# REPORT DOCUMENTATION PAGE

Form Approved OMB NO. 0704-0188

The public reporting burden for this collection of information is estimated to average 1 hour per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggesstions for reducing this burden, to Washington Headquarters Services, Directorate for Information Operations and Reports, 1215 Jefferson Davis Highway, Suite 1204, Arlington VA, 22202-4302. Respondents should be aware that notwithstanding any other provision of law, no person shall be subject to any oenalty for failing to comply with a collection of information if it does not display a currently valid OMB control number.
PLEASE DO NOT RETURN YOUR FORM TO THE ABOVE ADDRESS.

| 1. REPORT DATE (DD-MM-YYYY) | 2. REPORT TYPE | 3. DATES COVERED (From - To) |
|---|---|---|
| 27-04-2020 | Final Report | 23-Feb-2018 - 22-Feb-2020 |

**4. TITLE AND SUBTITLE**
Final Report: Micro Air Vehicle Scouts for Inventory Management and Situational Awareness

**5a. CONTRACT NUMBER**
W911NF-18-1-0121

**5b. GRANT NUMBER**

**5c. PROGRAM ELEMENT NUMBER**
106011

**6. AUTHORS**

**5d. PROJECT NUMBER**

**5e. TASK NUMBER**

**5f. WORK UNIT NUMBER**

**7. PERFORMING ORGANIZATION NAMES AND ADDRESSES**
Carnegie Mellon University
5000 Forbes Avenue

Pittsburgh, PA 15213 -3589

**8. PERFORMING ORGANIZATION REPORT NUMBER**

**9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS (ES)**
U.S. Army Research Office
P.O. Box 12211
Research Triangle Park, NC 27709-2211

**10. SPONSOR/MONITOR'S ACRONYM(S)**
ARO

**11. SPONSOR/MONITOR'S REPORT NUMBER(S)**
72638-SD-ICR.1

**12. DISTRIBUTION AVAILIBILITY STATEMENT**
Approved for public release; distribution is unlimited.

**13. SUPPLEMENTARY NOTES**
The views, opinions and/or findings contained in this report are those of the author(s) and should not contrued as an official Department of the Army position, policy or decision, unless so designated by other documentation.

**14. ABSTRACT**

**15. SUBJECT TERMS**

| 16. SECURITY CLASSIFICATION OF: | | | 17. LIMITATION OF ABSTRACT | 15. NUMBER OF PAGES | 19a. NAME OF RESPONSIBLE PERSON |
|---|---|---|---|---|---|
| a. REPORT | b. ABSTRACT | c. THIS PAGE | | | Sebastian Scherer |
| UU | UU | UU | UU | | 19b. TELEPHONE NUMBER 412-589-9581 |

# RPPR Final Report
as of 27-Apr-2020

Agency Code:

Proposal Number: 72638SDICR **Agreement Number: W911NF-18-1-0121**
**INVESTIGATOR(S):**


**Name:** Sankalp Arora
**Email:** asankalp@cmu.edu
**Phone Number:** 4125195935
**Principal:** N

**Name:** Sebastian Scherer
**Email:** basti@andrew.cmu.edu
**Phone Number:** 4125899581
**Principal:** Y

Organization: **Carnegie Mellon University**
Address: 5000 Forbes Avenue, Pittsburgh, PA 152133589
Country: USA
DUNS Number: 052184116 EIN: 250969449


**Report Date:** 22-May-2020 Date Received: 27-Apr-2020
**Final Report** for Period Beginning 23-Feb-2018 and Ending 22-Feb-2020
**Title:** Micro Air Vehicle Scouts for Inventory Management and Situational Awareness
**Begin Performance Period:** 23-Feb-2018 **End Performance Period:** 22-Feb-2020
**Report Term:** 0-Other


Submitted By: Sebastian Scherer Email: basti@andrew.cmu.edu
Phone: (412) 589-9581


**Distribution Statement:** 1-Approved for public release; distribution is unlimited.


**STEM Degrees:** 0 **STEM Participants:** 0

**Major Goals:** The primary goal of this project was to explore commercialization opportunities and discover if the technology has potential

**Accomplishments:** The main accomplishment was that the participation in the i-Corps program lead to the founding and investment by VCs in a company called Nablas Ascent / Gather.ai

Please see the attached PDF file for details.

**Training Opportunities:** Nothing to Report

**Results Dissemination:** Nothing to Report

**Honors and Awards:** Nothing to Report

**Protocol Activity Status:**

**Technology Transfer:** Nothing to report

**PARTICIPANTS:**

**Participant Type:** PD/PI
**Participant:** Sebastian Scherer
**Person Months Worked:** 3.00 **Funding Support:**
Project Contribution:
International Collaboration:
International Travel:
National Academy Member: N
Other Collaborators:

# RPPR Final Report
as of 27-Apr-2020

**Participant Type:** Graduate Student (research assistant)
**Participant:** Sankalp Arora
**Person Months Worked:** 3.00 **Funding Support:**
Project Contribution:
International Collaboration:
International Travel:
National Academy Member: N
Other Collaborators:

**Participant Type:** Graduate Student (research assistant)
**Participant:** Daniel Maturana
**Person Months Worked:** 3.00 **Funding Support:**
Project Contribution:
International Collaboration:
International Travel:
National Academy Member: N
Other Collaborators:

# Final Report for Army i-Corps

# ARO Proposal #7638-SD-ICR

# W911NF-18-1-0121

Period of Performance 02/23-2018-02/22/2020

Technical Point of Contact: Sebastian Scherer
basti@andrew.cmu.edu
412-589-9581

## Summary

In the i-Corps project we explored what commercialization opportunities exist for the research developed in a project on autonomous scouting with drones (sponsored by ONR). Three of Sebastian Scherer's students and he participated in a session of the program from January - March 2019. In that program (as well as before and after) the team formulated various business hypothesis, interviewed potential customers, formulated potential solutions, and attend relevant conferences.

This process lead to the discovery that there is a large potential market for warehouse inventory management and current management solutions are expensive and complex.

After the i-Corps project a company was founded and incorporated. The initial name of the company was Nabla Ascent and later changed names to "gather.ai." (http://gather.ai) and is currently successfully operating with VC investment.

# Details

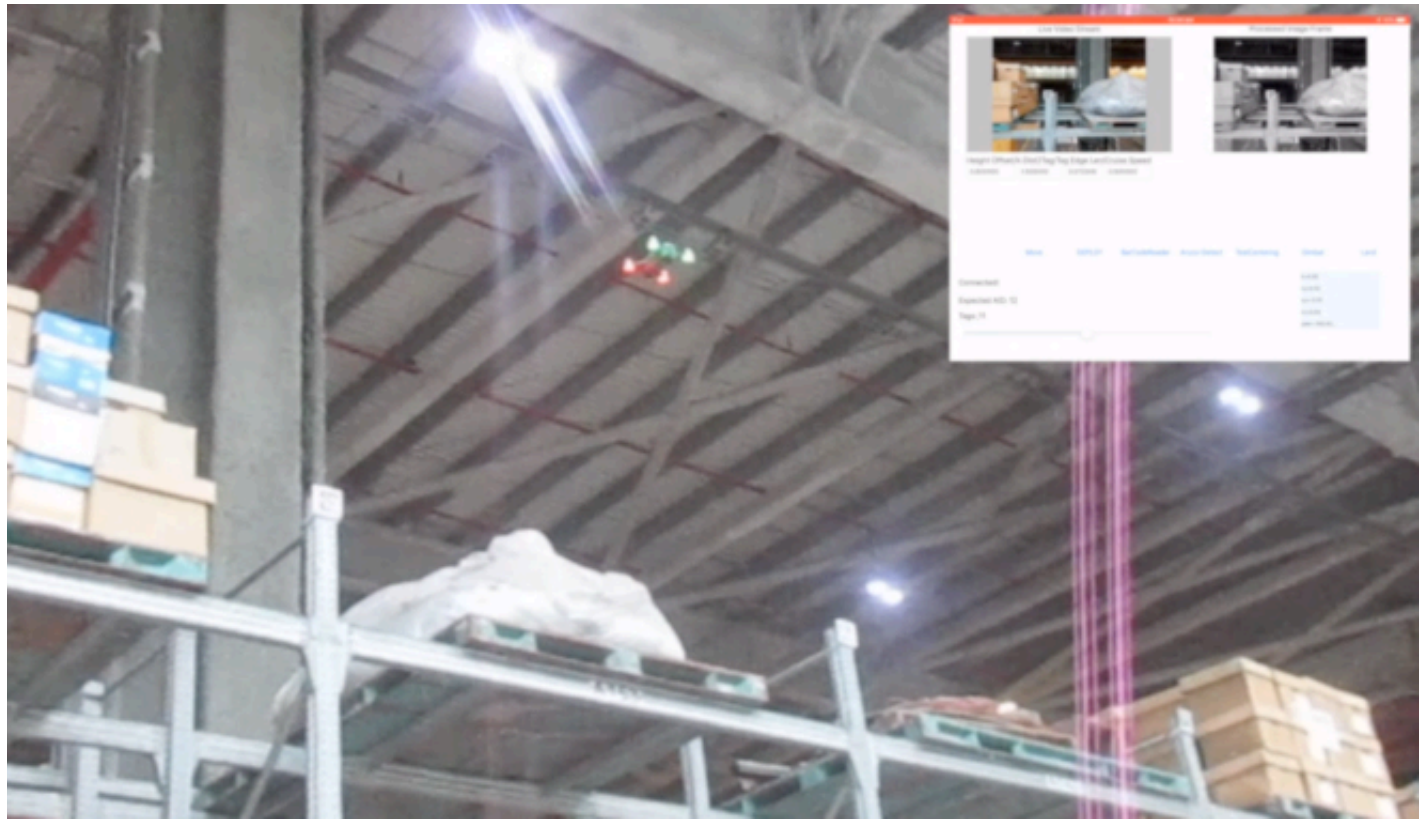
In the following pages are the pitches and detailed log of customer interactions that were performed as part of the i-Corps project.

Table of contents:

1. Slide deck from 01/16/2019
2. Slide deck from 01/17/2019
3. Slide deck from 01/18/2019
4. Slide deck from 01/24/2019
5. Slide deck from 01/31/2019
6. Slide deck from 02/07/2019
7. Slide deck from 02/14/2019
8. Slide deck from 02/21/2019
9. Slide deck from 03/01/2019
10. Customer discovery nodes.

Autonomy for the Real World

# Nabla Ascent



Data analytics and inventory monitoring solutions for warehouses with autonomous drones.




Sankalp Arora
EL



Daniel Maturana
TL



Robb Myer
M



Sebastian Scherer
PI

## Key Partners

- Drone manufacturers
- Consultants to develop initial dashboards
- Sensor developers/Hardware manufacturers

## Key Activities

- Development of autonomous solutions
- Maintiaining Online dashboard for analytics
- Customer support through setup, install and maintanence

## Key Resources

- Software/Hardware robotics developers
- Hardware suppliers for the solution
- Customer relationship managers

## Value Propositions

- Cost savings on taking inventory
- 24/7 live inventory
- Reduced losses from missing/mismatched inventory
- Continous facility monitoring through data analytics
- Optimizing Operations
- Product visibility
- Upsell to customers

## Customer Relationships

- References and cold calls
- Marketing campaign in relevant conferences
- subsidized customer trials
- Customer Service

## Channels

- Direct B2B Sales
- Online self-setup kits

## Customer Segments

- Warehouses with daily or weekly inventory taking ...
- Air Cargo
- 3PLs
- Distribution Centers
- Factories with need for asset tracking
- Retail stores

## Cost Structure

- Employee Salaries
- Hardware purchases
- Battery procurement and shipping

## Revenue Streams

- Monthly subscription inventory services
- Upsell analytics as value-add

Autonomy for the real world
Nabla Ascent

Autonomy for the Real World

# Nabla Ascent

Sankalp Arora EL
Daniel Maturana TL
Robb Myer M
Sebastian Scherer PI

Customers - Heads of supply chains and logistics for air cargo, retail stores, distribution centers and 3PLs.

Product - Data analytics and inventory monitoring solutions for warehouses with autonomous drones. We eliminate the need for manual inventory checks, optimize operations through live warehouse data analytics, reduce assets and workforce needed in the warehouse.

| | Interview Count |  |  |  |
|---|---|---|---|---|
| NEW | 5 | 5 | | |
| TOTAL | 5 | | | |

Why (data needs to be collected on numbers)–

- Labor shortage
- Savings in operation costs
- Upsell live inventory location to customers
- Savings in operation losses

# Retail Store Managers

- Hypothesis: Retail store managers want to reduce inventory mismatches and resulting losses by x%.

- Experiment: Talk to retail store managers to understand their pain points.

- Result:
  - Inventory mismatches are less than 1% of total revenue, they do not much care for it.
  - They care for labor shortage and want to repurpose staff from out of stock detection to increasing sales.
  - Misinformation on out of stock also lowers sales and service standards.

- Next Steps:
  - Validate the new results with more store managers, try and get numbers.
  - Target seems to have an automated solution, understand the same.
  - There are companies who are dedicated to perform audits in these stores, reach out to them as service providers.

# Distribution Center Operators

- Hypothesis: Distribution center operators want to reduce/eliminate manual work involved in taking inventory to alleviate labor shortage problem.

- Experiment: Talk to VP operations/SPL to understand their pain points.

- Result:
  - LTL distribution center's biggest pain point is labor shortage.
  - Since they stock the same low cost products throughout the year, check-in check-out inventory works.
  - They need driverless trucks to solve the labor problem, and robots to carry equipment in warehouses.

- Next Steps:
  - Segment warehouse and distribution center operators into different archetypes.
  - They did ask for a demo, probe why?
  - Talk to different archetypes.
  - Validate these findings by more numbers.

## Key Partners

- Drone manufacturers
- Consultants to develop initial dashboards
- Sensor developers/Hardware manufacturers

## Key Activities

- Development of autonomous solutions
- Maintiaining Online dashboard for analytics
- Customer support through setup, install and maintanence

## Key Resources

- Software/Hardware robotics developers
- Hardware suppliers for the solution
- Customer relationship managers

## Value Propositions

- Labor saving in taking inventory
- Product visibility
- Cost savings on taking inventory
- 24/7 live inventory
- Reduced losses from missing/mismatched inventory
- Continous facility monitoring through data analytics
- Optimizing Operations
- Upsell to customers

## Customer Relationships

- References and cold calls
- Marketing campaign in relevant conferences
- subsidized customer trials
- Customer Service

## Channels

- Direct B2B Sales
- Online self-setup kits

## Customer Segments

- ~~Warehouses with daily or weekly inventory taking ...~~
- Air Cargo: VP SPL, WM
- 3PLs: VP SPL, WM
- Distribution Centers: Dir, VP SPL, WM
- Factories with need for asset tracking: Dir, VP SPL, Floor ...
- Retail stores: VP SPL, Store Manager

## Cost Structure

- Employee Salaries
- Hardware purchases
- Battery procurement and shipping

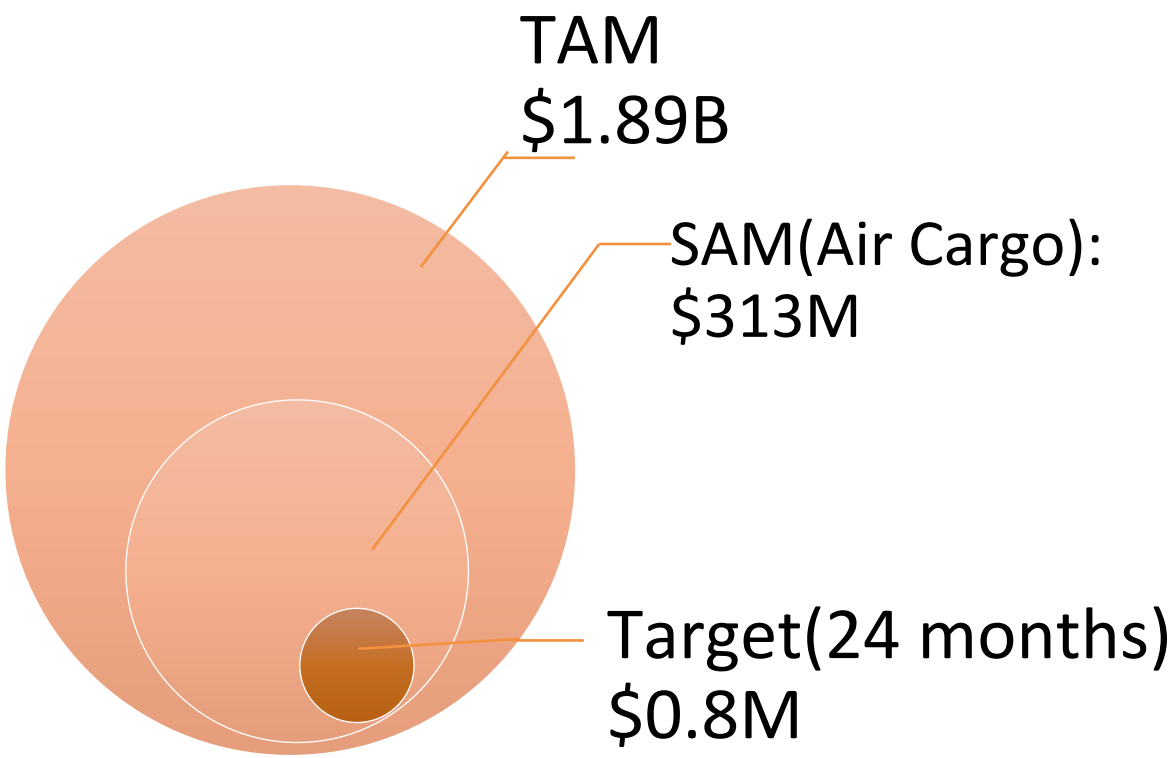
## Revenue Streams

- Monthly subscription inventory services
- Upsell analytics as value-add

Autonomy for the real world
Nabla Ascent

# Inventory Management

| Industry | Global Locations |
|---|---|
| Air Cargo | 4,357 |
| Public Storage (including 3PLs, Retail,DCs) | 19,053 |
| Marine & Container Operation | 2,901 |
| Total | 26,311 |




Year-on-Year Growth in Middle East Air-Cargo – 11%

Autonomy for the real world
Nabla Ascent

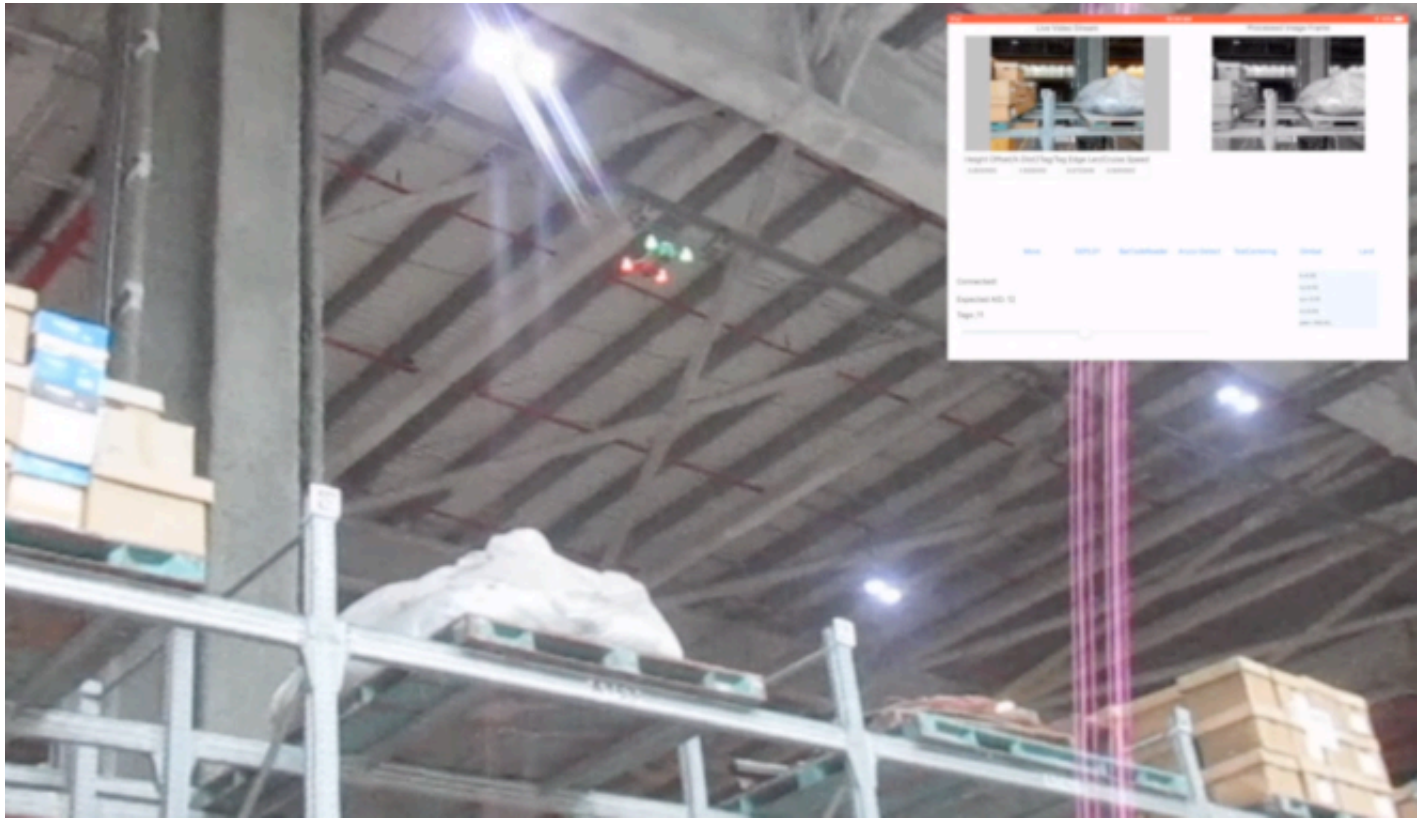
# Experiments

- Customer Segment:
  - In retail stores is the problem of spending workforce on inventory/out of stock detection already addressed?
  - It is a simple pass/fail, if any of the stores have figured a solution out, target is a good starting point.
- Value Proposition:
  - Is manual labor spent on inventory an operational problem for store managers on which they spend more than $200K?
  - It is a pass if the spending is greater $200K and they are willing to change for 50% improvement.
- Revenue Model:
  - How much are the customers willing to pay? And are they willing to pay for a service?
  - It is a pass if they are willing to pay around 10% of the current cost.

Autonomy for the Real World

# Nabla Ascent

Sankalp Arora EL
Daniel Maturana TL
Robb Myer M
Sebastian Scherer PI



| | Interview Count | | | |
|---|---|---|---|---|
| NEW | 7 | 7 | | |
| TOTAL | 12 | 12 | | |

Nabla Ascent provides automated inventory management solutions for warehouses using drones. Our solutions are up to 100X faster than manual inventory and reduce inventory work load by 80% while being 50% cheaper.

# 3PL's: Operation Managers

- Hypothesis:
  - Will pay to reduce manual inventory taking effort by 60%.
  - Pay $1000/month for continuous warehouse monitoring.

- Experiment: Talk to operation managers.

- Result:
  - 150 to 450 hours per week taking inventory. Ecstatic at 30% saving.
  - Need operation or customer driven.
  - Pay for asset tracking, reluctant to say how much.

- Iterate:
  - Validate the new results with more 3PL operation managers.
  - Interview decision makers.

# Retail: Store Managers

- Hypothesis: Automatic Inventory/Out of stock detection problem is solved.
- Experiment: Talk to store managers.
- Result: Dedicate teams to address the problem.
  - Backroom growing in retail.
- Next Steps:
  - Get numbers on how much spent on inventory taking.
  - Talk to decision maker/influencers.

## Key Partners

- Drone manufacturers
- Consultants to develop initial dashboards
- Sensor developers/Hardware manufacturers

## Key Activities

- Development of autonomous solutions
- Maintiaining Online dashboard for analytics
- Customer support through setup, install and maintanence

## Key Resources

- Software/Hardware robotics developers
- Hardware suppliers for the solution
- Customer relationship managers

Sankalp Arora • January 16, 2019

## Value Propositions

- Labor saving in taking inventory
- Cost savings on taking inventory
- Upsell to customers
- Continous facility monitoring through data analytics
- Product visibility
- 24/7 live inventory
- Reduced losses from missing/mismatched inventory
- Optimizing Operations

## Customer Relationships

- References and cold calls
- Marketing campaign in relevant conferences
- subsidized customer trials
- Customer Service

## Channels

- Direct B2B Sales
- Online self-setup kits

## Customer Segments

- ~~Warehouses with daily or weekly inventory taking ...~~
- Air Cargo: VP SPL, WM
- 3PLs: VP SPL, WM
- Retail stores: VP SPL, Store Manager
- Distribution Centers: Dir, VP SPL, WM
- Factories with need for asset tracking: Dir, VP SPL, Floor ...

