenance Suite

SECURITY AGENCIES

- Tracking Activities
- Responsible for Action

COMPETITIVE ADVANTAGE

1st to Market with Distinctive Competency

Scope and opportunity

Similar devices exist- but none in CLAEM target market

Driving Product and Service innovation

Airport security infrastructure advanced

Superior Responsiveness

Reaction time to the threats is very less

Optimizing Improvement

Software real time data feed leads to security optimization capabilities.

REVENUE MODEL

With a 100% gross margin on sensor packages

CLAEM
*Cost for fitting out a Smaller Airport:
$91,621

CLAEM
*Cost of Deployment in 5 Smaller Airports in 2017:
$458,106

Revenue in 2017:
$550,000

Profit: $51,678

* CLAEM offering Cost is inclusive of a 5 year maintenance contract with the airports along with software licensing.

CHALLENGES AND RISKS

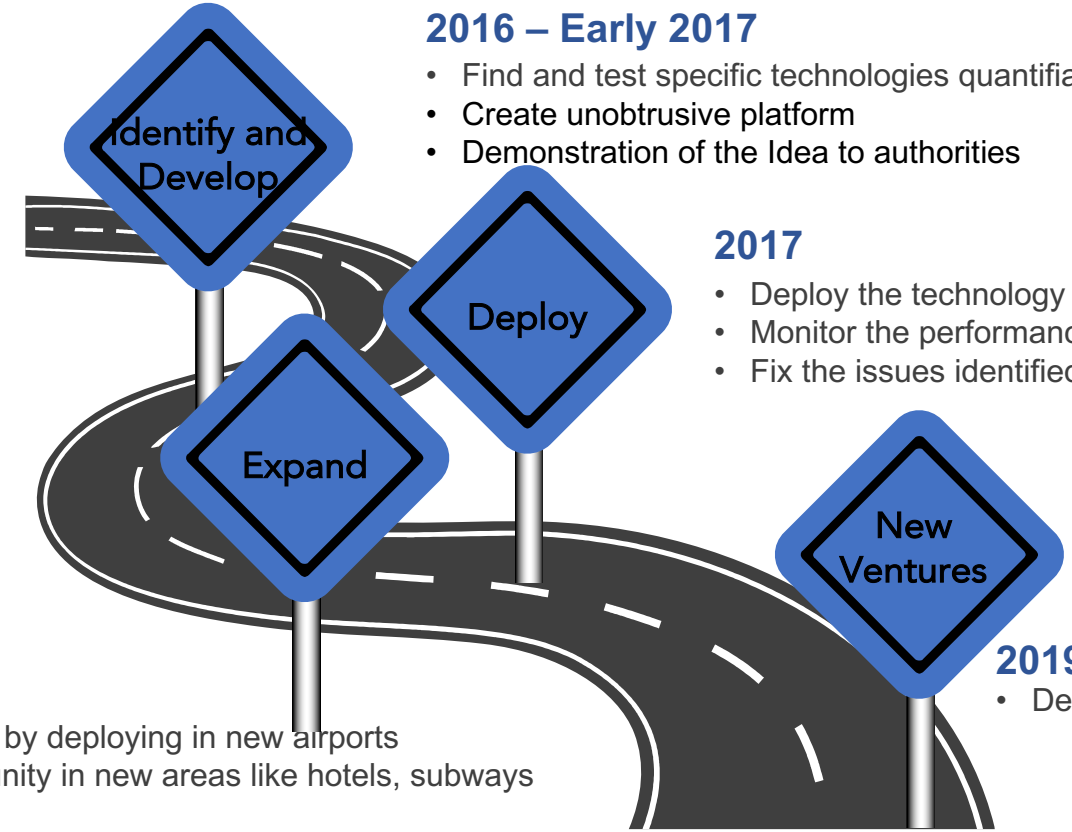
Investment Risk

Technology Protection

Regulation Authorities

Competitors

NEXT STEPS



2016 – Early 2017

- Find and test specific technologies quantifiably
- Create unobtrusive platform
- Demonstration of the Idea to authorities

2017

- Deploy the technology at 5 identified smaller airports
- Monitor the performance closely for 3 months
- Fix the issues identified during deployment phase

2018

- Expand the business by deploying in new airports
- Exploring the opportunity in new areas like hotels, subways

2019

- Deployment in new identified areas

ASK

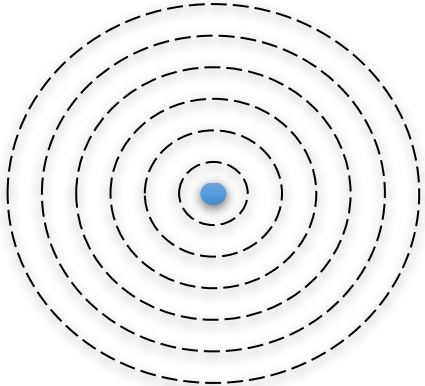
$ 400,000

Sensors
Server
Casing
Develop Technology
Deploy Technology
Salaries

Thank You!