## Cost Structure

- Employee Salaries
- Hardware purchases
- Battery procurement and shipping
- Maintenance

## Revenue Streams

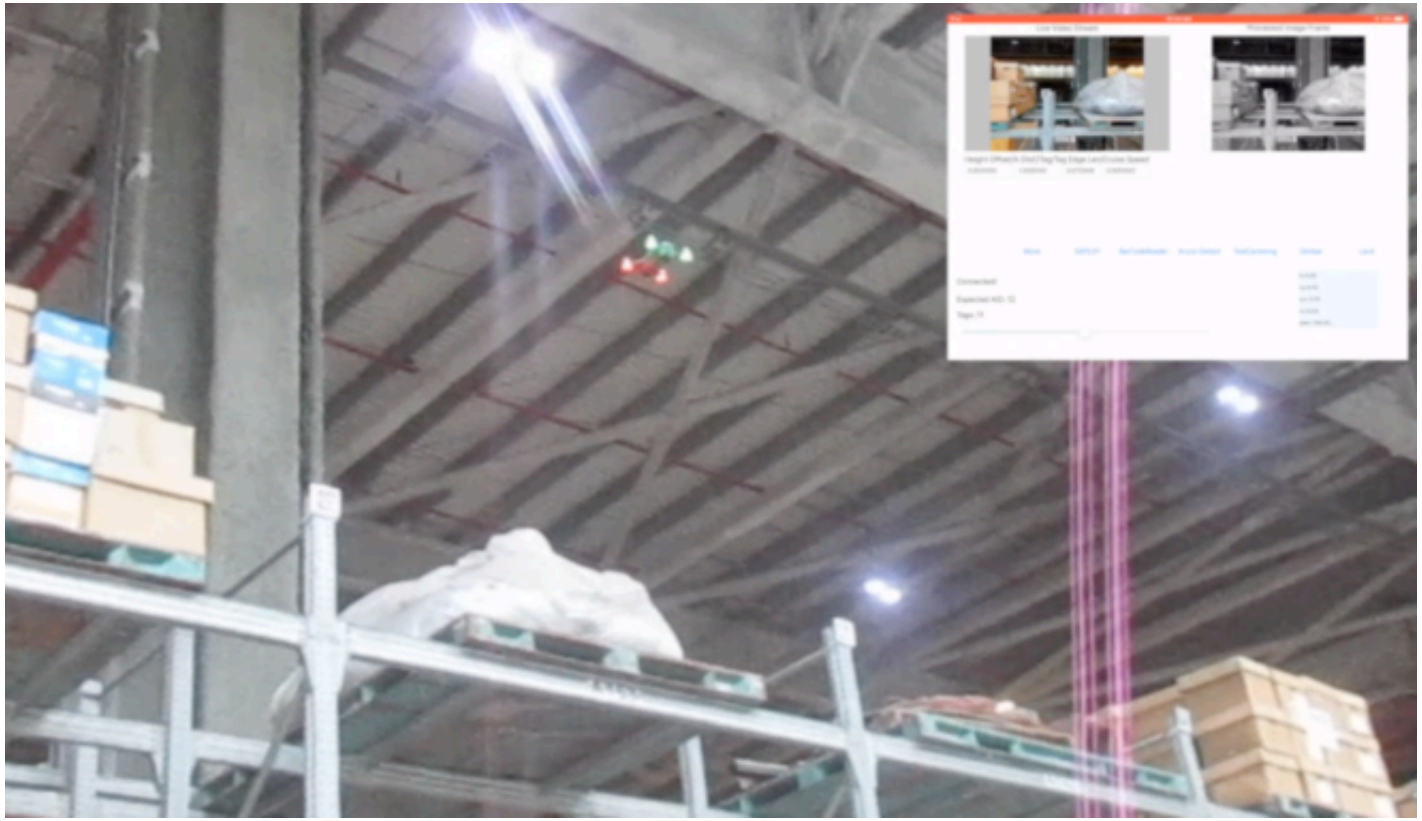
- Monthly subscription inventory services
- Upsell analytics as value-add

Autonomy for the real world
Nabla Ascent

Autonomy for the Real World

# Nabla Ascent

Sankalp Arora EL
Daniel Maturana TL
Robb Myer M
Sebastian Scherer PI



| | Interview Count | | | |
|---|---|---|---|---|
| NEW | 13 | 8 | 2 | 3 |
| TOTAL | 25 | 20 | 2 | 3 |

Nabla Ascent provides automated inventory management solutions for warehouses using drones. Our solutions are up to 2 orders of magnitude faster than manual inventory and reduce inventory work load by 80%.

# Retail: Store Managers

- Hypothesis: Automatic Inventory/Out of stock detection problem is solved.

- Experiment: Talk to store managers.

- Result: Dedicate teams to address the problem.
  - Store managers think that inventory and labor spent on it is not a big problem.
  - **Direct store delivery vendors might be a good market.**
  - Pilot in Pittsburgh has helped alleviate stocking issues.
  - Biggest pain-point is hiring.

- Next Steps:
  - Talk to direct store delivery vendors.
  - Talk to decision maker/influencers.

# 3PL's: Operation Managers

- Hypothesis:
  - Will pay to reduce manual inventory taking effort by 60%.
  - Pay $1000/month for continuous warehouse monitoring.

- Experiment: Talk to operation managers, decision makers.

- Result:
  - 150 to 450 hours per week taking inventory. **Ecstatic at 30% saving.**
  - Get more excited about operations cost. They can make more deliveries (how do we quantify?)
  - Pay for asset tracking, reluctant to say how much.

- Iterate:
  - Validate the new results with more 3PL operation managers, decision makers.
  - Interview decision makers.

## Key Partners

- Drone manufacturers
- Consultants to develop initial dashboards
- Sensor developers/Hardware manufacturers

## Key Activities

- Development of autonomous solutions
- Maintiaining Online dashboard for analytics
- Customer support through setup, install and maintanence

## Key Resources

- Software/Hardware robotics developers
- Hardware suppliers for the solution
- Customer relationship managers

## Value Propositions

- 30% Labor saving in taking inventory
- Cost savings on taking inventory
- Optimizing Operations
- Product visibility
- Upsell to customers
- Continous facility monitoring through data analytics
- 24/7 live inventory
- Reduced losses from missing/mismatched inventory

## Customer Relationships

- References and cold calls
- Marketing campaign in relevant conferences
- subsidized customer trials
- Customer Service

## Channels

- Direct B2B Sales
- Online self-setup kits

## Customer Segments

- Air Cargo: VP SPL, WM
- 3PLs: VP SPL, WM
- Direct store delivery vendors - Operations managers
- ~~Retail stores: VP SPL, Store Manager~~
- Distribution Centers: Dir, VP SPL, WM
- Factories with need for asset tracking: Dir, VP SPL, Floor ...

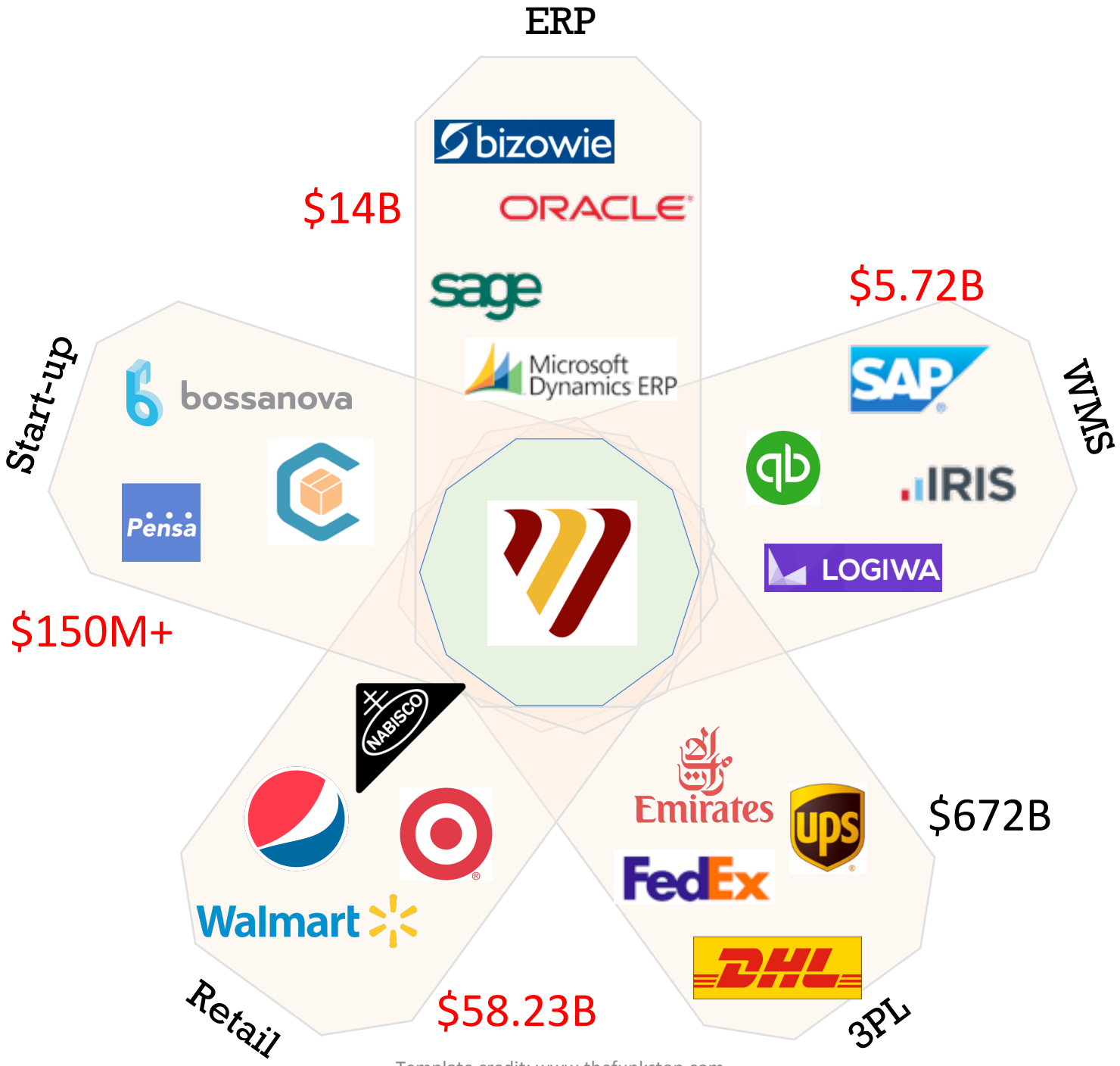
## Cost Structure

- Employee Salaries
- Hardware purchases
- Battery procurement and shipping

## Revenue Streams

- Monthly subscription inventory services
- Upsell analytics as value-add

Autonomy for the real world
Nabla Ascent



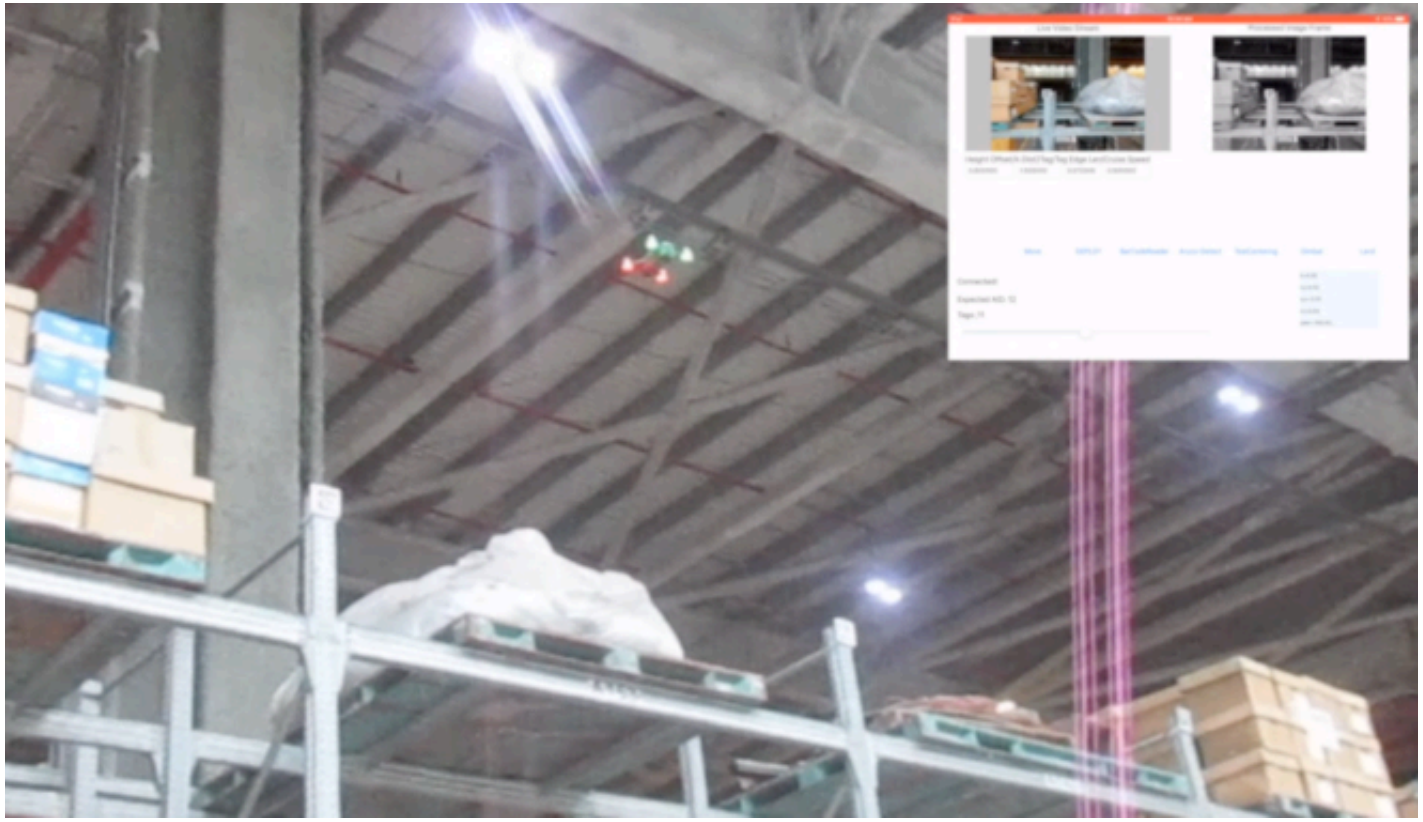

Template credit: www.thefunkstop.com

Autonomy for the real world
Nabla Ascent

Autonomy for the Real World

# Nabla Ascent

Sankalp Arora EL
Daniel Maturana TL
Robb Myer M
Sebastian Scherer PI



| | Interview Count | | | |
|---|---|---|---|---|
| NEW | 15 | 7 | 5 | 3 |
| TOTAL | 40 | 27 | 7 | 6 |

Nabla Ascent provides automated inventory management solutions for air cargo and 3rd party logistics operators using drones. Our solutions are up to 2 orders of magnitude faster than manual inventory and reduce inventory work load by 80%.

# Distribution Channel: Innovation Managers

- Hypothesis: Customers are willing to buy solutions directly from us.
- Experiment: Ask innovation managers about product purchase phases
- Result: Through Innovation Labs large companies do demos, do pilots and buy products.
  - Pilots typically last a 1 month – 3 months.
  - **Sales take 3 months after that.**
  - Demo is only a 1-2 day trials, pilots are often paid.
- Next Steps:
  - Talk to decision makers.
  - Try and schedule demos

Autonomy for the real world
Nabla Ascent

# Distribution Channel: ERP Sellers

- Hypothesis: We can sell as add-ons to current Enterprise Resource Planning (ERP) systems.

- Experiment: Talk to VP operations, ERP makers.

- Result: Some ERP vendors sell barcode readers as add-ons, we can follow the same model.
  - **$150K-$50M spent on ERP licenses annually.**
  - We are 10% of the cost for the lower end**.**
  - Other solution sellers are also willing to sell as an add-on.

- Next Steps:
  - Talk to big ERP sellers.

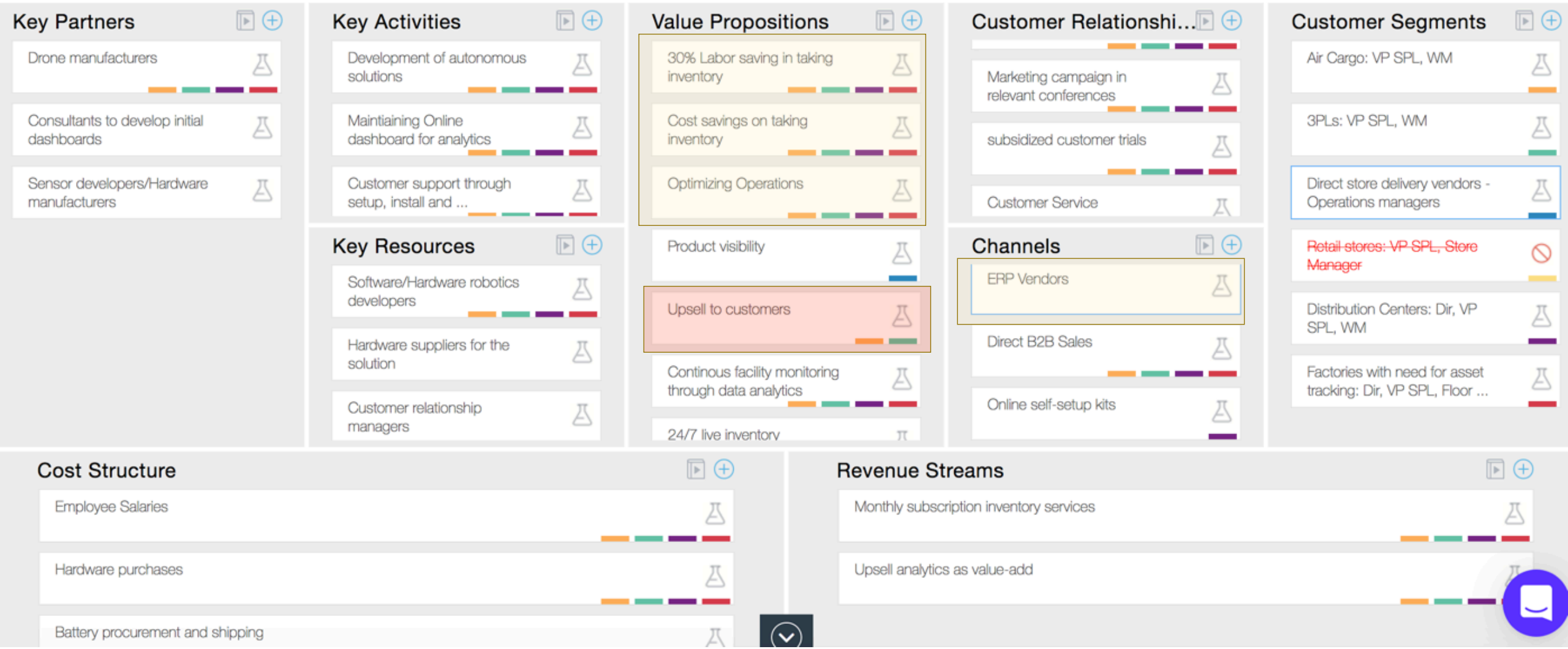
# Inventory Air Cargo: Supply Chain Managers

- Hypothesis: Providing Live Inventory solves the lost in warehouse problem for Air Cargo warehouse operators, saving about $1M an year.
- Experiment: Talk to supply chain managers, VP logistics.

- Result: United spends more than a $1M on overnight shipping for just catering.
  - Inventory management is the issue here and roving teams of people solve it.
  - **They are willing to pay for this service to be installed at their caterers.**

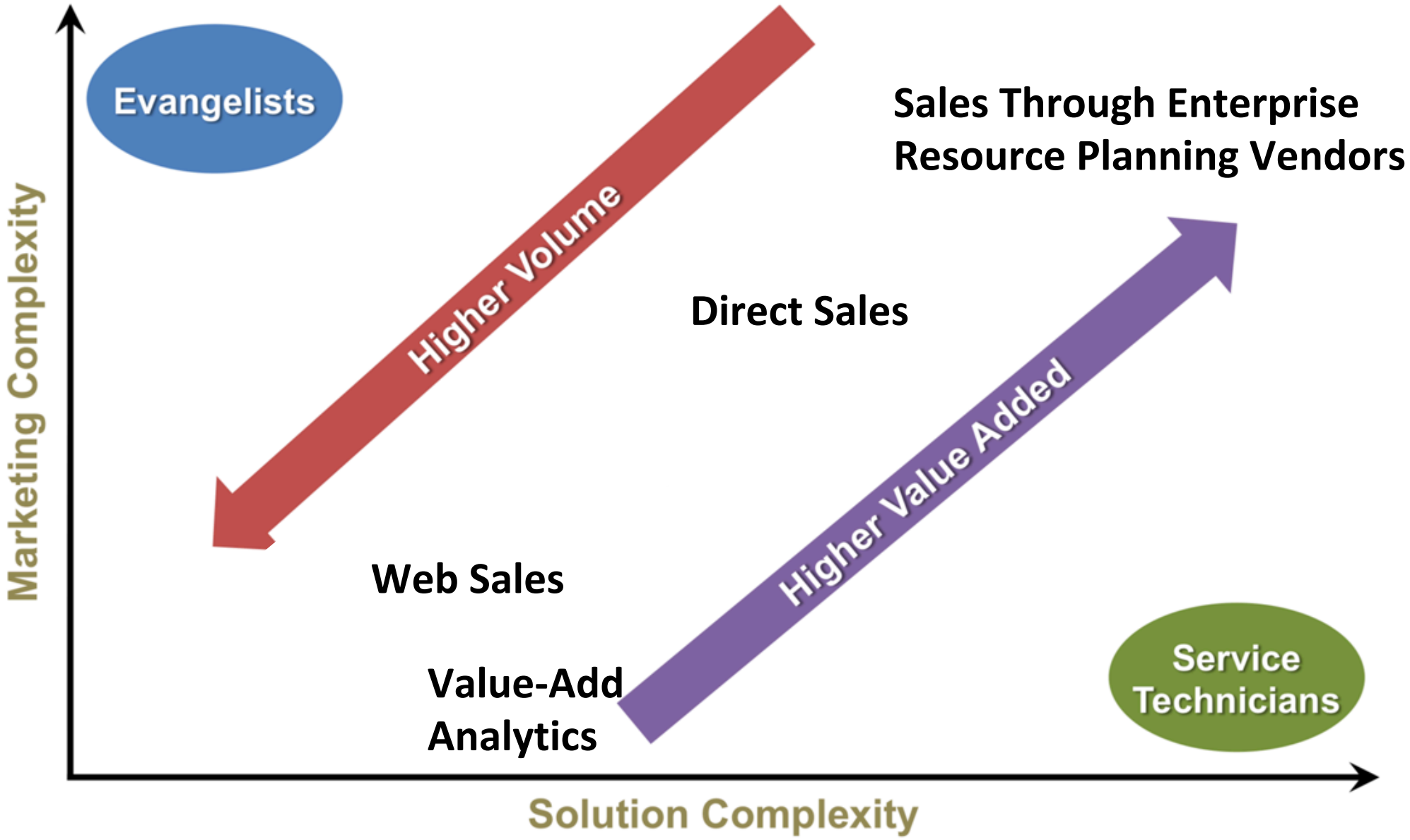
- Next Steps:
  - Talk to more supply chain managers.

Autonomy for the real world
Nabla Ascent




Autonomy for the real world
Nabla Ascent

# Distribution Complexity



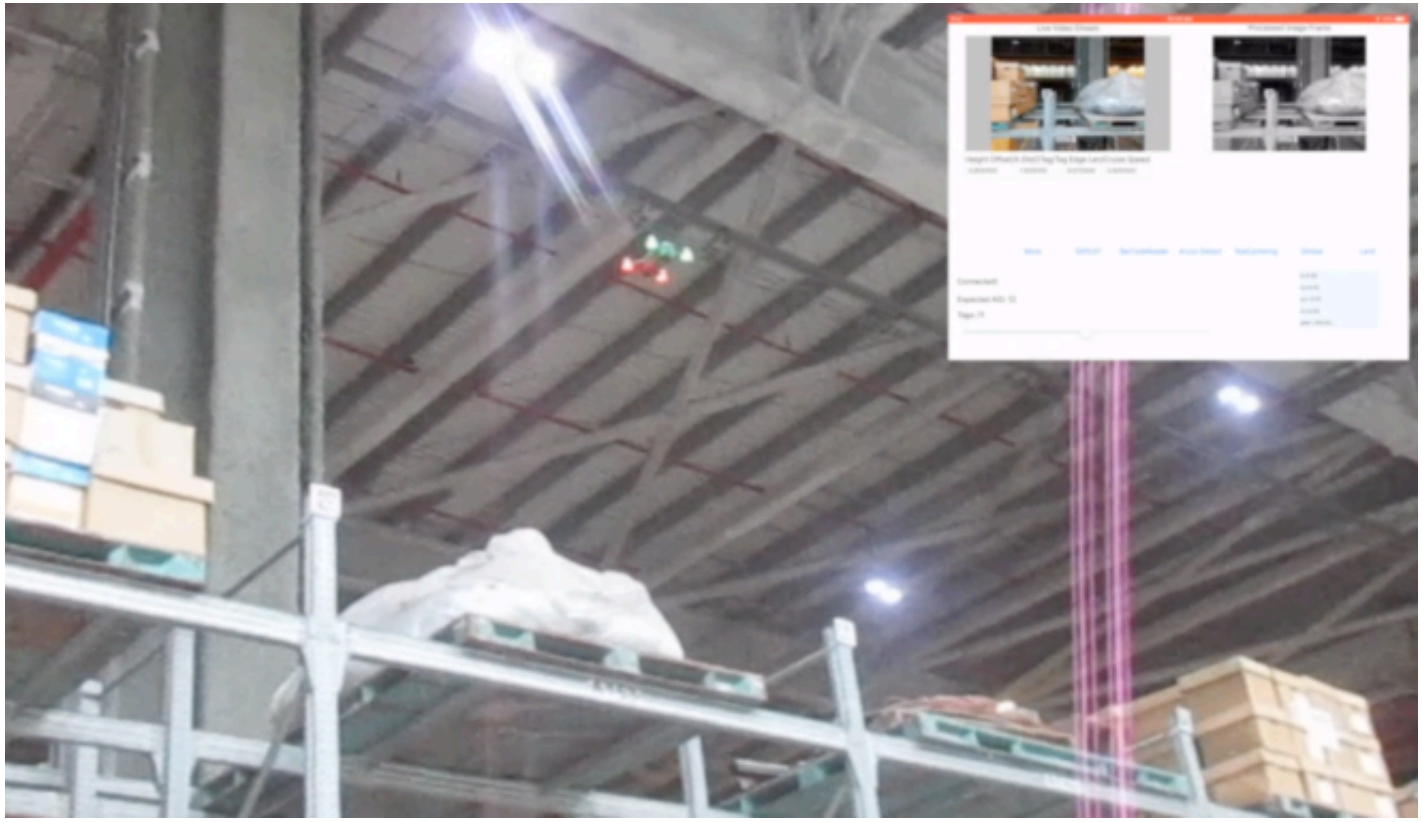

Ascent

Autonomy for the Real World

# Nabla Ascent



Sankalp Arora EL
Daniel Maturana TL
Robb Myer M
Sebastian Scherer PI



| | Interview Count | | | |
|---|---|---|---|---|
| NEW | 15 | 8 | 3 | 4 |
| TOTAL | 55 | 35 | 10 | 10 |

Nabla Ascent provides automated inventory monitoring for VP of supply chain and logistics of warehouses greater than 500,000 sq. ft., enabling are up to 2 orders of magnitude faster than manual inventory and reduce inventory work load by 80%.

# Inventory Monitoring: Accenture Retail

- Hypothesis: VP of supply chains/logistics are willing to pay for inventory monitoring for 30% reduction in effort needed in the distribution centers.

- Experiment: Ask Accenture's director of retail strategy

- Result: Through Innovation Labs large companies do demos, do pilots and buy products.
  - If you do yard inventory as well it is a $10M per yard opportunity.
  - Confirmed by William Sonoma, Merc's and Lowes.
  - **Sales take 3 months after that.**
  - Can use them as scale partners.

- Next Steps:
  - Talk to accenture research.

Autonomy for the real world
Nabla Ascent

# Inventory Monitoring: Global Operations

- Hypothesis: VP of supply chains/logistics are willing to pay for inventory monitoring for 30% reduction in effort needed in the warehouses.

- Experiment: Talk to VP operations.

- Result: Inventory monitoring does not only lead to 60% labor saving but solves the expansion problem for putting warehouses in new places.
  - **Currently facing labor shortage in Milan, Lahore and Iraq, all new centers.**
  - **Need analytics and asset tracking for further workforce optimization.**
- Next Steps:
  - Understand sales process.

# Inventory Air Cargo: Supply Chain Managers

- Hypothesis: Providing Live Inventory solves the lost in warehouse problem for Air Cargo warehouse operators, saving about $1M an year.
- Experiment: Talk to supply chain managers, VP logistics.

- Result: United spends more than a $1M on overnight shipping for just catering.
  - Inventory management is the issue here and roving teams of people solve it.
  - **They are willing to pay for this service to be installed at their caterers.**

- Next Steps:
  - Talk to more supply chain managers.

Autonomy for the real world
Nabla Ascent

## Key Partners

- Drone manufacturers
- Consultants to develop initial dashboards
- Sensor developers/Hardware manufacturers

## Key Activities

- Development of autonomous solutions
- Maintiaining Online dashboard for analytics
- Customer support through setup, install and ...

## Key Resources

- Software/Hardware robotics developers
- Hardware suppliers for the solution
- Customer relationship managers

## Value Propositions

- 30% Labor saving in taking inventory
- Cost savings on taking inventory
- Optimizing Operations
- Product visibility
- Upsell to customers
- Continous facility monitoring through data analytics
- 24/7 live inventory

## Customer Relationshi...

- Marketing campaign in relevant conferences
- subsidized customer trials
- Customer Service

## Channels

- ERP Vendors
- Direct B2B Sales
- Online self-setup kits

## Customer Segments

- Air Cargo: VP SPL, WM
- 3PLs: VP SPL, WM
- Direct store delivery vendors - Operations managers
- ~~Retail stores: VP SPL, Store Manager~~
- Distribution Centers: Dir, VP SPL, WM
- Factories with need for asset tracking: Dir, VP SPL, Floor ...

## Cost Structure

- Employee Salaries
- Hardware purchases
- Battery procurement and shipping

## Revenue Streams

- Monthly subscription inventory services
- Upsell analytics as value-add

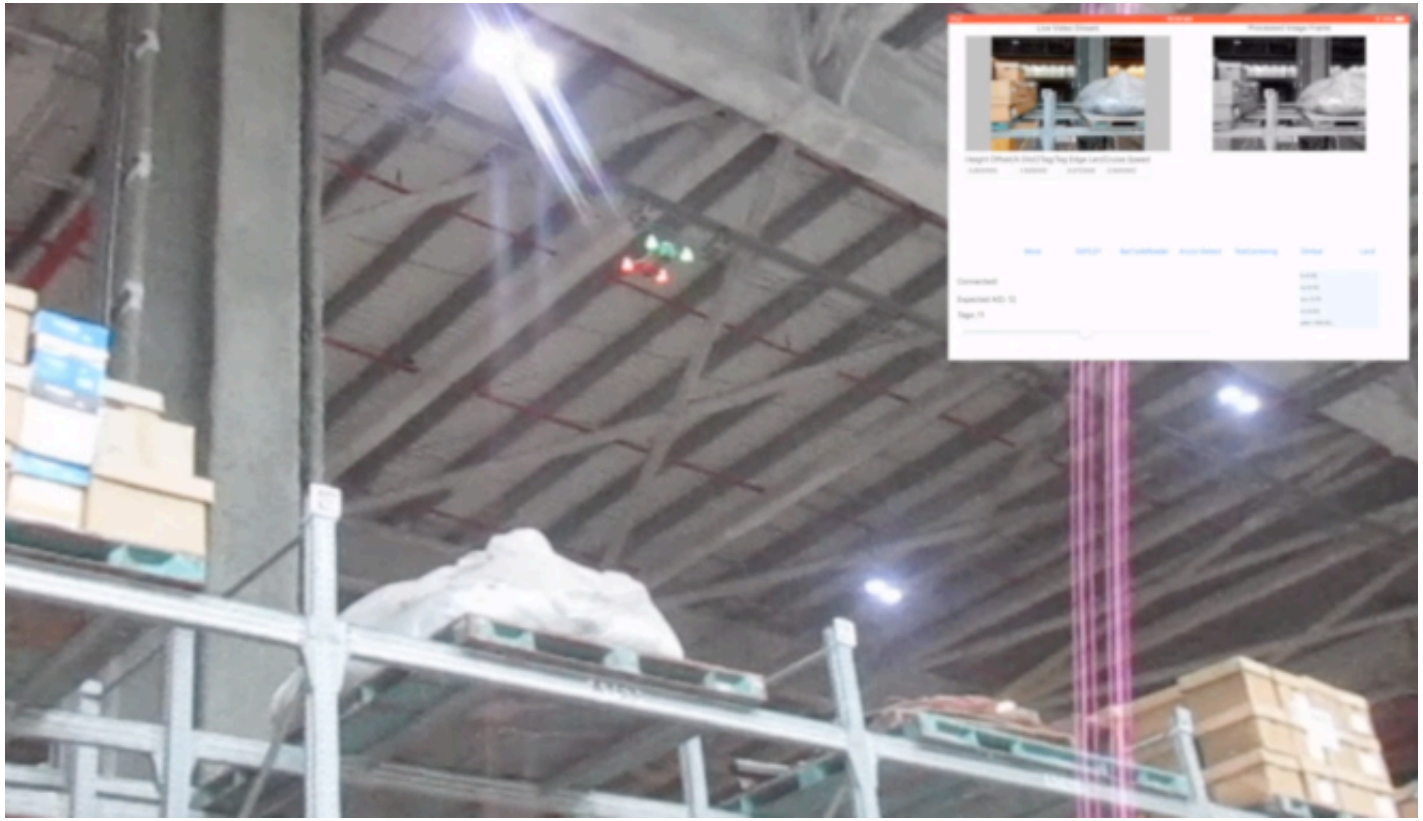
Autonomy for the real world
Nabla Ascent

| Activity | Type | Cost | Revenue | Duration (days) | Cost | Revenue |
|---|---|---|---|---|---|---|
| Conference Registration | Get | $5,000 | 0 | 1 | $5,000 | 0 |
| Conference Lodging | Get | $250 | 0 | 3 | $750 | 0 |
| Conference Travel | Get | $2,000 | 0 | 2 | $4,000 | 0 |
| PR Blitz | Get | $5,000 | 0 | | $0 | 0 |
| Demo | Get | $5,000 | 0 | 1 | $5,000 | 0 |
| Pilot | Get | $100 | 0 | 90 | $9,000 | 0 |
| Pilot-Rev | Get | $0 | $200 | 90 | $0 | $18,000 |
| | | | 0 | | 0 | 0 |
| Sales | Get | $10,000 | 0 | 1 | $10,000 | 0 |
| Hardware Cost | Keep | $21,000 | 0 | 1 | $21,000 | 0 |
| Monthly Cost | Keep | $300 | 0 | 12 | $3,600 | 0 |
| Forward Engineer/Op | Keep | $8,000 | 0 | 1 | $8,000 | 0 |
| Sales Rep | Keep/Grow | $5,000 | 0 | 1 | $5,000 | 0 |
| Account Manager | Keep/Grow | $2,000 | 0 | 1 | $2,000 | 0 |
| | | | 0 | | 0 | 0 |
| Revenue | | $0 | $7,000 | 12 | $0 | $84,000 |
| Total Revenue | | | | Total Cost | $73,350 | 102000 |
| | | | | | Duration | 3 |
| | | | | | LTV | $133,200 |

Autonomy for the Real World

# Nabla Ascent

Sankalp Arora EL
Daniel Maturana TL
Robb Myer M
Sebastian Scherer PI



| | Interview Count | | | |
|---|---|---|---|---|
| NEW | 16 | 7 | 3 | 6 |
| TOTAL | 71 | 42 | 13 | 16 |

Nabla Ascent provides automated inventory monitoring for VP of supply chain and logistics of warehouses greater than 500,000 sq. ft., reducing cycle count update time from 4 hours to 15 minutes and reduce inventory management work load by 60%.

# Inventory Monitoring: William Sonoma

- Hypothesis: VP of supply chains/logistics are willing to pay for inventory monitoring for 30% reduction in effort needed in the distribution centers/yards.

- Experiment: Ask William Sonoma's CTO

- Result: They currently pay more than $5000 per yard monthly to total save around $0.5M annually. For a product offering better yard inventory monitoring.
  - The product they are using is completely manual and the cost saving is through better location monitoring.
  - $0.5M is not even 10% reduction and if they are willing to pay for that, then I would assume hypothesis is true.
  - CTO was unwilling to give any specific numbers

- Next Steps:
  - Talk to operations folks (interesting)

# Inventory Monitoring: 3rd Party solution Providers

- Hypothesis: 3rd Party solution providers will sell added automated inventory monitoring capabilities for an add on of over $100K per year.

- Experiment: Talk to CEO of Stephen Gould.

- Result: They are excited about the prospect of the competitive advantage they get from selling automated inventory monitoring.
  - **Will not discuss pricing without an NDA.**
  - **Seem to suggest repeatedly that the solution will be much more valuable if sold with a Warehouse Management System.**
- Next Steps:
  - Sign the NDA?

## Key Partners

- Drone manufacturers
- Consultants to develop initial dashboards
  Sankalp Arora • January 16, 2019
  0 0 0
- Sensor developers/Hardware manufacturers

## Key Activities

- Development of autonomous solutions
- Maintiaining Online dashboard for analytics
- Customer support through setup, install and ...

## Key Resources

- Software/Hardware robotics developers
- Hardware suppliers for the solution
- Customer relationship managers

## Value Propositions

- 30% Labor saving in taking inventory
- 40% saving on placement decision making staff due ...
- 10% gain in warehouse throughput efficiency due ...
- ~~Cost savings on taking inventory~~
- ~~24/7 live inventory~~
- Product visibility
- Upsell to customers
- Reduced losses from

## Customer Relationshi...

- References and cold calls
- Marketing campaign in relevant conferences
- subsidized customer trials
- Customer Service

## Channels

- ERP Vendors
- Direct B2B Sales
- Online self-setup kits

## Customer Segments

- Air Cargo: VP SPL, WM
- 3PLs: VP SPL, WM
- Distribution Centers: Dir, VP SPL, WM
- Direct store delivery vendors - Operations managers
- Factories with need for asset tracking: Dir, VP SPL, Floor ...

## Cost Structure

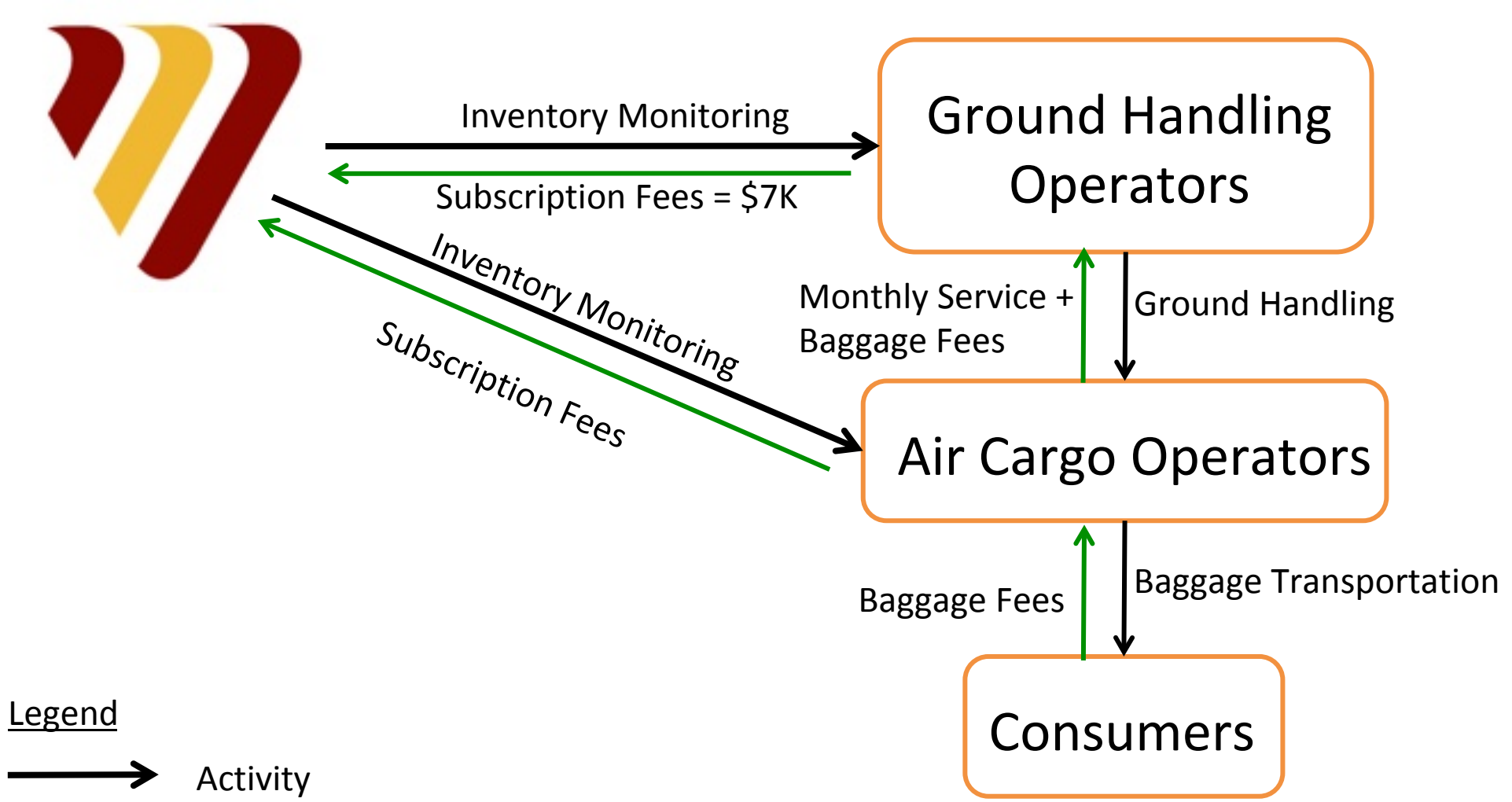
- Employee Salaries
- Hardware purchases
- Battery procurement and shipping

## Revenue Streams

- Monthly subscription inventory services
- Upsell analytics as value-add
- On Use, per package basis, shared success model

Autonomy for the real world
Nabla Ascent

# Payment Flow Diagram

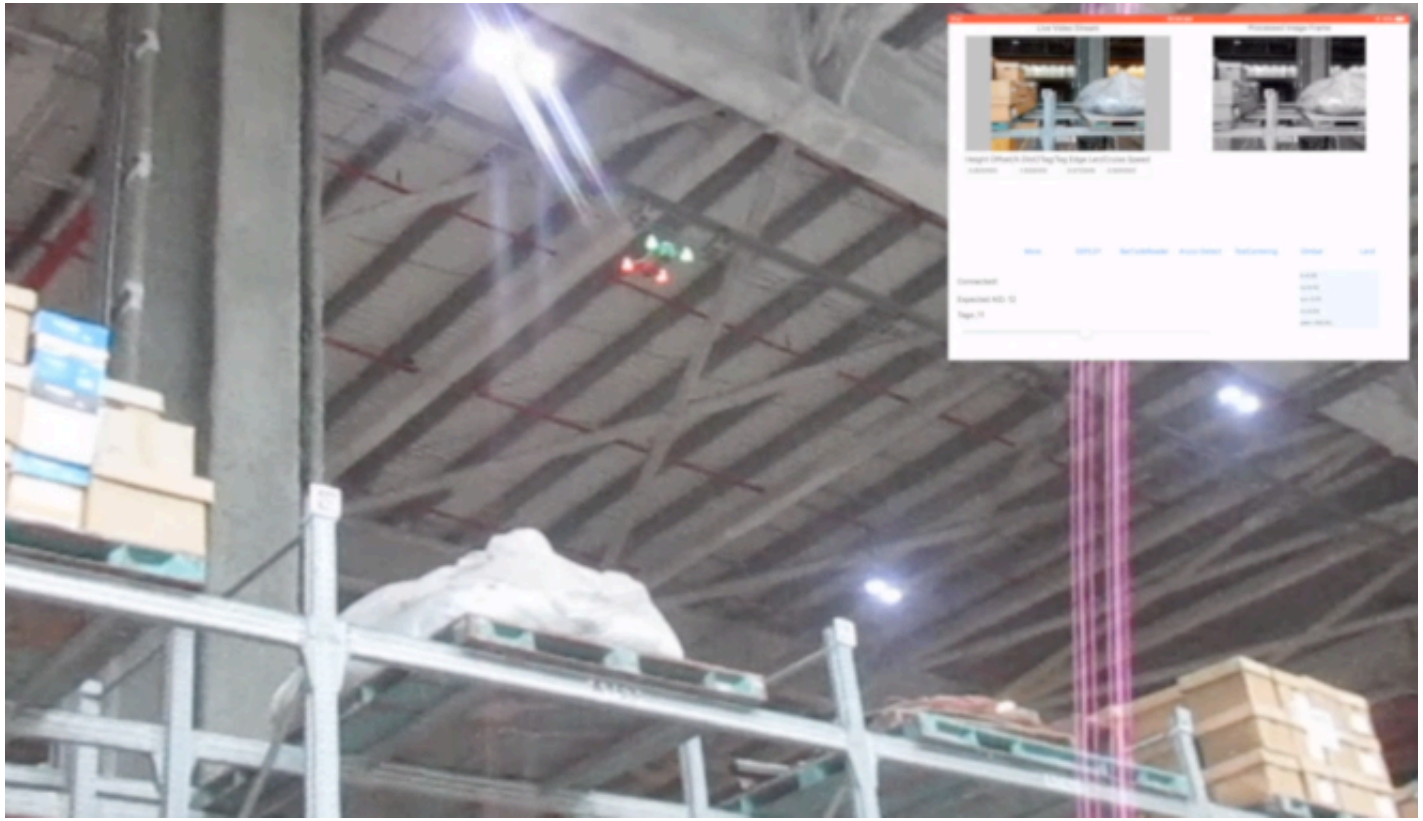



Autonomy for the real world
Nabla Ascent

Autonomy for the Real World

# Nabla Ascent

Sankalp Arora EL | Daniel Maturana TL | Robb Myer M | Sebastian Scherer PI



| | Interview Count | | | |
|---|---|---|---|---|
| NEW | 15 | 10 | 0 | 6 |
| TOTAL | 86 | 52 | 13 | 21 |

Nabla Ascent provides automated inventory monitoring for VP of supply chain and logistics of warehouses greater than 500,000 sq. ft., reducing inventory management work load by 60%.

# Inventory Monitoring: Usha

- Hypothesis: VP of supply chains/logistics are willing to pay for inventory monitoring for 30% reduction in effort needed in the distribution centers/yards.

- Experiment: Ask Usha's Senior VP Supply Chain Management

- Result: They have to take cycle counts once a month that shuts down the NDC for 3-4 days, was unwilling to share the exact costs, but around 70 people work there.
  - Current process is completely manual and the cost saving is through better location monitoring.
  - Damaged stocks is another pain point.