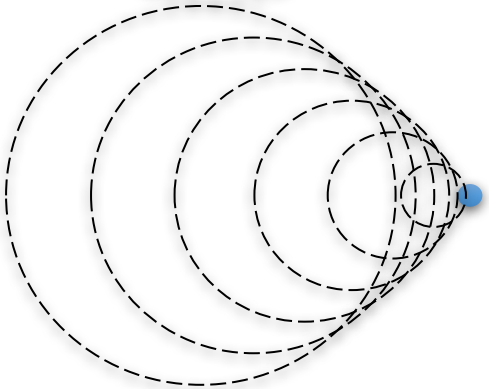
TECHNICAL VIABILITY

Sensor Coverage Area → Sensor Packages Map Design → Software Configuration



Diffusion

$$\frac{\partial u}{\partial t} = D\nabla^2 u = D\left(\frac{\partial^2 u}{\partial x^2} + \frac{\partial^2 u}{\partial y^2} + \frac{\partial^2 u}{\partial z^2}\right)$$



Doppler effect

$$f = \left(\frac{c + v_r}{c + v_s}\right) f_0$$

```
from PIL import Image

# image processing of the runway
im=Image.open('ORD - runway.png')
whitethreshold = 240
blackthreshold = 20
print 'white threshold: ' + str(whitethreshold) + ' black threshold: ' + str(blackthreshold)
black_runway=0
white_runway=0
grey_runway=0
for pixel in im.getdata():
    if (pixel[0]<=blackthreshold and pixel[1]<=blackthreshold and pixel[2]<=blackthreshold):
        black_runway+=1
    elif (pixel[0]>=whitethreshold and pixel[1]>=whitethreshold and pixel[2]>=whitethreshold):
        white_runway+=1
    else:
        grey_runway+=1
print ('black=' + str((black_runway/float(black_runway+white_runway+grey_runway)))+', white='+str((whi

# image processing of the terminal figure
im=Image.open('ORD - terminal.png')
whitethreshold = 240
blackthreshold = 20
print 'white threshold: ' + str(whitethreshold) + ' black threshold: ' + str(blackthreshold)
black_terminal=0
white_terminal=0
grey_terminal=0
for pixel in im.getdata():
    if (pixel[0]<=blackthreshold and pixel[1]<=blackthreshold and pixel[2]<=blackthreshold):
        black_terminal+=1
    elif (pixel[0]>=whitethreshold and pixel[1]>=whitethreshold and pixel[2]>=whitethreshold):
        white_terminal+=1
    else:
        grey_terminal+=1
print ('black=' + str((black_terminal/float(black_terminal+white_terminal+grey_terminal)))+', white='

#total runway area as the input (in feet)
runway_area = 7500*150 + 7500*150 + 9686*200 + 7967*150 + 13000*150 + 10801*200 + 7500*150 + 8075*150
#terminal area calculation
terminal_area = runway_area * (black_terminal+grey_terminal) / (black_runway+grey_runway)
print "total terminal area = " + str(terminal_area) + " sqaure feet"
```

ALTERNATIVE MARKETS

CINEMAS

MALLS

SUBWAYS

Why it has not been done before ?

Infrastructure Issues

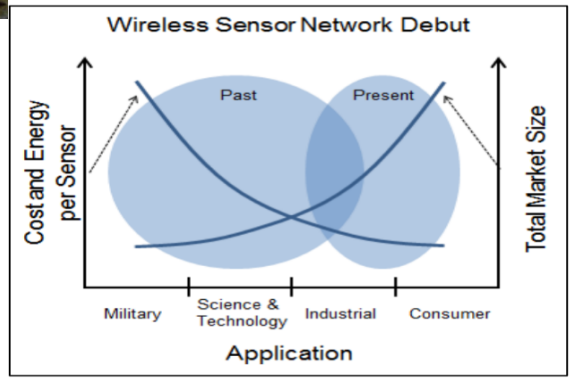
Analysts believe requiring a checkpoint just to enter the airport can create new targets.

Psychological Issues

Battling traveler anxiety about terror,
versus the safety and security of those customers.

Evolution of Sensor Technology

Advances in sensor technology leads to ubiquitous deployment of large-scale wireless sensor networks



What have people said about our Idea ?

David Cush,
President and Chief Executive Officer
Virgin America

- Excellent Idea
- Easy to work with government authorities like TSA then private agencies

Virginia Buckingham,
Former Executive Director and CEO
Massachusetts Port Authority

- Government and Agencies do not generally act proactively in such situations, TSA came into existence after 9/11

Thank you