- Next Steps:
  - Visiting the facility today

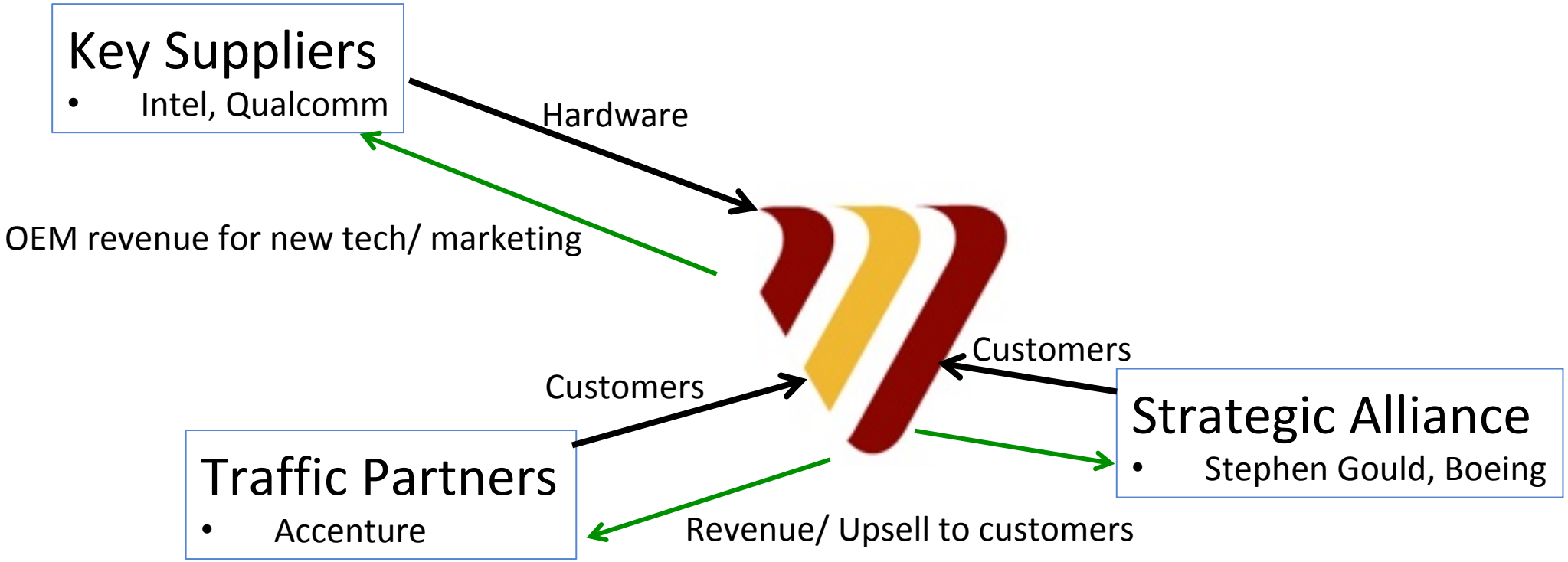
# Inventory Monitoring: HMEL

- Hypothesis: VP of supply chains/logistics are willing to pay for inventory monitoring for 30% reduction in effort needed in the distribution centers/ yards.

- Experiment: Talk to the CTO of HMEL.

- Result: They just spent $70M to develop a fully autonomous warehouse to solve the labor shortage problem.
  - **The whole industry suffers from it, the labor shortage problem is actually the labor dynamics problem, due to supply chain dynamics variable labor force is needed and managing a variable labor force is difficult.**
  - **They have smaller operations where they looking to automate to reduce labor dependence and labor spends around 50% of their time in inventory monitoring.**
- Next Steps:
  - Talk to the operations people

# Partnerships




Video Link - https://youtu.be/ND4WL7Dfc3k

Autonomy for the real world
Nabla Ascent

## Key Partners

- WMS solution providers
- ERP solution providers
- Drone manufacturers
- Sensor developers/Hardware manufacturers
- ~~Consultants to develop initial dashboards~~

## Key Activities

- Development of autonomous solutions
- Maintiaining Online dashboard for analytics
- Customer support through setup, install and ...

## Key Resources

- Software/Hardware robotics developers
- Hardware suppliers for the solution
- Customer relationship managers

## Value Propositions

- 30% Labor saving in taking inventory
- 40% saving on placement decision making staff due ...
- 10% gain in warehouse throughput efficiency due ...
- Product visibility
- Upsell to customers
- Reduced losses from missing/mismatched inventory

## Customer Relationshi...

- References and cold calls
- Marketing campaign in relevant conferences
- subsidized customer trials
- Customer Service

## Channels

- ERP Vendors
- Direct B2B Sales
- Online self-setup kits

## Customer Segments

- Air Cargo: VP SPL, WM
- 3PLs: VP SPL, WM
- Distribution Centers: Dir, VP SPL, WM
- Direct store delivery vendors - Operations managers
- Factories with need for asset tracking: Dir, VP SPL, Floor ...

## Cost Structure

- Employee Salaries
- Hardware purchases
- Battery procurement and shipping
- Maintenance

## Revenue Streams

- Monthly subscription inventory services
- Upsell analytics as value-add
- On Use, per package basis, shared success model

Autonomy for the real world
Nabla Ascent

Autonomy for the Real World

# Nabla Ascent

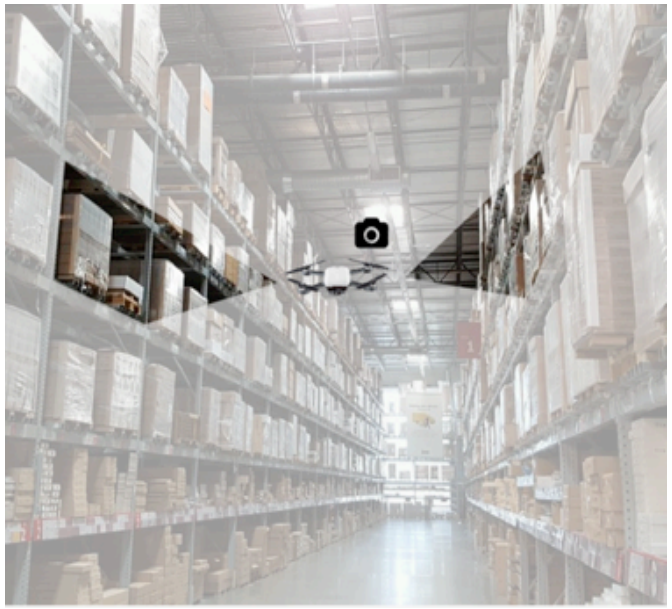
Sankalp Arora EL
Daniel Maturana TL
Robb Myer M
Sebastian Scherer PI



| | Interview Count | | | |
|---|---|---|---|---|
| NEW | 27 | 26 | 0 | 1 |
| TOTAL | 113 | 78 | 13 | 22 |

Dynamic labor needs making warehouses inoperable, with 3PL's and Air Cargo spending more than 300 hours/week on inventory monitoring

# We provide automated inventory and operations monitoring solutions

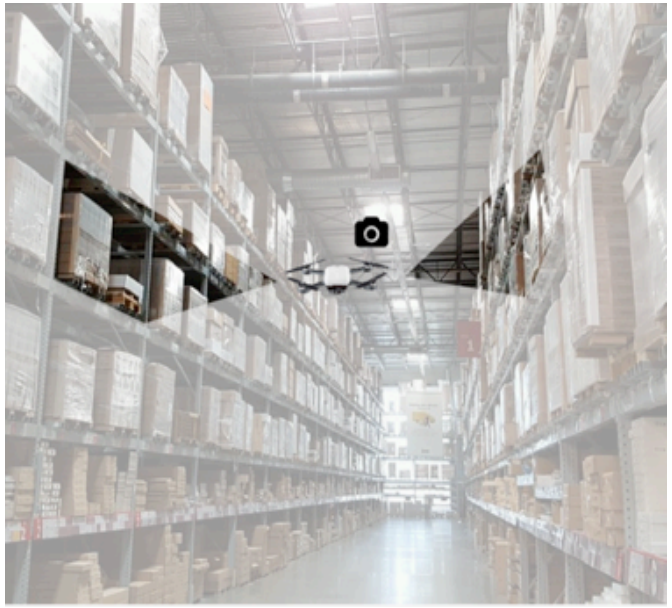


Vertical Warehouses



Autonomy for the real world
Nabla Ascent

# We provide automated inventory and operations monitoring solutions



Vertical Warehouses

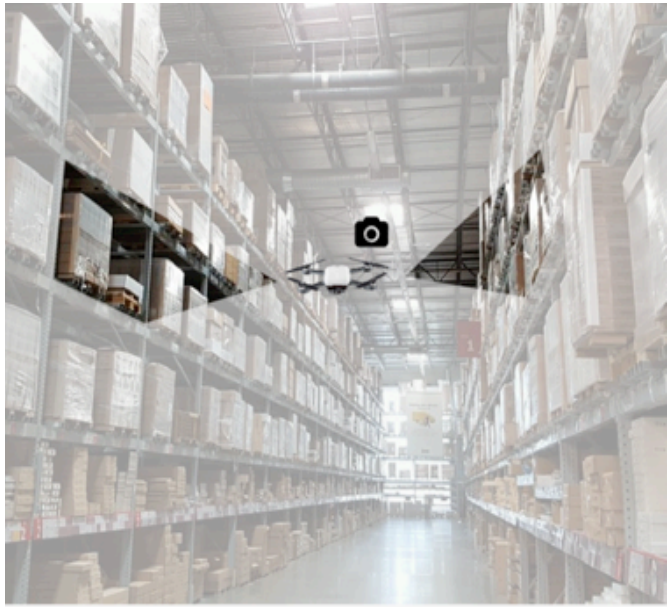



Horizontal Warehouses

RFID

Autonomy for the real world
Nabla Ascent

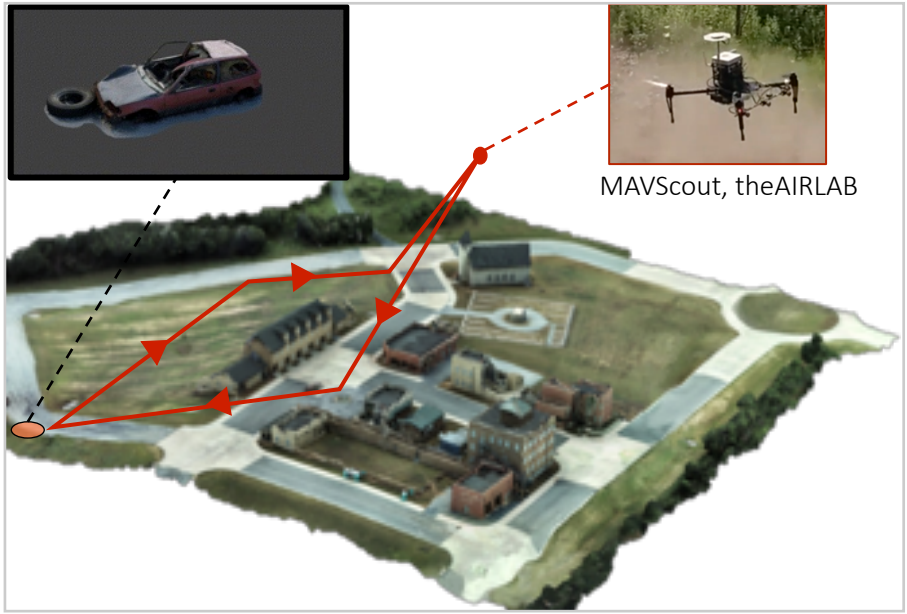
# We provide automated inventory and operations monitoring solutions



Vertical Warehouses




Horizontal Warehouses




Yards with front view

Autonomy for the real world
Nabla Ascent



Robb Myer

M



MBA, CMU



Entrepreneur of the year

nowait

Founder



Robb Myer

M



MBA, CMU



Entrepreneur of the year

nowait

Founder



Daniel Maturana

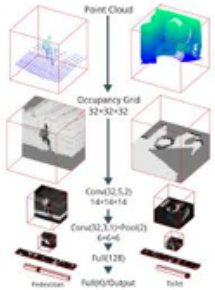
TL



Doctoral Candidate, RI, CMU



2 National Awards,
1 Fellowship




VOXNET



Robb Myer

M



MBA, CMU



Entrepreneur of the year

nowait

Founder



Daniel Maturana

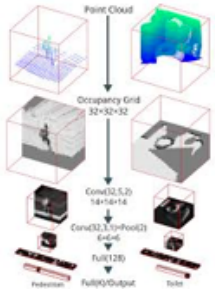
TL



Doctoral Candidate, RI, CMU



2 National Awards,
1 Fellowship



VOXNET



Sankalp Arora

EL



Ph. D.,RI , CMU



2 National Awards,
2 Fellowship

# What we thought we provide: Data analytics and inventory monitoring solutions for warehouses with autonomous drones.

## Key Partners

- Drone manufacturers
- Consultants to develop initial dashboards
- Sensor developers/Hardware manufacturers

## Key Activities

- Development of autonomous solutions
- Maintiaining Online dashboard for analytics
- Customer support through setup, install and maintanence

## Key Resources

- Software/Hardware robotics developers
- Hardware suppliers for the solution
- Customer relationship managers

## Value Propositions

- Cost savings on taking inventory
- 24/7 live inventory
- Reduced losses from missing/mismatched inventory
- Continous facility monitoring through data analytics
- Optimizing Operations
- Product visibility
- Upsell to customers

## Customer Relationships

- References and cold calls
- Marketing campaign in relevant conferences
- subsidized customer trials
- Customer Service

## Channels

- Direct B2B Sales
- Online self-setup kits

## Customer Segments

- Warehouses with daily or weekly inventory taking ...
- Air Cargo
- 3PLs
- Distribution Centers
- Factories with need for asset tracking
- Retail stores

## Cost Structure

- Employee Salaries
- Hardware purchases
- Battery procurement and shipping

## Revenue Streams

- Monthly subscription inventory services
- Upsell analytics as value-add

# What we thought we provide: Data analytics and inventory monitoring solutions for warehouses with autonomous drones.

## Key Partners
- Drone manufacturers
- Consultants to develop initial dashboards
- Sensor developers/Hardware manufacturers

## Key Activities
- Development of autonomous solutions
- Maintiaining Online dashboard for analytics
- Customer support through setup, install and maintanence

## Key Resources
- Software/Hardware robotics developers
- Hardware suppliers for the solution
- Customer relationship managers

## Value Propositions
- Cost savings on taking inventory
- 24/7 live inventory
- [illegible] losses from [illegible]/mismatched inventory
- Continous facility monitoring [illegible]
- Optimizing Operations
- Product visibility
- Upsell to customers

**No testable hypothesis**

## Customer Relationships
- References and cold calls
- Marketing campaign in relevant conferences
- subsidized customer trials
- Customer Service

## Channels
- Direct B2B Sales
- Online self-setup kits

## Customer Segments
- Warehouses with daily or weekly inventory taking ...
- Air Cargo
- 3PLs
- Distribution Centers
- Factories with need for asset tracking
- Retail stores

## Cost Structure
- Employee Salaries
- Hardware purchases
- Battery procurement and shipping

## Revenue Streams
- Monthly subscription inventory services
- Upsell analytics as value-add

# What we thought we provide: Data analytics and inventory monitoring solutions for warehouses with autonomous drones.

## Key Partners
- Drone manufacturers
- Consultants to develop initial dashboards
- Sensor developers/Hardware manufacturers

## Key Activities
- Development of autonomous solutions
- Maintiaining Online dashboard for analytics
- Customer support through setup, install and maintanence

## Key Resources
- Software/Hardware robotics developers
- Hardware suppliers for the solution
- Customer relationship managers

## Value Propositions
- Cost savings on taking inventory
- 24/7 live inventory
- [illegible] losses from [illegible]/mismatched inventory
- Continous facility monitoring [illegible] data analytics
- Optimizing Operations
- Product visibility
- Upsell to customers

**No testable hypothesis**

## Customer Relationships
- References and cold calls
- Marketing campaign in relevant conferences
- subsidized customer trials
- Customer Service

## Channels
- Direct B2B Sales
- Online self-setup kits

## Customer Segments
- Warehouses with daily or weekly inventory taking ...
- [illegible]
- 3PLs
- Distribution Centers
- Factories with need for asset tracking
- [illegible]

**Every company with a warehouse**

## Cost Structure
- Employee Salaries
- Hardware purchases
- Battery procurement and shipping

## Revenue Streams
- Monthly subscription inventory services
- Upsell analytics as value-add

# Some household companies we talked to…



# Some household companies we talked to…

WILLIAMS-SONOMA

LOWE'S

INDEPENDENT SERVICE PROVIDER

DHL

SAINT-GOBAIN

Walmart

THE HOME DEPOT

accenture

TATA SOLAR

Emirates

intel

Microsoft

Sam's CLUB

LOCUS

QUIET LOGISTICS

TARGET

# Facilities we visited



# Some household companies we talked to…

WILLIAMS-SONOMA

LOWE'S

INDEPENDENT SERVICE PROVIDER

DHL

SAINT-GOBAIN

Walmart

THE HOME DEPOT

accenture

TATA SOLAR

Emirates

intel

Microsoft

Sam's CLUB

LOCUS

QUIET LOGISTICS

TARGET

# Facilities we visited




# Cities we travelled



# Retail: In-store pain-point is already addressed or does not exist.













Store Managers

# Retail: In-store pain-point is already addressed or does not exist.

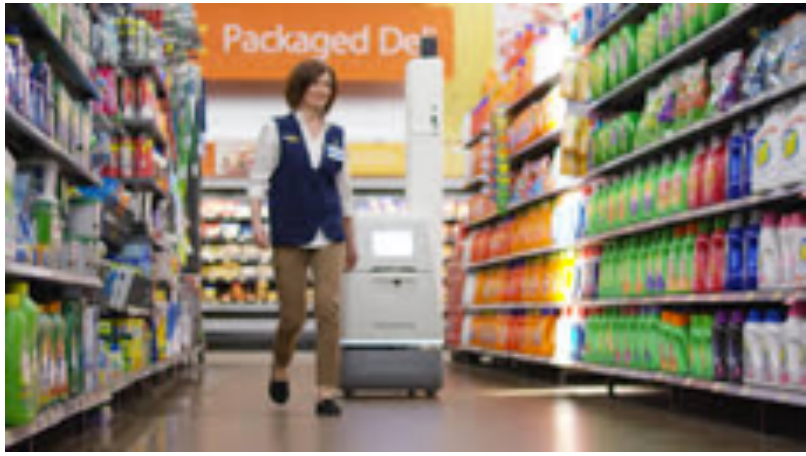


Store Managers

# Retail: In-store pain-point is already addressed or does not exist.

Store Managers



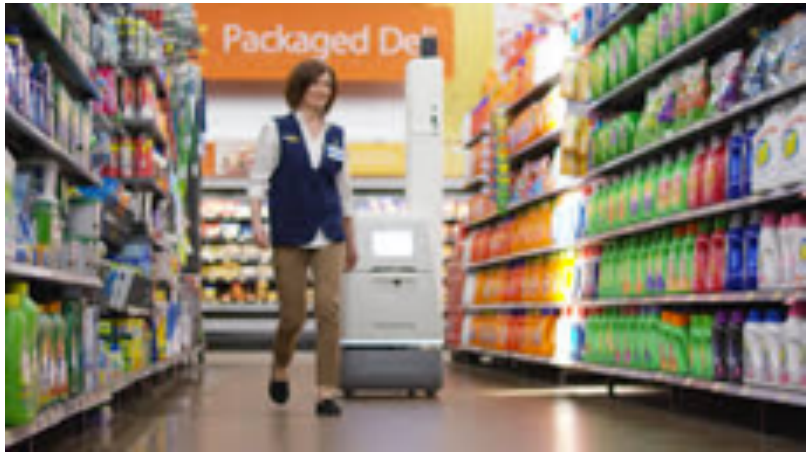



Bossanova Robotics

# Retail: In-store pain-point is already addressed or does not exist.



Store Managers



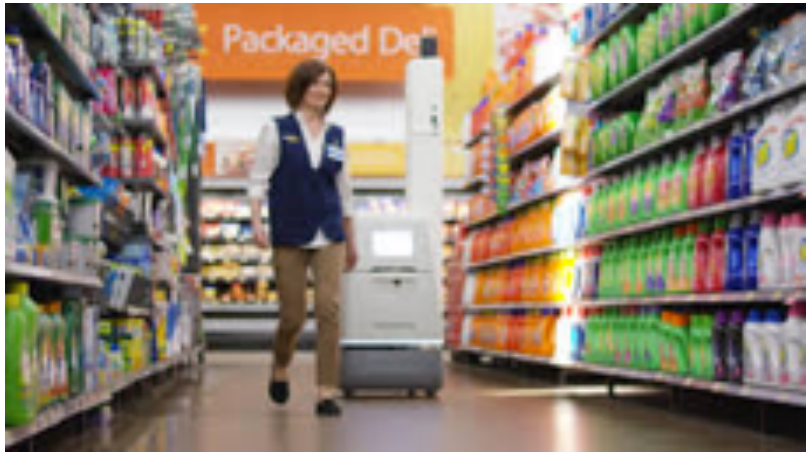

Bossanova Robotics

Retail stores: VP SPL, Store Manager

# Retail: In-store pain-point is already addressed or does not exist.



Store Managers




Bossanova Robotics

~~Retail stores: VP SPL, Store Manager~~

# Retail: Shark-Bite Problem




WILLIAMS-SONOMA

accenture




CXO, SVP Supply Chain

# Retail: Shark-Bite Problem

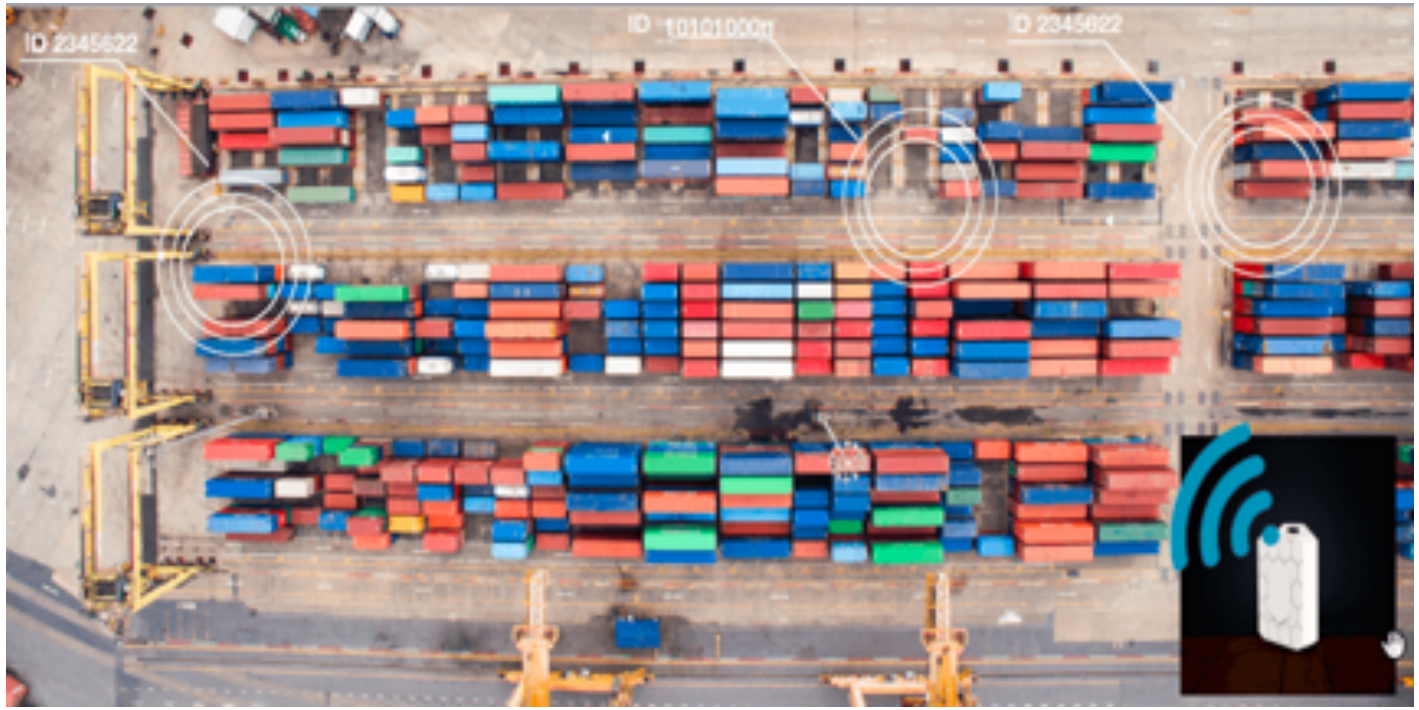
LOWE'S

WILLIAMS-SONOMA

accenture

USHA

CXO, SVP Supply Chain



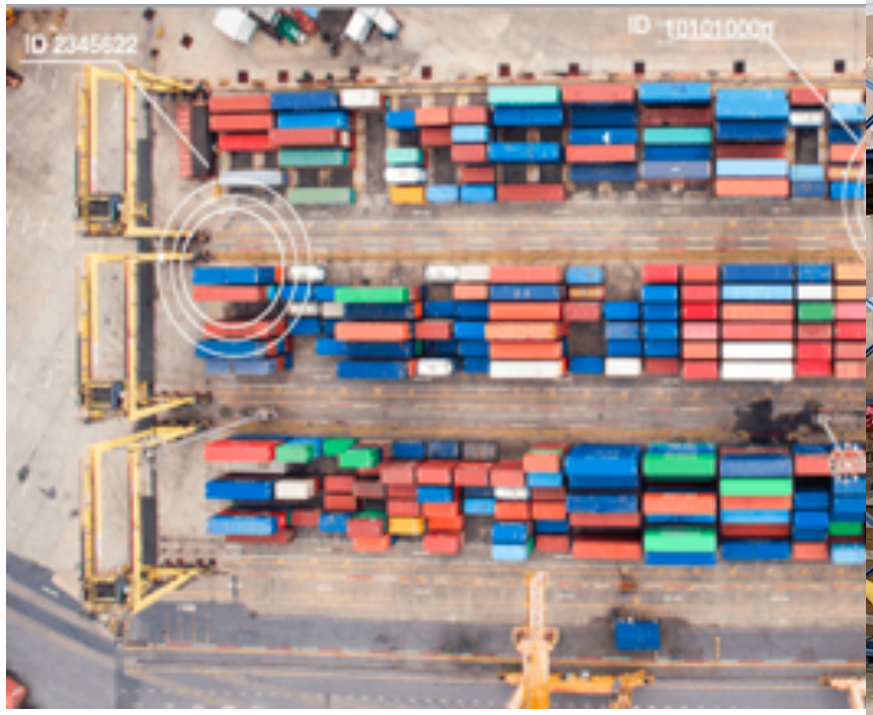
# Retail: Shark-Bite Problem

LOWE'S

WILLIAMS-SONOMA

accenture

USHA





CXO, SVP Supply Chain

# Retail: Shark-Bite Problem

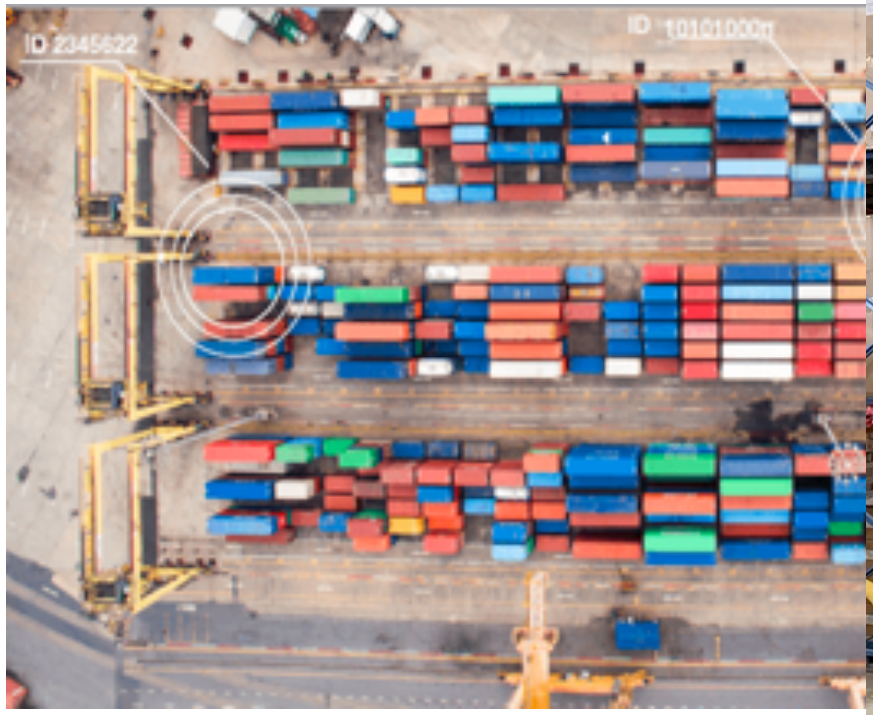
LOWE'S

WILLIAMS-SONOMA

accenture

USHA

CXO, SVP Supply Chain





Distribution Centers: Dir, VP
SPL, WM

# Retail: Shark-Bite Problem

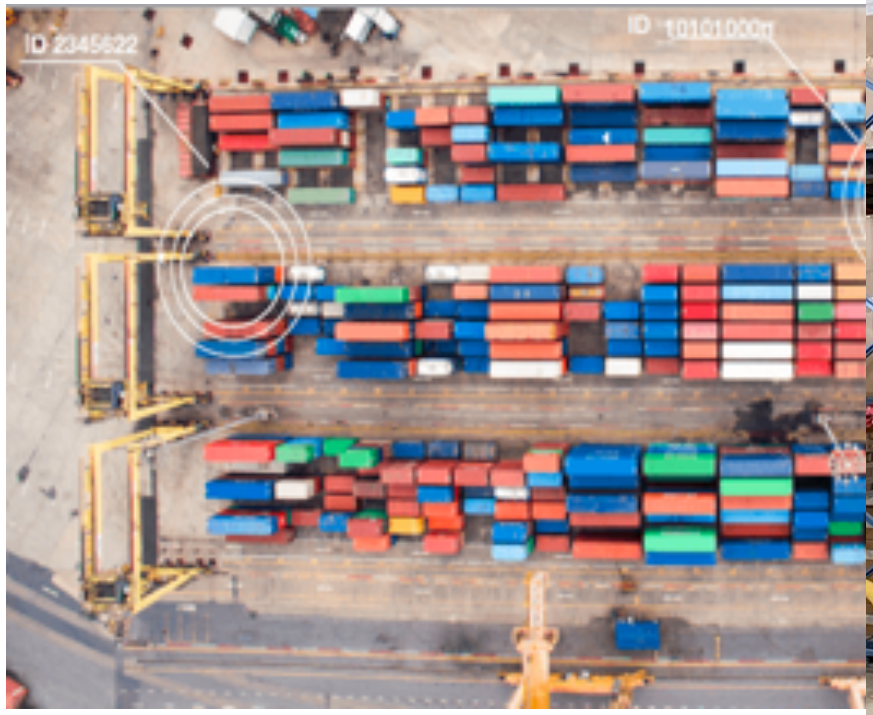
LOWE'S

WILLIAMS-SONOMA

accenture

USHA

CXO, SVP Supply Chain





Distribution Centers: Dir, VP
SPL, WM

## Key Partners

- Drone manufacturers
- Consultants to develop initial dashboards
- Sensor developers/Hardware manufacturers

## Key Activities

- Development of autonomous solutions
- Maintiaining Online dashboard for analytics
- Customer support through setup, install and ...

## Key Resources

- Software/Hardware robotics developers
- Hardware suppliers for the solution
- Customer relationship managers

## Value Propositions

- 30% Labor saving in taking inventory
- Cost savings on taking inventory
- Optimizing Operations
- Product visibility
- Upsell to customers
- Continous facility monitoring through data analytics
- 24/7 live inventory

## Customer Relationshi...

- Marketing campaign in relevant conferences
- subsidized customer trials
- Customer Service

## Channels

- ERP Vendors
- Direct B2B Sales
- Online self-setup kits

## Customer Segments

- Air Cargo: VP SPL, WM
- 3PLs: VP SPL, WM
- Direct store delivery vendors - Operations managers
- ~~Retail stores: VP SPL, Store Manager~~
- Distribution Centers: Dir, VP SPL, WM
- Factories with need for asset tracking: Dir, VP SPL, Floor ...

## Cost Structure

- Employee Salaries
- Hardware purchases
- Battery procurement and shipping

## Revenue Streams

- Monthly subscription inventory services
- Upsell analytics as value-add

## Key Partners

- Drone manufacturers
- Consultants to develop initial dashboards
- Sensor developers/Hardware manufacturers

## Key Activities

- Development of autonomous solutions
- Maintiaining Online dashboard for analytics
- Customer support through setup, install and ...

## Key Resources

- Software/Hardware robotics developers
- Hardware suppliers for the solution
- Customer relationship managers

## Value Propositions

- 30% Labor saving in taking inventory
- Cost savings on taking inventory
- Optimizing Operations
- Product visibility
- Upsell to customers
- Continous facility monitoring through data analytics
- 24/7 live inventory

## Customer Relationshi...

- Marketing campaign in relevant conferences
- subsidized customer trials
- Customer Service

## Channels

- ERP Vendors
- Direct B2B Sales
- Online self-setup kits

## Customer Segments

- Air Cargo: VP SPL, WM
- 3PLs: VP SPL, WM
- Direct store delivery vendors - Operations managers
- ~~Retail stores: VP SPL, Store Manager~~
- [illegible] WM
- Factories with need for asset tracking: Dir, VP SPL, Floor ...

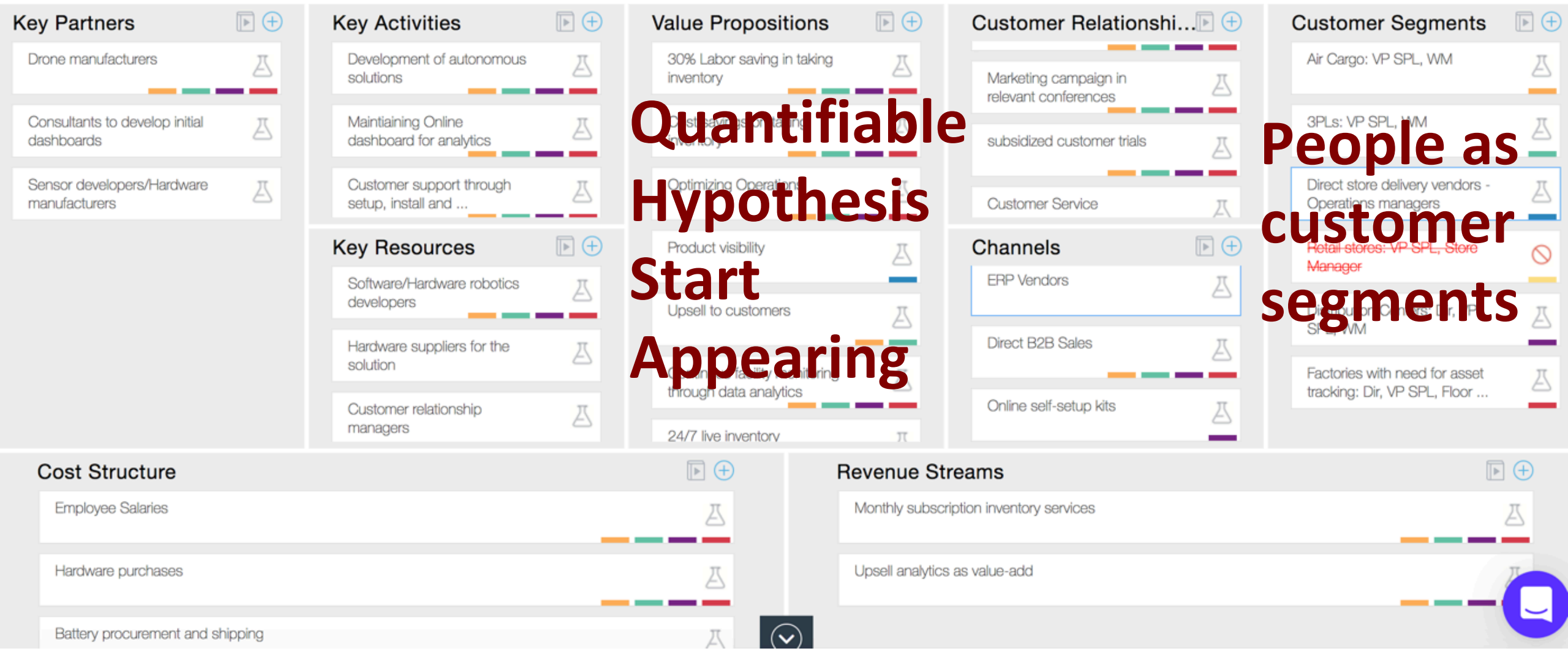
**People as customer segments**

## Cost Structure

- Employee Salaries
- Hardware purchases
- Battery procurement and shipping

## Revenue Streams

- Monthly subscription inventory services
- Upsell analytics as value-add




**Quantifiable Hypothesis Start Appearing**

**People as customer segments**

# 3PL’s and Air Cargo Warehouse Managers say their biggest pain point is inventory monitoring.

Warehouse Managers,
VP Supply Chain

# 3PL's and Air Cargo Warehouse Managers say their biggest pain point is inventory monitoring.

Emirates

QUIET LOGISTICS

ODW Logistics, Inc.





Warehouse Managers,
VP Supply Chain

# 3PL's and Air Cargo Warehouse Managers say their biggest pain point is inventory monitoring.

Emirates

QUIET LOGISTICS

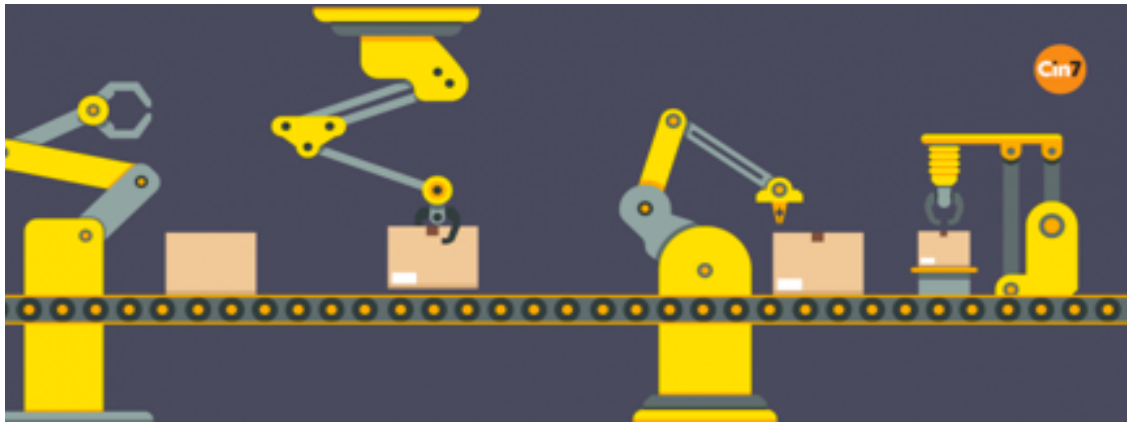
ODW Logistics, Inc.

Warehouse Managers,
VP Supply Chain

TARGET








- Inflexible
- CapEx

# Supply Chain Fault Detection is an established business



# Supply Chain Fault Detection is an established business

LINK 2019




PROFITECT
Identify, Resolve & Measure™

LOGINNO
Smart Logistic Innovations

# Supply Chain Fault Detection is an established business

LINK 2019




PROFITECT
Identify, Resolve & Measure™

LOGINNO
Smart Logistic Innovations



# And they are really willing to pay… they are already paying!



LOCUS



# And they are really willing to pay… they are already paying!

LOCUS

DHL



## Key Partners

- WMS solution providers
- ERP solution providers
- Drone manufacturers
- Sensor developers/Hardware manufacturers

## Key Activities

- Development of autonomous solutions
- Maintiaining Online dashboard for analytics
- Customer support through setup, install and ...

## Key Resources

- Software/Hardware robotics developers
- Hardware suppliers for the solution
- Customer relationship managers

## Value Propositions

- 30% Labor saving in taking inventory
- 40% saving on placement decision making staff due ...
- 10% gain in warehouse throughput efficiency due ...
- Product visibility
- Upsell to customers
- Reduced losses from missing/mismatched inventory

## Customer Relationshi...

- References and cold calls
- Marketing campaign in relevant conferences
- subsidized customer trials
- Customer Service

## Channels

- ERP Vendors
- Direct B2B Sales
- Online self-setup kits

## Customer Segments

- Air Cargo: VP SPL, WM
- 3PLs: VP SPL, WM
- Distribution Centers: Dir, VP SPL, WM
- [illegible]
- [illegible]
- Factories with need for asset tracking: Dir, VP SPL, Floor ...

**Focused Customer Segments**

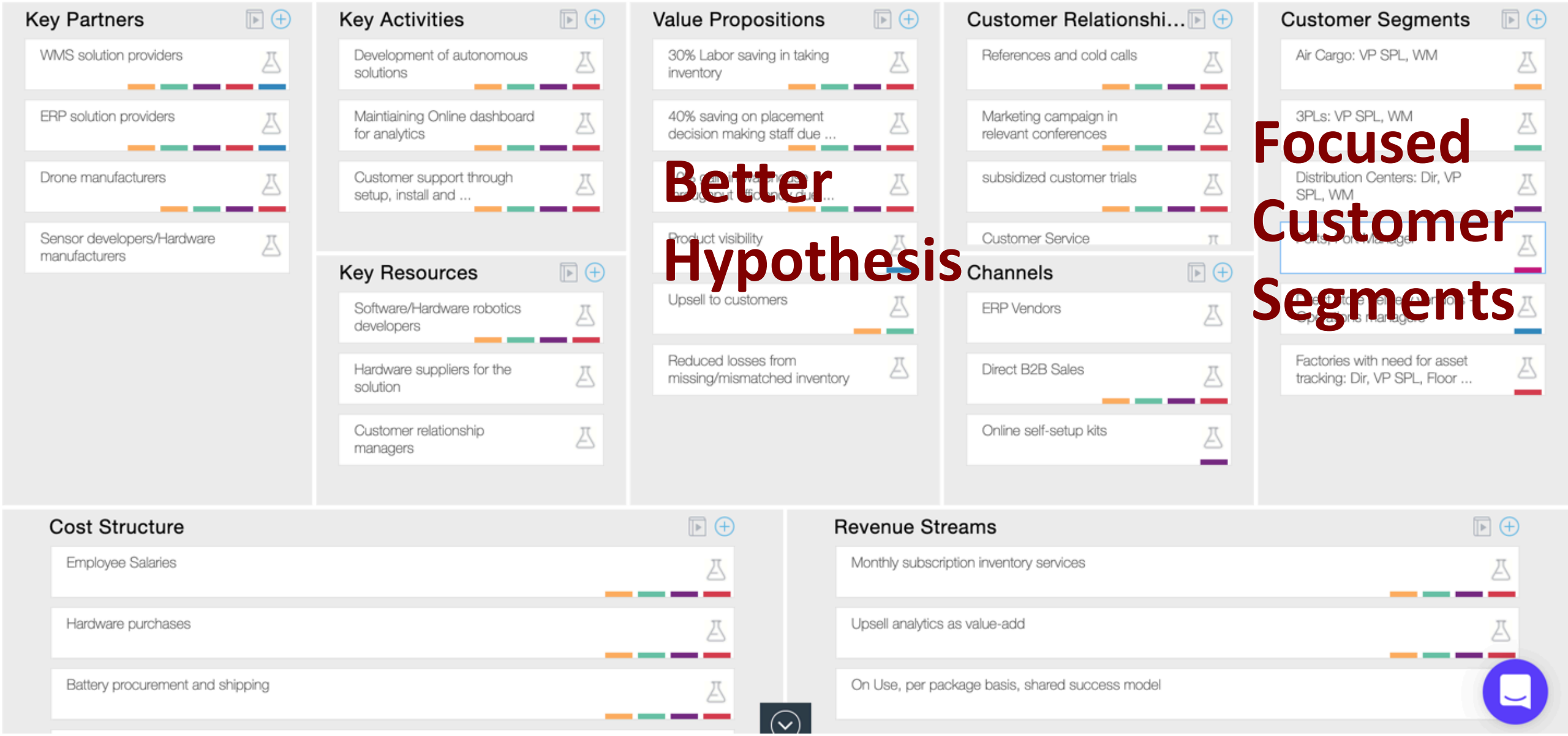
## Cost Structure

- Employee Salaries
- Hardware purchases
- Battery procurement and shipping

## Revenue Streams

- Monthly subscription inventory services
- Upsell analytics as value-add
- On Use, per package basis, shared success model

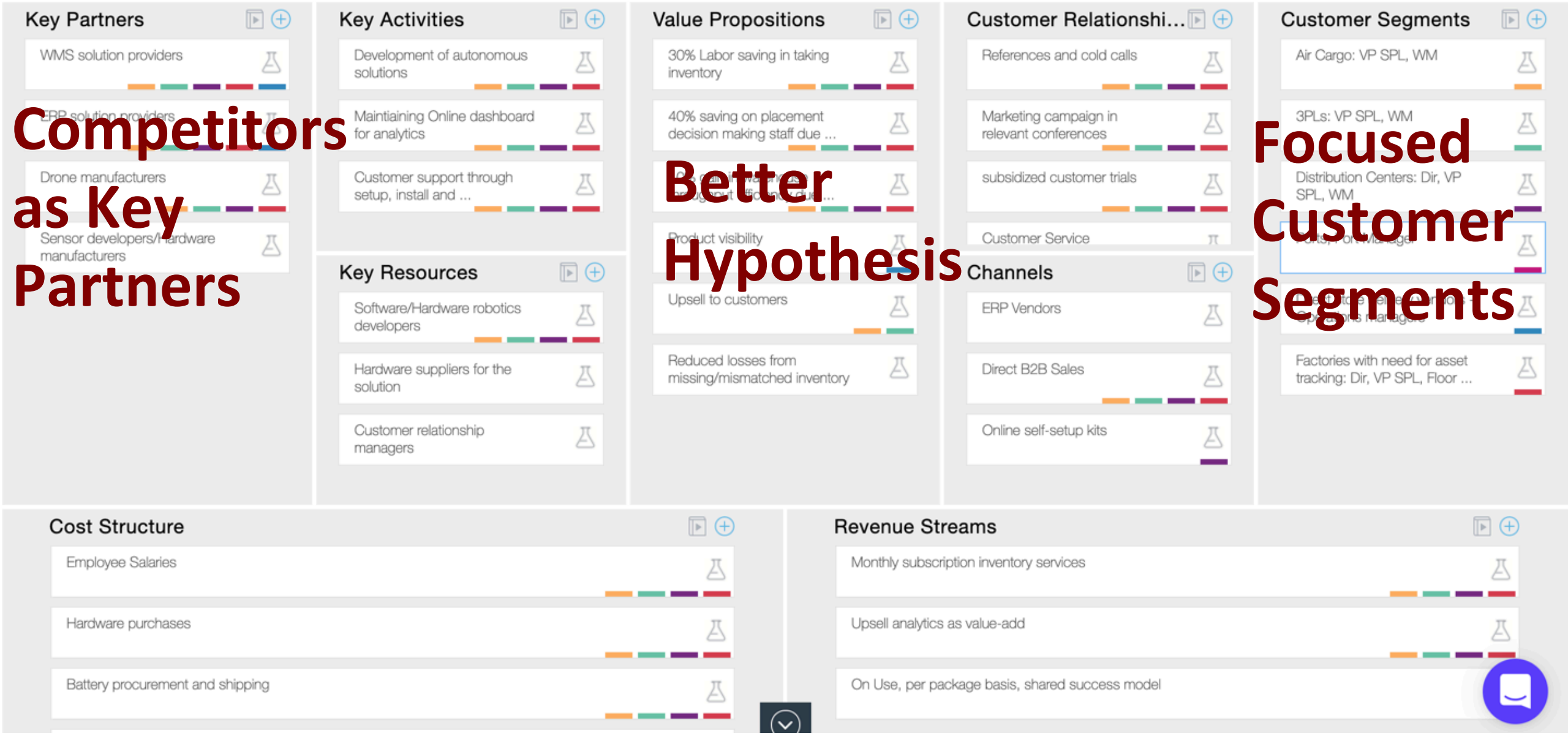
Autonomy for the real world
Nabla Ascent




Better Hypothesis

Focused Customer Segments

Autonomy for the real world
Nabla Ascent

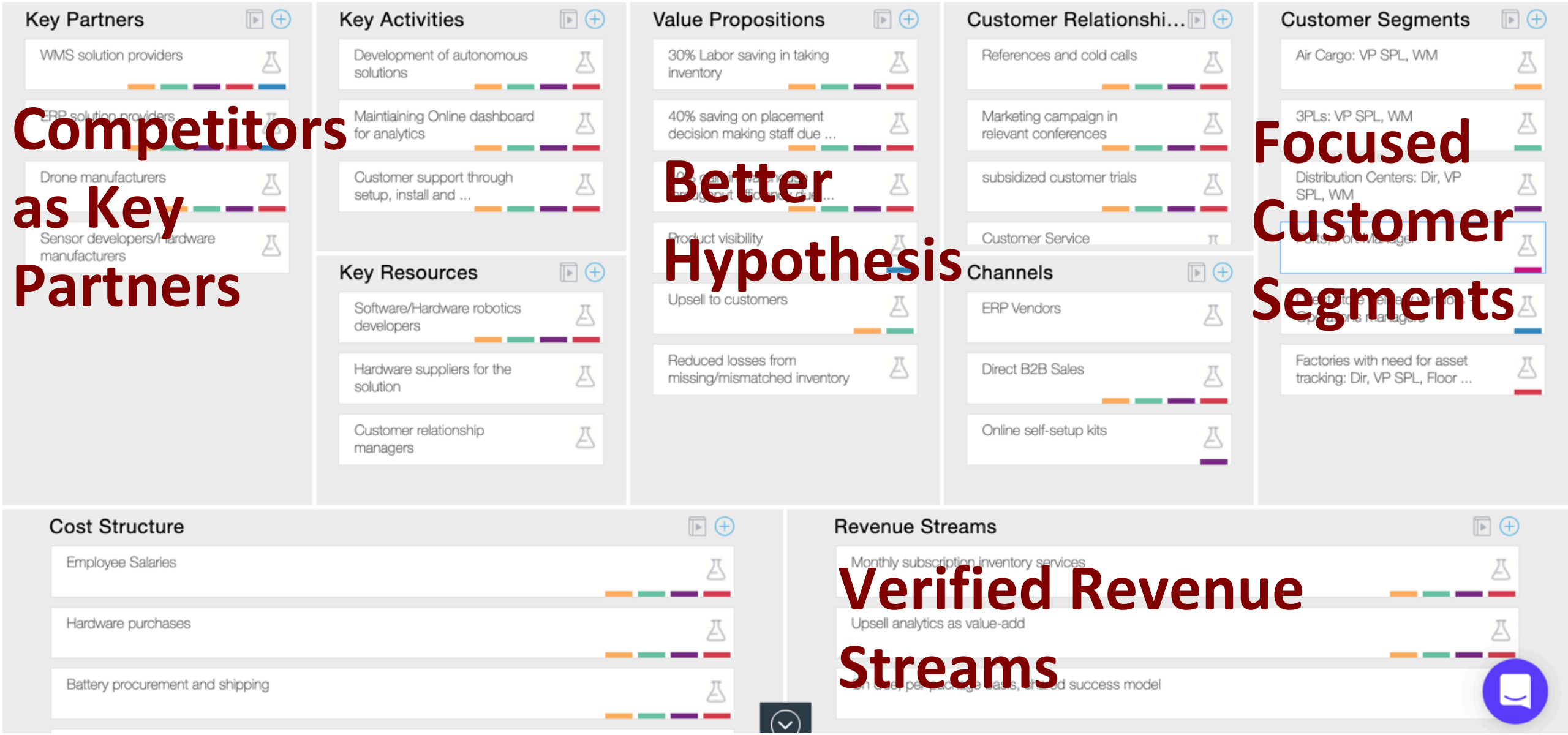



Competitors as Key Partners

Better Hypothesis

Focused Customer Segments

Autonomy for the real world
Nabla Ascent



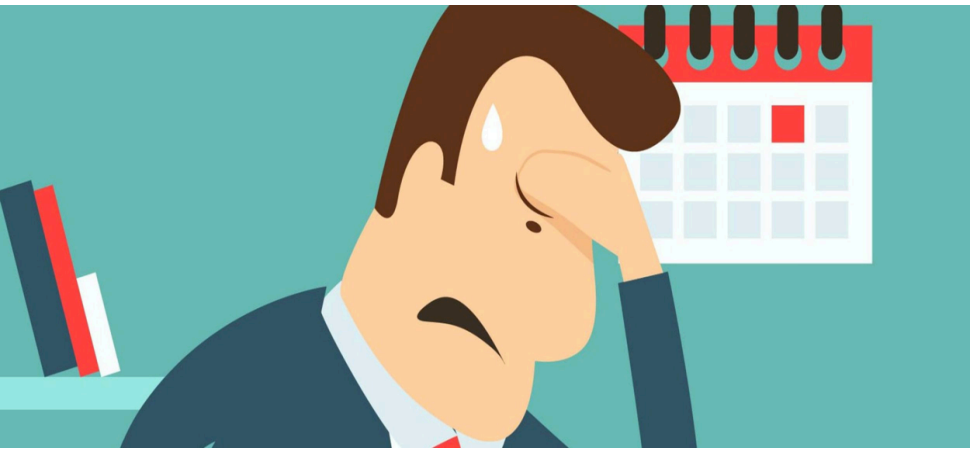

# Competitors as Key Partners

# Better Hypothesis

# Focused Customer Segments

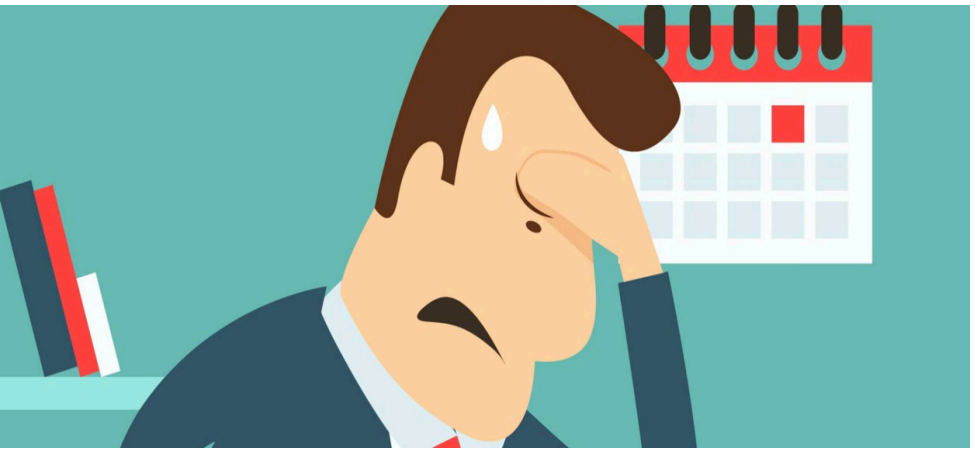
# Verified Revenue Streams

Autonomy for the real world
Nabla Ascent



First Video - https://youtu.be/ND4WL7Dfc3k

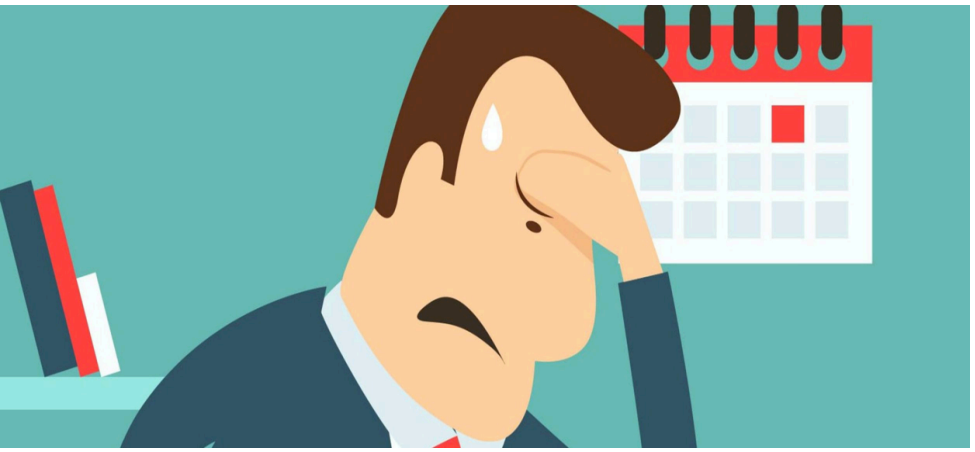
Final Video - https://youtu.be/UmrPWiIFyTU





First Video - https://youtu.be/ND4WL7Dfc3k

Final Video - https://youtu.be/UmrPWiIFyTU

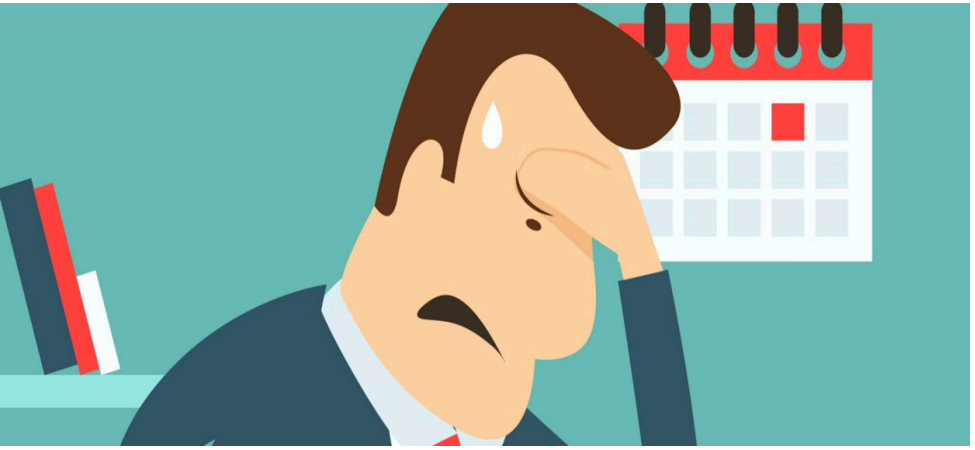







First Video - https://youtu.be/ND4WL7Dfc3k

Final Video - https://youtu.be/UmrPWiIFyTU





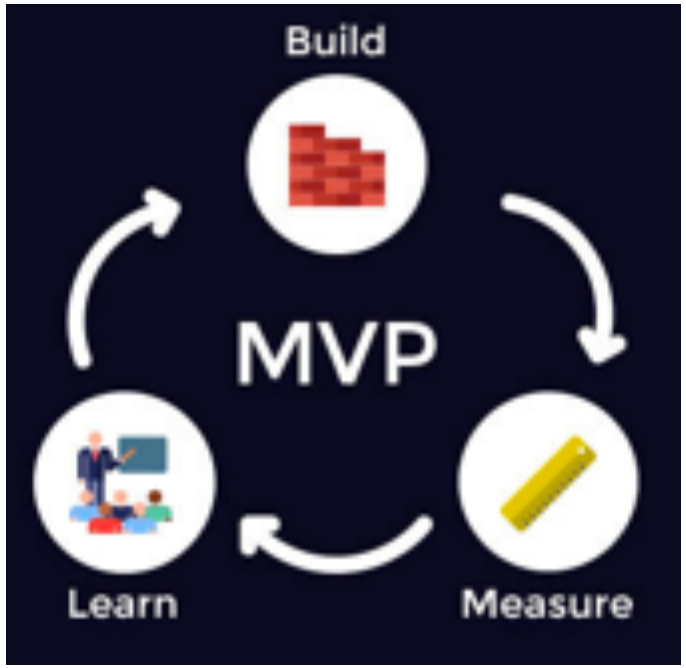



# Go

First Video - https://youtu.be/ND4WL7Dfc3k

Final Video - https://youtu.be/UmrPWiIFyTU

# Next Steps:



# Next Steps:






# Next Steps:









# Retail

Retail

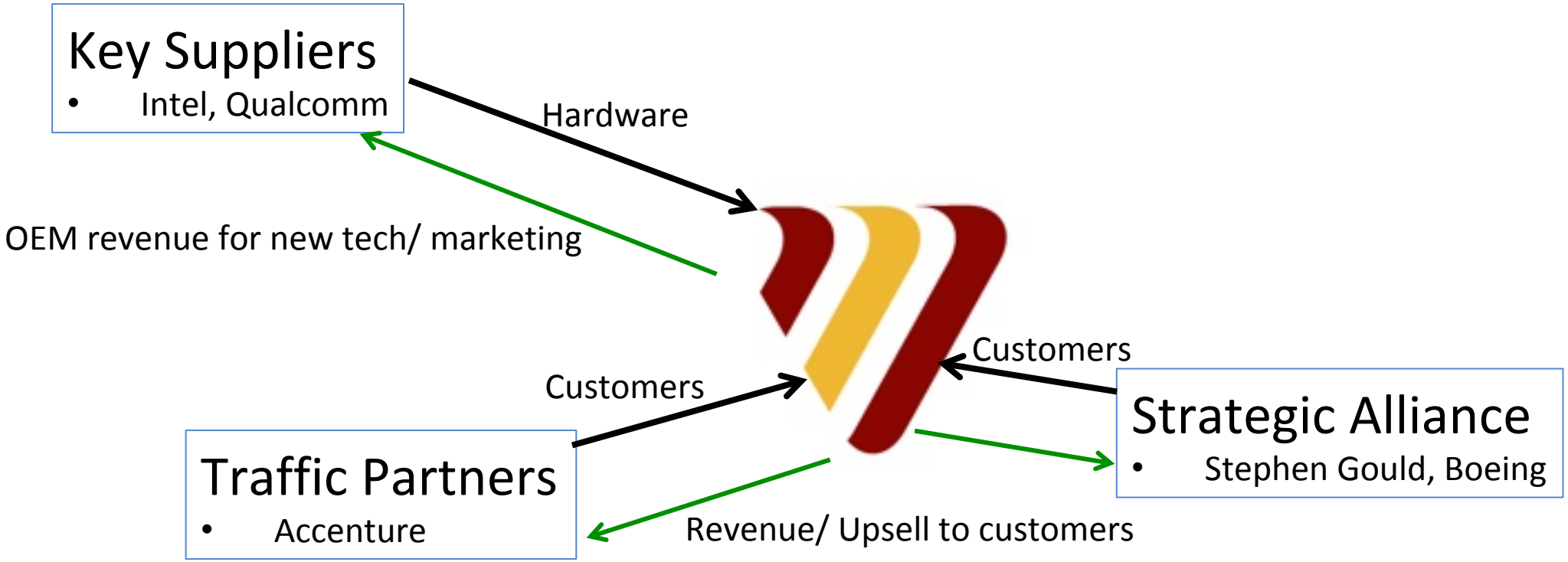
Distribution Centers

Retail

Distribution Centers

3PL’s Air-Cargo

# Partnerships




Video Link - https://youtu.be/ND4WL7Dfc3k

Autonomy for the real world
Nabla Ascent

| Date | Type | Title | Key Insights | Body | Owner | Canvas Tag | Must Have | Nice to Have | Don't Care |
|---|---|---|---|---|---|---|---|---|---|
| 3/1/19 | Team Presentation | 1449_Nabla Ascent Presentation 03/01/2019 | | https://www.dropbox.com/sh/4rja9vp4xn7phf5/AABjRLNSUV4ABD7aZFuo9Rana?dl=0 | Jessica Fleenor | | | | |
| 2/26/19 | Customer Interview | In Person Meeting with Derek A Coppinger, VP Sales & Marketing, NewCastle Systems | Promat Chicago, Modex Atlanta are the biggest logistics conferences | Derek is not a customer actually we are his customer.But he shared how he has been getting customer traction by having booths in conferences, and the above 2 conferences are his go to. He is able sell online, B2B sales. | Sankalp Arora | Channels | | CH: Direct B2B Sales | |
| 2/28/19 | Business Model Hypothesis | Ports, Port Manager | | | Sankalp Arora | | | | |
| 2/25/19 | Customer Interview | Phone Call with Kevin Mac, Supply Chain Consultant, Independent | Inventory control process in 3PL, Ports and, Distribution centers is always a large pain point | Cycle counts and spot checks are done every weekOperation efficiency is always on warehouse operations mind,Distribution centers have more money to spend than 3PLs because of marginsBut 3PLs are dealing with other people cargo hence their need is more pressing Cycle counting is a constant process specially for preishables | Sankalp Arora | Value Propositions, Customer Segments | VP: 10% gain in warehouse throughput efficiency due to continous monitoring of inventory with added data analytics., VP: 30% Labor saving in taking inventory, VP: 40% saving on placement decision making staff due to closed loop nature of inventory monitoring, CS: 3PLs: VP SPL, WM, CS: Air Cargo: VP SPL, WM, CS: Distribution Centers: Dir, VP SPL, WM | | |
| 2/26/19 | Customer Interview | In Person Meeting with Jeff Schorondwall, Marketing Exec, Kansas city smart port | Ports use outfitted cranes to to inventory tracking | use NAVIS softwarecrane knows where it picked and where it dropped or the other equipment knows. No chance of it being lost. His hypothesis since he is from marketing. | Sankalp Arora | Value Propositions | | | VP: 30% Labor saving in taking inventory |
| 2/25/19 | Customer Interview | In Person Meeting with Paul Andre, sales engineer, Proglove | no aha moment | hardware module for barcode reading in a glovecan be poistioned on drones as wellradio and wireless intergation using ultra wide band technology. | Sankalp Arora | Key Partners | KP: Sensor developers/Hardware manufacturers | | |
| 2/25/19 | Customer Interview | In Person Meeting with Jeff Ashcroft, Blogger, supplychainnetwork.com | He is an influencer that expects to get paid for publicity on his blog. | He is an influencer that expects to get paid for publicity on his blog. Interested in blogging about us, we will see | Sankalp Arora | Customer Relationships | CR: Marketing campaign in relevant conferences | | |
| 2/25/19 | Customer Interview | In Person Meeting with James Rebrue, Logistics Sales Engineer, Cognex | They have a barcode reader that we can integrate with our drone as is. | Attractive hardware solution for barcodes, could be our key suppliers for barcode reading.will have to sign an NDA for further diclosure of revenue models and costs. | Sankalp Arora | Key Partners | | KP: Sensor developers/Hardware manufacturers | |
| 2/25/19 | Customer Interview | In Person Meeting with Caitlin Anderson, Senior supply chain analyst, DHL | 50% efficiency increase noticed through the use of automated dollies, will expand them to all over US. | 3 locations in US have 70-80 locust robots.100% efficiency increase, leading to 50% labor reductionlooking at drones for yard themselvesWill connect us to their yard team. | Sankalp Arora | Customer Segments | CS: 3PLs: VP SPL, WM | | |
| 2/25/19 | Customer Interview | In Person Meeting with Stacy B Watson, General Manager, economy & Industrial Development, Georgia Port | Ports use "a lot" of people for inventory management, NAVIs is the software that manages all the ports | In this port they are private employees but in other ports they can be unionized, which means automation introduction is really difficult. Bill Sutton, their head of IT can help us organize a pilot. | Sankalp Arora | Customer Segments | | CS: 3PLs: VP SPL, WM, CS: Distribution Centers: Dir, VP SPL, WM | |
| 2/25/19 | Customer Interview | In Person Meeting with Mike Limoli, VP, Biz Dev, Trimble | Supply chain fault detection service working on a subscription model | They operate on the same model as fourkites, using GPS to track cargo movement and inform stakeholders namely customers, customer's customers, shippers, warehouse operators and manufacturers. They are mainly data aggregators and have to do a lot of customization of their pipeline for each and every one of their customers. They will help us connect to the relevant people in the organization. | Sankalp Arora | Revenue Streams | R$: Monthly subscription inventory services | | |
| 2/25/19 | Customer Interview | In Person Meeting with Fernanando Cordero, General Secretary, Panama Port | Panama port is one of the world's logistics hubs like Dubai, might be a great a market like Dubai. | They are ramping up their offerings to companies that deploy their to setup world distribution and manufacturing. They lure companies through value added services like presence of 3PL's, consultancy on customizable distribution centers. But nothing on the granularity of what we offer. Fernando himself runs a consultancy company for 3PL solutinos and can be an influential figure in getting us setup in that region.† | Sankalp Arora | Key Partners | KP: ERP solution providers, KP: WMS solution providers | | |
| 2/25/19 | Customer Interview | In Person Meeting with Ian Watkins, National Account Executive, Pack Rat | For pack rat the problem is container damages at clients side, if inventory gets lost, they do not care. | They provide container services US wide, and have expanded into transportation and trucks. Inventory is never a problem for them as containers are large and well tracked through in-built processes. The main problem is containers getting damaged at customer sites because they sit for so long.† | Sankalp Arora | Customer Segments | | | CS: Factories with need for asset tracking: Dir, VP SPL, Floor Manager |
| 2/24/19 | Customer Interview | In Person Meeting with Kelli Woelfel, VP, Industry Solutions, Profitect | They are data aggregators for ports and distribution centers but have no way to take physical inventory, they are excited to upsell the solution to their customers | *- Monthly subscription model<br>*- Want to do a pilot with LA port<br>*- They can be our data aggregators as well, given they have an established pipeline.<br>*- They already are working on fault detection and reduction, so streamlines quite well with our VP | Sankalp Arora | Value Propositions, Revenue Streams | VP: 30% Labor saving in taking inventory, R$: Monthly subscription inventory services | | |
| 2/25/19 | Customer Interview | In Person Meeting with Jeff Cody, Director of Interactive Marketing, Locus Robotics | New warehouses may prefer using IoT devices than using drones. | *yes automation is the future<br>*lots of newer warehouses may be better for automation like drones but some may also not need by having built in infrastructure<br>*drones, specially small ones make sense - they use them occasionally but not for warehouse inventories, just taking pictures. | Sankalp Arora | Customer Segments | CS: 3PLs: VP SPL, WM, CS: Air Cargo: VP SPL, WM | | |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 2/26/19 | Customer Interview | In Person Meeting with Nishil Soni, Solution Designer, Llamasoft | Inventory and supply chain monitoring is quite an established business but very few companies offer the capability to do physical counts. | Llamasoft<br>*supply chain modelling on the cloud (live system keeep track of inventory, predict and react to variations in demand, analytics)<br>*$300M VC, walmart, amzaon, home depot<br>*how do they ingest data? excel spreadheets, data lake, different systems<br>*would drones be useful?<br>*yes, some places wouldn't need it, but plenty companies have inventory problem, like freight and cargo, having up to date info and analytics would be great value, and their data could go into a system such as theirs.† | Sankalp Arora | Value Propositions, Revenue Streams | VP: 30% Labor saving in taking inventory, VP: 40% saving on placement decision making staff due to closed loop nature of inventory monitoring, R$: Monthly subscription inventory services | |
| 2/26/19 | Customer Interview | In Person Meeting with Rich Wilder, Director Retail Supply Chain Solutions, CHEP | CHEP is the america's largest pallet providers, they have a team 50 people, just to do pallet counting all across US. They are actively looking for people to address the auditing problem. | Rich employees around 50 people to do pallet counting for 4 months. Rest of the year they have other responsibilities. This auditing process is a big pain for them in terms of hiring dynamics and it needs these people to go into hazardous environments. They are actively looking for a solution to the problem and were quite excitd to find our booth. We will visit their facilities in April to study feasibility. | Sankalp Arora | Value Propositions, Revenue Streams | VP: 30% Labor saving in taking inventory, R$: On Use, per package basis, shared success model | |
| 2/25/19 | Customer Interview | In Person Meeting with Ryan Connor, Enterprise Account Executive, FourKites | Identify supply inefficiencies in the supply chain and integrate it with Customer service, ERP to predict delays and inform customers. For us this kind of integration and reporting will be the key. | They provide GPS tracking solutions for cargo to identify inefficiencies in supply chain. More importantly they integrate with the customer service, with ERPs to proactively predict delays and warn customers and consumers of delays.They charge a monthly subscription fees, selling to CEO's, procurement officers and VPs of supply chain. | Sankalp Arora | Revenue Streams | R$: Monthly subscription inventory services | |
| 2/25/19 | Customer Interview | In Person Meeting with Alex, Biz Dev Head, US, Nextail | Subscription model is already prevalent in the industry and attending conferences needs a strategy. | *- Nextai<br>*-Business Development Head US<br>*- They solve the fashion industry forecasting and buying decisions using past data.<br>*- It reduces stockouts and leftovers just by analysing data on demand and supply.<br>*- For both historical and third party data<br>*- Note they are only focussed on the fashion industry as the size curves make the industry specifically interesting.<br>*- They charge a cut of 10-15% revenue increase in the segment they operate as a SaaS<br>*- The conferences are a good way for them to find connections, but they have to be coupled with cold e-mailing to attendees. They hire a company to find emails of attendees.<br>*- They just spent $30000 on a conference and generated 2 leads.<br>*- Their main person for sales is the C-Suite and the VP of planning and delivery. | Sankalp Arora | Revenue Streams | R$: Monthly subscription inventory services | |
| 2/25/19 | Customer Interview | In Person Meeting with Wayne Jacobson, Client Partner, Profitect | There are companies focussed on providing dedicated services for finding faults in supply chain and they charge a monthly fees. | they again sell inventory tracking and data analytics solutions for warehouses, specifically focussed on tracking faults in supply chain with inventory mismatches being the starting point. they take in all the receipts, the shipping labels etc through FTP and assemble that data themselves to provide supply chain fault detection.<br>BUT they do not have a way to take physical inventory and rely on people to do so. It is a gap in their system that they want to fill<br>They want us to integrate in their solution and upsell with our services, their claim "its a match made in heaven". My next question is how much of a percentage increase is it? | Sankalp Arora | Key Partners, Revenue Streams | KP: WMS solution providers, R$: Monthly subscription inventory services, R$: Upsell analytics as value-add | |
| 2/25/19 | Customer Interview | In Person Meeting with Garner StrickLand, VP Transportation, Garner Strickland Central Garden and Pet Company | The transportation manager, managing 48 different locations, does not venture into warehouse operations, inventory is not his problem. | *- Carter met us at the conference lunch at LINK, RILA. It is the biggest supply chain conference in US for the retail sector. Unfortunately we meet more marketing people than operations. Carter was one off the rare operations people.†<br>*- They use SAP as their ERP<br>and have a customized TMS<br>*- end to end TMS tracking<br>†using GPS<br>*- Biggest pain point is decentralization of the company<br>*- consultant for transportation management within the company<br>*- visibility is not an issue | Sankalp Arora | Value Propositions | | VP: 30% Labor saving in taking inventory |
| 2/21/19 | Customer Interview | In Person Meeting with Jitendar Singh, instrumentation Engineer, Saint Gobain | We can automate glass inventory, it is not a problem they are looking a solution for. | This was a a tour of the factory that boasts the biggest floating glass production line in Asia, and also is the most advanced in robotics applications.They use kuka robots and a production line that is fully automated by eyeglass technologies from Israel.<br>The holes in the automations are supervision and no automation at all in the warehousing department.They do not show any signs of needing it as well.† | Sankalp Arora | Value Propositions | | VP: 30% Labor saving in taking inventory |
| 2/21/19 | Customer Interview | In Person Meeting with T K Chakraborty, Plant Head, Saint Gobain | According to plant head his ship is tight and surprisingly the only pain point he has is that his dispatch gets held up with quarterly audits for 3-4 days | These quarterly audits are done by 6-7 auditors and a team of 10 staff.He wants to solve the that problem, didn't even want to talk about money.3-4 days, the warehouse has to shutdown.†they are moving around 1000 tonnes a day.I am not sure whether he would be willing to pay for inventory, even if we provide the solution. | Sankalp Arora | Value Propositions | | VP: 30% Labor saving in taking inventory |
| 2/15/19 | Customer Interview | Phone Call with Kumaradevan G, CTO, Saint-Gobain | Kumaradevan is already investing towards automating inventory monitoring through using in-house developed Ultra wide band tags but they do not work in a warehouse setting. | They want live inventory of yards and warehouses.Again the labour training and acquiring is a pain-point.<br>But in the yard they have briefly tested UWB solutions and are quite happy with it.However those yard solution is not applicable in the warehouse for the want of infrastructure, (I am perplexed, didnt understand how there is more infrastructure in the yard than warehouse)<br>Will not discuss numbers but is trying to come up with a solution. | Sankalp Arora | Value Propositions, Customer Segments | VP: 30% Labor saving in taking inventory, CS: 3PLs: VP SPL, WM | |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 2/21/19 | Team Presentation | 1449_Nabla Ascent Presentation 02/21/2019 | | https://www.dropbox.com/sh/xaovbbij50f3edf/AAB675_mUZ-t00iMF2xGTvDYa?dl=0 | Jessica Fleenor | | | |
| 2/20/19 | Customer Interview | In Person Meeting with Pradeep Singh, Warehouse Manager, Usha | Everyday 4 customer orders are left unfulfied because of missing items. | Pradip also mentioned that manual labor training is his main pain point as the warehouse operator and unfulfilled orders because of missing inventory the second.They are rated on how many orders were met without damage, and missing inventory leads to both damaged and unfulfilled orders.everyday on an average 4 orders go unmet.The cost of the same is around $5000 daily.Labor cannot solve the problem becuase of the layout. | Sankalp Arora | Value Propositions, Customer Segments | VP: 10% gain in warehouse throughput efficiency due to continous monitoring of inventory with added data analytics., VP: 30% Labor saving in taking inventory, VP: Reduced losses from missing/mismatched inventory, CS: 3PLs: VP SPL, WM, CS: Distribution Centers: Dir, VP SPL, WM | |
| 2/21/19 | Customer Interview | In Person Meeting with Shambhu Nath, Distribution Center Manager, Usha | Horizontal warehouses have rules for palletization that make inventory taking easier in case of occlusion. | They have 1% damages because of lost inventoryInventory is his biggest pain pointAdding more people will not increase the current 70% accuracy.The warehouse productivity goes down by 30% when inventory is overflowing, which is often the case.They don'thave a placememnt decision making staffIts 250,000 sq ft warehouse. | Sankalp Arora | Value Propositions, Customer Segments | VP: 10% gain in warehouse throughput efficiency due to continous monitoring of inventory with added data analytics., VP: 30% Labor saving in taking inventory, CS: 3PLs: VP SPL, WM | |
| 2/20/19 | Customer Interview | In Person Meeting with Vikas Jain, Head - Sales Administration, Usha | Current WMS software cannot handle overflows in horizontal warehouses, hence they do not use them. | Vikas mentioned that they use WMS for inventory management, as it does not have the capacity to handle overflows in a horizontal warehouse.The overflow occurs because of unpredictability of customer orders, the forecasts are only 40% accurate.This results in damages, slower operation with the productivity going down from 15 truckloads a day to just 10. | Sankalp Arora | Value Propositions | VP: 30% Labor saving in taking inventory, VP: 40% saving on placement decision making staff due to closed loop nature of inventory monitoring, VP: Reduced losses from missing/mismatched inventory | |
| 2/20/19 | Customer Interview | In Person Meeting with Ajay Sharma, Head Supply Chain Management, Usha | Inventory management is the biggest pain point in supply chain, with improvement in pilferage, defect and warranty services if done right. | *-They are willing to pay for 30% labor saving for inventory monitoring, --the warehouse has to close for a week every quarter for inventory monitoring.-- There are damaged goods because they buckle under overstock-- They need inventory monitoring for stacked items for horizontal warehouses.-- Something that can do cycle count once a day, perpetual inventory.-- Current inventory accuracy 60%-- National distribution center | Sankalp Arora | Value Propositions, Customer Segments | VP: 30% Labor saving in taking inventory, VP: 40% saving on placement decision making staff due to closed loop nature of inventory monitoring, VP: Reduced losses from missing/mismatched inventory, CS: Distribution Centers: Dir, VP SPL, WM | |
| 2/19/19 | Customer Interview | In Person Meeting with Sushil Kumar, AGM Pipeline, HMEL | Pipeline security is the main issue for which pipeline inspection required not crack detection | *- Currently we assumed pipeline inspection is always about cracks,†<br>*- hence never looked at the problem.†<br>*- But the main problem is security-- Currently they employee 100 people over a 1000 km pipeline.-- Very unhappy with that situation with the threats of collusion.† | Sankalp Arora | Value Propositions | VP: 30% Labor saving in taking inventory | |
| 2/19/19 | Customer Interview | In Person Meeting with Vikram Saigal, Manager IT, HMEL | Upper management is moving towards automated solution even if ROI is not direct savings | *- Hypothesis is 30% labor savings in inventory a value prop worth buying for-- HMEL is spending on labor savings and inventory takes up to 10% of their labor activities in non-automated distribution centers.--†A 30% savings in the same is a good value prop to invest.-- Next steps make a proposal | Sankalp Arora | Value Propositions | VP: 30% Labor saving in taking inventory | |
| 2/19/19 | Customer Interview | In Person Meeting with Manoj Kumar, Head- IT (CTO), HMEL | HMEL has already spent $70M in a single warehouse to solve the manual labor dynamics problem. | HMEL will pay for 30% reduction in inventory labor (hypothesis).--They are more concerned with labor dynamics and hence are moving towards full automation.-- But they want to solve the labor problem at other places as well and want to solve the inventory problem. | Sankalp Arora | Value Propositions, Customer Segments | VP: 30% Labor saving in taking inventory, CS: Distribution Centers: Dir, VP SPL, WM | |
| 2/19/19 | Customer Interview | In Person Meeting with Battu Singh, Head Marketing, HMEL | The main problem with the warehouses is manual labour but not because labor is short it is because labor requirements are dynamic and that dynamic sourcing of labor is impossible. | Hence, even in India labour is cheap the ROI is not defined by cost saving but by more packages being delivered, more productivity. Unfortunately he did not have the numbers for the productivity increases. | Sankalp Arora | Value Propositions | | VP: 30% Labor saving in taking inventory |
| 2/19/19 | Customer Interview | In Person Meeting with Pawan Kumar Agarwal, General Manager - Pipeline, HMEL | Pipeline inspection is not required for cracks but for security reasons | *- HMEL has massive warehouses so I assumed that they might be interested in addressing the inventory and labor problems, but I was talking to pipelines person.-- His problem was monitoring security of the pipeline.-- Currently thy use runners to do so, for a 1000 km pipeline.-- Each runner covers 16km in a day.-- There are over 100 runners employed to cover the pipeline daily.<br>*- They are willing to buy if the runners deployed are lowered to 50.<br>*- A drone can lower the runners needed to 20.<br>*- This could be a massive problem to solve. | Sankalp Arora | Value Propositions | VP: 30% Labor saving in taking inventory | |
| 2/18/19 | Customer Interview | Phone Call with Aman Srivastav, Category Manager, Amazon | Aman estimates 0.03% margin improvement due to fully automated inventory, for amazon 0.01% increase is massive news. But amazon will solve the problem themselves. | Aman estimates 0.03% margin improvement due to fully automated inventory, for amazon 0.01% increase is massive news. But amazon will solve the problem themselves. | Sankalp Arora | Value Propositions | VP: 30% Labor saving in taking inventory | |
| 2/18/19 | Customer Interview | Phone Call with Sanjam Sidana, Head - Customer relations and Key Accounts, Tata Power Solar Systems | Rooftop solar systems have been increasing exponentially in India. | Sanjam mentioned that rooftop solar systems are being installed rapidly all across India. The manual labor shortage problem plagues the industry the same as it does the supply chain problem. The installation is obviously labor intensive, but surprisingly the inspection of roofs for their eligibility of solar installation. The only way to automate the problem is through drones, however laws don't allow for that. This could be a big opportunity!. | Sankalp Arora | Value Propositions | VP: 30% Labor saving in taking inventory | |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 2/18/19 | Customer Interview | Phone Call with Vaibhav Rai, CFO, Dulipbuildcon | Construction business in India does not need transparency. | Vaibhav's company is the largest road building company in India, Their problem is basically policing the workforce to get the road building done. However they cannot use tools that provide transparency. Becuase their business model only works if they can charge extra for the work they do and cook the books. | Sankalp Arora | Value Propositions | | | VP: 10% gain in warehouse throughput efficiency due to continous monitoring of inventory with added data analytics. |
| 2/11/19 | Customer Interview | Phone Call with Vijay Shekhar, Head of structures, EIL | When new structures are constructed the inspection of the structures is someone else's department. And it was quite surprising to see siloed these jobs were. He did not know anything about the inspection part of things. | A few things mentioned just for knowledge-<br>*- Underwater pipes are cathodized<br>*- Off-shore pipes are constructed against tolerances for rust<br>*- sales for innovative solutions is however done directly | Sankalp Arora | Channels | | CH: Direct B2B Sales | |
| 2/14/19 | Customer Interview | In Person Meeting with Kshitij Aggarwal, Marketing Lead, Intel | Intel is trying to follow Nvidia in their hardware distribution strategy | Kshitij provided the the marketing perspective in our discussion with Intel. Nvidia has won the last generation hardware wars by distributing hardware to early stage start ups and labs. Kshitij mentioned that Intel wants to do the same. They are coming up with new heterogeneous accelerators, coupled with 5G technologies, they seem to be eager to collaborate. But the cpmpany is siloed, if Kshitij's department decides to start the partnership by giving out free hardware and luring us in, they have to do it at their own cost, moreover marketing is independent of manufacturing. We will have to figure out how to navigate this situation. | Sankalp Arora | Key Partners | | KP: Drone manufacturers, KP: Sensor developers/Hardware manufacturers | |
| 2/14/19 | Customer Interview | In Person Meeting with Julie Lee, senior developer, Intel | Intel is actively searching for partners to apply their latest hardware tech on robotics application. | Intel has been on our list for a long time as potential key supplier for integrated hardware. However, they have approached us for solutions but never as a supplier role. This was the first interaction regarding the same. Julie mentioned now intel is actively looking for start ups to implements their new hardware solutions on mobile robots. Revenue for now is not a concern, but the promise of mass deployment, more than 1000 bots is needed. Intel is willing give out free hardware for testing as well. The risk in the partnership is that integration time for their tech is substantial and Intel is known to cut-off non-performing hardware, loosing as partners will not matter to Intel but we will be left with a lot of work to do again if so happens. | Sankalp Arora | Key Partners | | KP: Sensor developers/Hardware manufacturers | |
| 2/20/19 | Business Model Hypothesis | ERP solution providers | | | Sankalp Arora | | | | |
| 2/20/19 | Business Model Hypothesis | WMS solution providers | | | Sankalp Arora | | | | |
| 2/20/19 | Customer Interview | In Person Meeting with Anthony Weldon, Investor at XRC labs; ex-manager of supply chain for Mars Inc, Not sure if applicable | *It might be really hard to actually sell the product the way we're thinking of doing it (SaaS).<br>*Dealing with foreign (as in non-US) markets might dilute our efforts and breed mistrust among American companies, specially as foreigners ourselves.<br>*We should talk to people who make warehouses or racks in warehouses - potential partner<br>*We should talk to manufacturers who put things in warehouses (e.g. Boeing)<br>*'Numbers don't matter, customers do'<br>*We don't emphasize the "Just-in-time" potential of our solution<br>*Maybe customers won't like SaaS model | Our intention was to learn from Mr Weldon's past experience as manager for supply chain in a large company, and to leverage any contacts or networks he may also have acquired during his time as an investor. While I was prepared to ask various questions following our business hypothesis it soon became clear Mr Weldon would be the one asking the questions (and often answering them himself). After asking about what we were proposing, and the brief response on our part, he made a series of observations (some of them already mentioned in 'key insights'):Selling to 3PLs or air cargo companies or companies that put their product in warehouses would be too time-consuming, difficult, and nobody would ever commit to making that decision (due to "CYA"). We needed to partner with someone, for example people who made the racks for warehouses. We haven't really considered this angle before and might be worth looking into.We should talk to manufacturers that make large number of components, such as airplane manufacturers, and help them monitor the supply of parts in their warehouses, and throughout the supply chain, enabling a "just-in-time" approach to supply. Currently we are focused in a narrower aspect of the supply chain; a more broadly encompassing might be worth further consideration, if it makes the whole system more attractive.Our SaaS model is too expensive and too much fuss. Customers might prefer a simple "up front" acquisition, with potential upgrades through a leasing model. We should sell it cheaper than our current estimates (in the >$10k range).Going outside America is not a good idea in his opinion. Nobody trusts the middle eastern companies and if we partner with them we will be tainted by association. Indian companies will just copy our product. We should focus on American companies and earn their trust, which might take extra work as foreigners.I asked about learning quantitative estimates from potential customers; he declared that numbers don't really matter, that getting customers matters. I'm not completely sure what he meant - I think the idea is that if our product was good enough, the companies would get it (and become customers) regardless of cost.In addition, he described various opinions very much in line with the i-corp spirit: we knew nothing about our customers, we had to go out and talk to (potential) customers, to | Daniel Maturana | Channels, Customer Segments, Revenue Streams | CS: Factories with need for asset tracking: Dir, VP SPL, Floor Manager, R$: Upsell analytics as value-add | CH: Direct B2B Sales | R$: Monthly subscription inventory services |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| 2/11/19 | Customer Interview | Phone Call with Joshua Leger, Business dev executive, Scandit | *There are mutliple robotics companies targeting similar customers, but tenchnologically different methods (e.g. ground robots, sensor networks) using this supplier<br>*This supplier prices their license differently for automation/robot companies, assuming each "robot" licensee is at least 3x more productive than a "human" licensee | After the initial meeting with the sales team, we scheduled another interview with Scandit, as a key partner/supplier. In this interview we would go further into technical details and learn more about pricing structures they use, and in particular a ballpark cost for us if we were to license their software. We learned about several other companies targeting similar niches to ours that use their products as OEM. For OEMs using automation and robotics, their licensing is different - they assume a robot/machine licensee will be 3-6x more productive than a human licensee (using the device, e.g. as a mobile device). For next steps, we would need to further test† their product and specify our requirements to their team, with optional NDAs if necessary from our side.† | Daniel Maturana | Value Propositions, Key Partners | | VP: 30% Labor saving in taking inventory, KP: Sensor developers/Hardware manufacturers | |
| 2/8/19 | Customer Interview | Video Chat with Todd McKellar, Narine M., Sales team, Scandit | *Multiple distribution channels spanning hardware and software, for different segments.<br>*To show off advantages of their product, make it very simple to test | Scandit is a company providing hardware and software for barcode reading that works with many customers in the logistics and retail areas. We spoke to them as a potential supplier, but also as a possible competitor and to learn more about how they commercialize their products, considering that we would possibly have high overlap in some customer segments and distribution channels. They have three methods of licensing their software product (or four, counting a limited non-commercial license) depending on how their product is used and what the potential volume would be. To us, they would license their product as an OEM, and this would require at least two more meetings to finalize - meanwhile, we had various means of testing their product with no further contact.† | Daniel Maturana | Value Propositions, Key Activities | KA: Customer support through setup, install and maintanence | VP: 30% Labor saving in taking inventory | |
| 2/13/19 | Customer Interview | Video Chat with Isaac Korn, Director of Innovation, Perry Ellis | Innovation directors do not necessarily know about operational problems but can be an evangelist inside a company | Isaac didnt know about the exact size of the problem, but was excited about automation and was told by his operations people that inventory is a big problem. How big he does not know, we have a follow-up call. | Sankalp Arora | Customer Segments | CS: Direct store delivery vendors - Operations managers, CS: Distribution Centers: Dir, VP SPL, WM | | |
| 2/11/19 | Customer Interview | Phone Call with J. K., President, M S G | Mr J supplies sporting goods nationally to big retail stores but was quite secretive of the business. On being probed about the pain points in operations the predictable pain point of retention and shortage of manual labor emerged. At every warehouse ghosting of employees had become a major problem and fining people at competitive wages has become difficult. On further probing about inventory and workforce dedicated to it. He did not have the details, since he didnt have the details it seems like its not his main problem. | Mr J supplies sporting goods nationally to big retail stores but was quite secretive of the business. On being probed about the pain points in operations the predictable pain point of retention and shortage of manual labor emerged. At every warehouse ghosting of employees had become a major problem and fining people at competitive wages has become difficult. On further probing about inventory and workforce dedicated to it. He did not have the details, since he didnt have the details it seems like its not his main problem. | Sankalp Arora | Value Propositions, Customer Segments | | | VP: 10% gain in warehouse throughput efficiency due to continous monitoring of inventory with added data analytics., VP: 30% Labor saving in taking inventory, CS: Distribution Centers: Dir, VP SPL, WM |
| 2/12/19 | Customer Interview | Phone Call with Gervasio Mutarelli, Innovation Manager, Target | No aha moment, just described the channel to do pilots with Target. | Target is looking at innovation in the supply chain space to make it make the processes leaner, efficient and flexible. Current automation technologies do not enable flexibility hence fail to keep up modern customer or as target calls them guests requirements. With more competitive labor market and pressure on supply chain due to lower margins, automation is imminent. Since full automation is some time away the initial solutions will be those that augement humans and reduce their worm load. Inventory itself is a big problem for target with constant money being spent to reduce cycle counts or reduce the time takes to do them, According to Gervasio it is atleast $15M siz problem per group of shops and a distribtuion center, with each group having 14-15 storefronts, However, exact number per store were not avaialable. | Sankalp Arora | Value Propositions | VP: 10% gain in warehouse throughput efficiency due to continous monitoring of inventory with added data analytics., VP: 30% Labor saving in taking inventory, VP: 40% saving on placement decision making staff due to closed loop nature of inventory monitoring | | |
| 2/13/19 | Customer Interview | Phone Call with Rohan Bawalikar, CEO, Exivision | Outsourcing of robotics solution is 10 times or more expensive of developing app solutions | Exivision provides solution to the state estimation problem. They provide custom multi-camera solutions that are being used on commercial drones to improve time to market. They can be our key supplier and almost like a development partner. However as compared to outsourcing app development for MVP which only costs $20K in total the exivision solution costs $90K for a specific custom solution. At that cost we are better off developing something in-house.† | Sankalp Arora | Cost Structure | C$: Employee Salaries | | |
| 2/12/19 | Customer Interview | In Person Meeting with Jaqueline Hernandez, Founder, Mongoose Pharmaceuticals | Pharmaceuticals is an industry that is struggling with maintaining inventory for perishable but critical items, however our solution cannot address the problem. | The industry needs a solution that can track multiple small perishable items in climate controlled environments, Jaqueline is opening a warehouse is Pittsburgh and knows that inventory monitoring is atleast a $3M problem per warehouse, but the technical requirements of the problem make it unsuitable for us.† | Sankalp Arora | Value Propositions | VP: Product visibility | | |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 2/11/19 | Customer Interview | Video Chat with Loc Ngo, Lead Designer, Interactive labs | Cost of just UI development is $5K for MVP | Loc works for interactive labs and consults to develop UI/UX for tech companies. We assumed a UI/UX design exersize will take around $2K but surprisingly the costs double that, this brings our total MVP cost to around $20K excluding founder effort. Now the question is should we make an MVP, the customers who have shown interest have requested for demos while saying they will only decide how much to pay for it after seeing that product is not vaporware. The sceptisim in the market mainly comes from the fact that so many companies have promised and then failed to deliver drone autonomy products. | Sankalp Arora | Cost Structure | | C$: Employee Salaries |
| 2/14/19 | Customer Interview | Video Chat with Rudy Wen, Technologist in Residence, Expa | No aha moment | This was to understand the cost of development of MVP. Hiring a consultant to do app work while we work on the autonomy side. Development of the MVP app if completely outsourced will cost us around $5-8K. That is quite feasible to enable customer validation. | Sankalp Arora | Cost Structure | C$: Employee Salaries | |
| 2/11/19 | Customer Interview | Video Chat with Yasir Anwar, CTO, William Sonoma | William Sonoma believes that inventory in the warehouse is solved for them but there is a gap in inventory in the yard vs in the warehouse which causes delay, especially during peak holiday season. | Yard inventory is a problem and they $12000 per yard monthly just to take inventory in the yard, which done completely manually still. But a better process of taking inventory which involves using Yard View one of the premium yard inventory taking software has saved $0.5M per year. Given a $0.5M per year savings promtped them to invest in YardView, I assume where we can offer almost full automation of the process, they should be willing to pay more. Just denied to comment on numbers. | Sankalp Arora | Value Propositions, Channels, Customer Segments | VP: 30% Labor saving in taking inventory, CH: Direct B2B Sales, CS: Distribution Centers: Dir, VP SPL, WM | |
| 2/8/19 | Customer Interview | In Person Meeting with Ron Baime, CEO, Baime Advisory Group | The same story as Stephen Gould, interested in upselling the solution as a consultant, says too early to talk numbers, does say saving manual labor is one of the most pressing problems of the industry as people are becoming more and more difficult to find and margins are growing ever smaller due to e-commerce. | Same story as stephen gould, interested in upselling the solution as a consultant, says too early to talk numbers, does say saving manual labor is one of the most pressing problems of the industry as people are becoming more and more difficult to find and margins are growing ever smaller due to e-commerce.<br>The hypothesis to tests - Warehouse Management Systems or solution providers for at least $25K for L4 autonomy and $150K for L5 autonomy.†<br>Result -† We know they are willing to upsell and are excited about it, don't know the amount. So only a qualitative hypothesis test, not a quantitative expariement.<br>Future follow-ups with Ron should bring out the numbers.† | Sankalp Arora | Channels | CH: ERP Vendors | |
| 2/8/19 | Customer Interview | In Person Meeting with Kelly A Jhonson, Director Marketing, Stephen Gould | Willing to sell it as an add-on but not willing to share price points | We thought heading into the meeting that Stephen gould as the logistics, packaging and supply chain solution provider will be willing to sell automated inventory monitoring as add-on differentiator to their solutions, the price point at which it becomes feasible for such sales is around $24000 annually for L4 solutions and $120000 annually for L5 drones. They said they are definately interested in further discussions but want to sign an NDA to discuss pricing. Their lawyers are drafting one now. So the hypothesis is qualitatively validated but not quantitaively.† | Sankalp Arora | Channels | | CH: ERP Vendors |
| 2/13/19 | Business Model Hypothesis | On Use, per package basis, shared success model | | | Sankalp Arora | | | |
| 2/8/19 | Customer Interview | In Person Meeting with David T. Hunter, CEO, Stephen Gould | Stephen Gould is a custom packaging and supply chain solution provider, they viewed an autonomous inventory monitoring as a partner but felt that an integrated warehouse management system that can offer such solutions will be of greater value. They were unwilling to mention how much they would ask or pay for integration with their solutions.<br>They did mention that the workforce and its retention is the biggest problem that the industry faces. | Stephen Gould is a custom packaging and supply chain solution provider, they viewed an autonomous inventory monitoring as a partner but felt that an integrated warehouse management system that can offer such solutions will be of greater value. They were unwilling to mention how much they would ask or pay for integration with their solutions.They did mention that the workforce and its retention is the biggest problem that the industry faces especially as e-commerce picks up and stores/distribution centers look to compete with Amazon | Sankalp Arora | Customer Segments, Value Propositions | CS: 3PLs: VP SPL, WM, VP: 30% Labor saving in taking inventory | |
| 2/14/19 | Team Presentation | 1449_Nabla Ascent Presentation 02/14/2019 | | https://www.dropbox.com/sh/j6tizjx65dwaxel/AAChwksRC8mZ4jTbOv1HJe1Ha?dl=0 | Jessica Fleenor | | | |
| 2/5/19 | Customer Interview | Phone Call with Mar C., Manager, Global Operations | The problem is not just labor is too expensive but it is that it does not exist, hence new warehouses in locations like Milan, Lahore, Iraq. | Mar introduced the problem as notthat of saving operations cost but actually enabling the operations of warehouses in locations where skilled labour willing to do warehouse work is difficult to find. Currently her problem locations are the new warehouses she is looking to open internationally, namely Milan, Lahore, and Iraq. The savings are actually still $1M per year but VP is more that the savings, its enabling these facilities. | Sankalp Arora | Value Propositions, Customer Segments, Channels | VP: 24/7 live inventory, VP: 30% Labor saving in taking inventory, VP: 10% gain in warehouse throughput efficiency due to continous monitoring of inventory with added data analytics., CS: Air Cargo: VP SPL, WM, CH: Direct B2B Sales | |
| 2/5/19 | Customer Interview | In Person Meeting with Bernd Stuck, SVP Cargo, Dnata | No aha moments, just confirmed our hypothesis | Is willing to look into a solution that saves 30% of inventory taking effort. Labor shortage is the main problem and hinders operations . The saving is the order of $1M per warehouse annually. They are willing to buy directly from start-ups after we go through the technology vetting process. They want to track assets within the warehouse and measure volume since they do not have ubiquitous volume measureement sensor. | Sankalp Arora | Value Propositions, Customer Segments | VP: 24/7 live inventory, VP: 30% Labor saving in taking inventory, VP: 10% gain in warehouse throughput efficiency due to continous monitoring of inventory with added data analytics., CS: Air Cargo: VP SPL, WM | |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 2/4/19 | Customer Interview | Video Chat with Laura A., CEO, Williams Sonoma | Inventory taking of yard and the warehouse is needed. | We hypothesized that distribution centers for retail stores are willing to pay for 30% reduction in work-hours involved inventory taking.Although for just warehouses it is a nice to have for Williams-Sonoma but their main problem is that the inventory management system of the yard does not match the inventory mamangement system of the warehouse. Leading to slow-down of operations in the peak season. Laura did not want put numbers on the slow downs, I am talking to her CTO her next week and might be able to get numbers. | Sankalp Arora | Value Propositions, Customer Segments | VP: 24/7 live inventory, VP: Cost savings on taking inventory, VP: 40% saving on placement decision making staff due to closed loop nature of inventory monitoring, CS: Distribution Centers: Dir, VP SPL, WM | VP: 30% Labor saving in taking inventory, VP: 10% gain in warehouse throughput efficiency due to continous monitoring of inventory with added data analytics. | |
| 2/5/19 | Customer Interview | Video Chat with Alexa Depasquale, SVP Innovation, Grey Adventures | Inventory problem as highlighted by Accenture in the pharma industry is a sharkbite problem to which pfyzer is looking for solutions continously. She was unwilling to put numbers on it because lack of in-depth detail, as her domain expertise is innovation. She does think making sales through innovation labs is always difficult. | Inventory problem as highlighted by Accenture in the pharma industry is a sharkbite problem to which pfyzer is looking for solutions continously. She was unwilling to put numbers on it because lack of in-depth detail, as her domain expertise is innovation. She does think making sales through innovation labs is always difficult. | Sankalp Arora | Value Propositions | VP: 30% Labor saving in taking inventory | | |
| 2/3/19 | Customer Interview | In Person Meeting with Ratnesh Madan, Autonomy Engineer, Microsoft | Microsoft is spinning out a branch with a focus on drone autonomy, they are looking to develop business cases for autonomous drones. Their current play is to be edge data analytics provider and a sim verification system with air sim but the long term play is to make an autonomy engine, a kind of OS for drones. They are interested in what we are doing given our reputation in the field. | Microsoft is spinning out a branch with a focus on drone autonomy, they are looking to develop business cases for autonomous drones. Their current play is to be edge data analytics provider and a sim verification system with air sim but the long term play is to make an autonomy engine, a kind of OS for drones. They are interested in what we are doing given our reputation in the field. | Sankalp Arora | Value Propositions | VP: 24/7 live inventory | | |
| 2/4/19 | Customer Interview | Phone Call with Marta Dalton, Global Director, E-commerce, Unilever | No Aha moment | Marta works for unilever and have worked for coca-cola for their e-commerce business. Inventory monitoring is around 6-800 hours a week problem for an average 5,000,000 sq. ft warehouse. Reducing that by just 40% will make for a viable product, the problem exists because of shortage of trained labor force. The problem exists world-wide, people do not want to do this job. This information is not new, rather it just confirms wht we learnt from previous interviews | Sankalp Arora | Value Propositions, Customer Segments, Channels | VP: 30% Labor saving in taking inventory, VP: Cost savings on taking inventory, CS: 3PLs: VP SPL, WM, CH: Direct B2B Sales | | |
| 2/6/19 | Customer Interview | Phone Call with Ben W., Accelerator Programme Manager, Cube-co | The demos for innovation managers are recommended by university professors or scout investors like YC or XRC labs. | *- Innovation labs hear directly from universities<br>*- That was only partially true, innovation labs either hear from universities but more effective are investor scouts<br>*- 80% of the companies they work with are through investor scouts.<br>*- The companies then make direct b2b slaes | Sankalp Arora | Channels | CH: Direct B2B Sales | | |
| 2/2/19 | Customer Interview | In Person Meeting with Deonna, Business Manager, Apple | The distribution centers at Apple use in-house developed software. | WMS systems are customized to each and every company depending on their needs, which leads to the industry much more being open to direct b2b sales. But it also means big companies make softwares that are developed in-house. These software offer interfaces to inventory measuring hardware. Apple runs a tight ship they do not need some one else to track their inventory.† | Sankalp Arora | Customer Segments | | | CS: Factories with need for asset tracking: Dir, VP SPL, Floor Manager |
| 2/4/19 | Customer Interview | In Person Meeting with James Turnshek, CEO, Formations, Inc. | Maintaining operations is the main cost after deploying autonomous robots inventory. | We thought the main cost of maintaining automated inventory monitoring systems will be their maintenance.However the cost of operation is 3 times the cost of maintanence. There are large operation centers that maintains this operation. The sales are direct b2B always since only start-ups exist in the space. | Sankalp Arora | Channels | CH: Direct B2B Sales | | |
| 2/6/19 | Customer Interview | In Person Meeting with Matthew Turnshek, Director, Sales, Formations, Inc. | No particular aha moment | Mattew Turnshek works for formations Inc, leading sales he confirmed that the sales cycle usually takes 6 months to 1 year, and it goes through the demo, pilot, sales process. He is not a potential customer but is very familiar with the sales process and cycles. His company goes to 2 big conferences or shows per year but most of the sales occurs through word of mouth. | Sankalp Arora | Customer Relationships, Channels, Revenue Streams | CR: Customer Service, CH: Direct B2B Sales, R$: Monthly subscription inventory services, R$: Upsell analytics as value-add | | |
| 2/4/19 | Customer Interview | In Person Meeting with Mike Frechak, Systems Engineer, Formations Inc. | Maintaining operations is the main cost after deploying autonomous robots inventory. | Mike the systems engineer at Fromations Inc, he supports operations software for a major automated inventory taking company for retailers. There were a few hypothesis confirmed by the interviewee,† the sales cycle for the retail sector can go upto an year. Operation costs for around 500 robots equals to a team of 30 people working full time, year round.† | Sankalp Arora | Value Propositions, Customer Relationships | VP: 24/7 live inventory, CR: Customer Service | | |
| 2/6/19 | Customer Interview | In Person Meeting with Vai, President, Zenith Automation | No aha moment just reconfirmed our last week's finding about sales. It takes 7-8 months for an average sales to come through. | Before the meeting we wanted to learn the sales process of zenith robotics to make multi-robot autonomous transportation of goods in the warehouse floor. Their technology took around 6 months to 1 year but given he was unable to secure sufficient cash flow as a single solution maker due to long sales cycle they had to pivot to become a consultant company. Their technology was not quite there yet as well, so that also resulted in sales not being able to deliver on promises made. Their key value proposition was manual labor saving and it was given that value proposition they were able to sell technology that was not quite mature enough. | Sankalp Arora | Value Propositions, Channels, Customer Segments | VP: 30% Labor saving in taking inventory, CH: Direct B2B Sales, CS: Factories with need for asset tracking: Dir, VP SPL, Floor Manager | | |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 2/2/19 | Customer Interview | In Person Meeting with Stuart Evans, Director, Innovation Lab, Emirates, CMU | Air Cargo industry is struggling with hiring people for their warehouses, so the automation is not just a cost saving as it traditionally has been but also enable operations where they are not possible anymore. | Our hypothesis was that automated inventory taking saves 60-80% of manual labor involved in taking inventory.Stuart who is consulting with Dnata and Emirates, and leads their innovation lab at CMU.He mentioned Dnata is struggling with hiring and haven't been able to start operations in Milan, Lahore and Iraq due to lack of workforce. Inventory monitoring takes up 24 full-time employees, and an automated solution can relieve up to 60% of that.The main hindrance in adopting autonomy is upfront costs, changes in warehouses and lack of flexibility. | Sankalp Arora | Value Propositions, Customer Segments | VP: 24/7 live inventory, VP: 30% Labor saving in taking inventory, VP: 40% saving on placement decision making staff due to closed loop nature of inventory monitoring, CS: Air Cargo: VP SPL, WM | | |
| 2/1/19 | Customer Interview | Phone Call with Nilesh Mohan, Director, Engineering & Transformation, Global Supply Chain & Logistics, Target | Customer needs are changing with increased requirements for flexibility and lesser store-front requirements. Warehouses are bigger and need automation with low upfront cost and flexibility. | At a high-level, my main take away was supply chain logistics is looking to change to meet the evolving customer needs with ever reducing the margin. However, automation has turned out to be excellent at doing the same thing over and over again but the upfront and maintenance costs with the lack of flexibility have been the main factors the lack of adoption. New user habits like last minute changes, pick-up or delivered groceries are driving innovation, and flexibility and live trackability are big requirements. Currently, people are employed geared with barcode readers and RFID readers to track inventory. There is a problem to be solved there. | Sankalp Arora | Value Propositions, Channels | VP: 30% Labor saving in taking inventory, CH: Direct B2B Sales | VP: Upsell to customers | |
| 2/1/19 | Customer Interview | Video Chat with Al Sambar, Director of Retail strategy, Accenture | Accenture can work as scale partners. Yard management with inventory in pharma are problems worth more than $1B in revenue. | The main application we discussed was around managing yards at Flat-bed distribution centers. Another application that seemed to impactful was guiding loading procedures using drones on loading bays. Both applications not only present labor savings but also present an opportunity to upsell products to prosumers for companies like Lowes. With a 10-20% labor savings this could be $10M opportunity per yard. One problem with yard management through drones is drones will need to fly in federal air space but a section 333 exemption can be applied for. Similar aplications for 3PL's but without the 333 exemption needed.Another application is pharmaceuticals, since inventory tracking is always a dilema for them, especially pharma suppliers for city wide hospitals. Some of the inventory is high value and not being out of inventory is of prime importance. Some of the next steps were--- Talk to Marcus Rawlings at Accenture research to undertand the vetting process, and other possible active opportunitities.-- Simulate scenarios in sketches to describe them better. *- Make an introduction to Chris Langford at Lowe's. beautiful analogy used -† about coaches telling quarterbacks strategy because they have full, brid's eye view of the field. | Sankalp Arora | Value Propositions, Customer Segments, Channels | VP: 24/7 live inventory, VP: 30% Labor saving in taking inventory, VP: 10% gain in warehouse throughput efficiency due to continous monitoring of inventory with added data analytics., VP: Cost savings on taking inventory, CS: 3PLs: VP SPL, WM, CH: Direct B2B Sales | | |
| 2/7/19 | Team Presentation | 1449_Nabla Ascent Presentation 02/07/2019 | | https://www.dropbox.com/sh/eot2vutvkge52i5/AAAlbUSkHhCNlYjPyq3ci1AVa?dl=0 | Jessica Fleenor | | | | |
| 1/31/19 | Team Presentation | 1449_Nabla Ascent Presentation 01/31/2019 | | https://www.dropbox.com/sh/x0fx9v6veh4o3oh/AAAJ2OdTMJmxXGyzFs_93x5na?dl=0 | Jessica Fleenor | | | | |
| 1/28/19 | Customer Interview | In Person Meeting with Phil Broener, Ex-Supply Chain Consultant, McKinsie | Complete automation from most of the warehouses has failed other than for big players, for automation with quick ROI that shares the space with workers should work. | Hypothesis tested -† 1. Inventory is one of the biggest pain points for warehouses. 2. They are willing to pay for 30% reduction in their costs. Phil was a consultant in the space 10 years ago, he still thinks inventory is the biggest pain point but gave us example of Amazon and Walmart where full automation has been implemented at a few select locations. Most of the automation exists with workers being re-allocated to assist the automation or vice-versa.He is of the opinion if ROI is right then supply chain VPs will be willing to pay for reduction of even 10% with 24/7 live inventory monitoring of the warehouse.We need to be able to get to VPs. | Sankalp Arora | Value Propositions | VP: 24/7 live inventory, VP: 30% Labor saving in taking inventory, VP: 10% gain in warehouse throughput efficiency due to continous monitoring of inventory with added data analytics. | | |
| 1/27/19 | Customer Interview | In Person Meeting with Ajay Punia, Team Lead, Hi-Tech Robotics Systemz | Other robotics warehouse automation providers can be partners but they themselves are a bit too early. | Hypothesis - Other robotics warehouse automation providers can be partners. What we learnt - They can be but they are themselves too early, and are struggling to provide solutions that can create value. This learning was first expressed by Kraig from familyDot holdings. Next Steps - There are 2 companies in Pittsburgh that provide these solutions, try and reach out to them, to see if they can be distribution partners (unlikely). | Sankalp Arora | Channels | | | CH: ERP Vendors |
| 1/29/19 | Customer Interview | Video Chat with Ellen Jackson, Manager, Asset Protection & Supply Chain, RILA | More than live inventory she cares about asset protection and shrinkage, which the store managers didn't seem to care about too much. | Asset protection and shrinkage is at least $1.5B problem for walmart itself. So far in our customer discovery store managers did not think it was a big pain point, it was more of a nice to have than must have. But from Ellen's perspective that is her biggest pain point. It is surprising that in both the retail interactions we had this week, we got opposite signals than that of store managers. | Sankalp Arora | Value Propositions, Customer Relationships | VP: 24/7 live inventory, CR: Customer Service | | |
| 1/30/19 | Customer Interview | Video Chat with Vineet N., Innovation Manager, Emirates Air Cargo | Change in management leads to setbacks in sales. | Vineet Nair was handling our integration with Emirates air cargo warehouses over the last year. The main VP there is saving of manual labor for inventory, addressing the main problem the industry has, which is shortage of manual labor. But that has already being confirmed through our customer discovery so far. This meeting Vineet informed us about changes in decision makers within Emirates and how that has led to changes in policies on what areas t focus on for introducing new products. Now we will have to start all over again to convince the decision maker. | Sankalp Arora | Value Propositions | VP: 30% Labor saving in taking inventory, VP: 40% saving on placement decision making staff due to closed loop nature of inventory monitoring | VP: 24/7 live inventory, VP: 10% gain in warehouse throughput efficiency due to continous monitoring of inventory with added data analytics. | |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 1/29/19 | Customer Interview | Video Chat with Jess Dankert, VP Operations, RILA | None | We wanted to seek opportunitites to be at conferences that RILA organizes. There is one on 24th-27th Feb. Given the nature of our product, they have offered us a booth. More imporantly it was important to confirm the sales channel, again it seems to be direct going through the innovation labs of these big retailers and then setting up demos, pilots, and culminating in product sales. She seems to think live nature of inventory is important, we haven't heard the same from other retailers. | Sankalp Arora | Value Propositions | VP: 24/7 live inventory, VP: Cost savings on taking inventory, VP: 40% saving on placement decision making staff due to closed loop nature of inventory monitoring | |
| 1/31/19 | Instructor Engagement | Comment from Nancy Saucier on 01/31/2019 | | You last 3 VPs are features and not measureable.† What do these features offer the customer?† You can also quantify cost savings, so take a guess that you can test.† Remember cost savings can be a dangerous VP.† The ulitmate goal is to find a customer that is willing to pay more to have your solution because it provides so much more value than their current solution.† This drives from finding a big problem that you can solve. | Nancy Saucier | | | |
| 1/30/19 | Customer Interview | In Person Meeting with Bruce, Ex-Chemical Engineer, Chevron | A chemical engineer spends 4 hours a day for rust detection on oil rigs, while sitting in inspection boats or helicopters | Rust inspection is a big-ticket, expensive process for oil rigs.Bruce confirmed it and put the number at around $1M a month in terms of costs.They will be willing to pay if it reduces by even 25%.The helicopters need to fly withinh 2 feet of the rig, so it dangerous as well.This is another customer archetype and will need sugnificant hardware customizartion.He thinks painting these Rigs is an equally big problem as same amount of time is spent doing so. | Sankalp Arora | Value Propositions | VP: 10% gain in warehouse throughput efficiency due to continous monitoring of inventory with added data analytics., VP: 40% saving on placement decision making staff due to closed loop nature of inventory monitoring | |
| 1/29/19 | Customer Interview | Video Chat with Emad E., Senior Manager - Integration, GE | Oil and Gas industry cares about keeping thin inventory margins, their problem is not so much tracking inventory ERP does that already, their main problem is predicting customer orders and keeping inventory. | Oil and Gas industry cares about keeping thin inventory margins, their problem is not so much tracking inventory ERP does that already, their main problem is predicting customer orders and keeping inventory.Large Oil and gas companies will pay up to $50M for ERPs, they can be a good sales channel (partners). | Sankalp Arora | Channels | CH: ERP Vendors | |
| 1/28/19 | Customer Interview | In Person Meeting with Mark Nolan, VP Instiutional Partnerships, CMU | University is willing to provide access to companies that come to it for innovative solutions. | Lowes and Fed-Ex have been coming to campus for drone based applications, Mark will connect us to them. He will connect us to the innovation labs in these companies. Again the sales channel will be direct sales, going through the demo, pilot, sales process. | Sankalp Arora | Channels, Customer Relationships | CH: Direct B2B Sales, CR: References and cold calls | |
| 1/28/19 | Customer Interview | Video Chat with Kathy, Ex-Supply chain manager, United | The inventory problem is much more severe in catering than in the cargo business. They are willing to pay for vendor installations. | Air cargo is willing to spend to save 30% cost of saving inventory.Catering seems to be a more pressing need, with $1M spent on overnighting catering to planes within US.The catering comes from 3rd party vendors and their inventory reporting is often inaccurate, leading to shortages, needs fro overnighting. Her team managed 80-90 vendors and were only 5 people. So had to rely on flying visits to enable random inventory checks.<br>They are willing to pay for installation on their vendors! | Sankalp Arora | Value Propositions | VP: 24/7 live inventory, VP: 40% saving on placement decision making staff due to closed loop nature of inventory monitoring, VP: Cost savings on taking inventory | |
| 1/29/19 | Customer Interview | Video Chat with Rudy Wen, Technologist in residence, Expa | ERP sales are massive and they can be a good channel to get into warehouses, 3PL's etc. | We will learn about ERP landscape from Rudy. Understand how sales are made and how bar code readers sales are made. ERP companies charge large amounts of money for a license $100K - $50M depending on the size of the company. They sell inventory system integration API's but also sell inventory management system through partnerships. Direct B2B sales also work but there will be much more friction.† | Sankalp Arora | Channels | CH: Direct B2B Sales, CH: ERP Vendors | |
| 1/29/19 | Customer Interview | Phone Call with Todd Crawford, Innovation Manager, Caterpillar | They need drones for measuring productivity at mine sites, not for inventory. They also want them for measuring productivity in warehouses. | We assumed Caterpillar might need drones for inventory in their massive warehouses.They seem to have a good handle on that problem but the other problem of measuring productivity of earth movers still lingers on and is solvable by drones.In terms of a sales channel to them, the innovation lab vets the new solutions through demos, these demos then turn into pilots and pilots convert to sales. Sales cycle is atleast 6 months. | Sankalp Arora | Value Propositions | VP: 24/7 live inventory, VP: 10% gain in warehouse throughput efficiency due to continous monitoring of inventory with added data analytics., VP: 40% saving on placement decision making staff due to closed loop nature of inventory monitoring | |
| 1/28/19 | Customer Interview | In Person Meeting with Prerana P., Architect, Desmone Architects | Measuring construction progress can be up to 10-20% cost of architect's fees goes into site visits dong construction progress monitoring. | Architects spend significant amount of money to track progress of construction of projects.She was working on a project where they were charging around $10M for a building's design and monitoring. Taking inventory of the construction or monitoring its construction would have been around $1M cost over the course of 1 year. There is a valid case for using automation to provide construction updates. It also saves cost of re-doing some of the things, since progress can be monitored continously. | Sankalp Arora | Value Propositions | VP: 24/7 live inventory, VP: 30% Labor saving in taking inventory, VP: 10% gain in warehouse throughput efficiency due to continous monitoring of inventory with added data analytics. | |
| 1/26/19 | Customer Interview | In Person Meeting with Qi Wang, Innovation Engineer, Caterpillar | Caterpillar's main concern is not inventory taking but measuring productivity with enough precision. | Initial Hypothesis - Caterpillar's operations managers want to reduce labor to take inventory in their large yards.In Qi's time at Caterpillar it never came up that they have to use technology to track inventory. Since, they have expensive, large items for inventory, check-in, check-out system of inventory works for them. They do more care about worker efficiency and want to track people through their warehouses to measure their productivity. Measuring productivity seems to be a running theme, where their big pain point is to measure earth mover's performance for inventory taking. They have tried demonstrations of commercial drones solutions for earth movement measuring but they are too imprecise since they measure the earth from far away. Our technology can solve this problem but we do not know if we want to. | Sankalp Arora | Value Propositions, Customer Segments | | VP: 10% gain in warehouse throughput efficiency due to continous monitoring of inventory with added data analytics., VP: 40% saving on placement decision making staff due to closed loop nature of inventory monitoring, CS: Factories with need for asset tracking: Dir, VP SPL, Floor Manager |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 1/28/19 | Customer Interview | In Person Meeting with Amir R., Store Manager, Apple | Apple stores want to maintain a lean but accurate inventory that caters to customers demand since the store work is labor intensive anyways the need for automation does not arise. | Apple store managers need to reduce man-hours spent on inventory taking by 30%. Apple stores, given the high value items stored always know the inventory they have in the back-store. They keep running out of shelf space because they want to store more things to serve customers. Since the store employees people to make the sales, it is ok with re-allocating some of that task force to† do inventory. | Sankalp Arora | Value Propositions | | | VP: 24/7 live inventory |
| 1/25/19 | Customer Interview | Video Chat with Dave Hall, VP Strategic Monitoriing, Honeywell | Large warehouses tend to be nearly fully automated other than picking but taking inventory for small, medium and large inventory still remains a problem, there is a valid business case here. | Before the meeting the main hypothesis was that honeywell is a major player in the automated warehouse market and would have addressed the inventory maintenance problem.During discussion Dave described how the ain problem honeywell addresses is full automation of warehouses. That needs considerable infrastructure in place, hence large players like amazon can afford to deploy their solutions in specific high volume warehouses but smaller companies or smaller warehouses same solutions are infeasible. Given that manual labor is the problem to address in this sector, any tool that uses that does minimal changes in the current infrastructure while reducing the need for skilled labor should work.Honeywell's main issue is that they have plenty of cool tech with limited real-world applications. This is his biggest problem as he is a sales guy.Given the size of honey well, their sales channel is direct. After the discussion it was clear that there is a whole in the market for semi-automated warehouses, we are still figuring out the size of this whole. | Sankalp Arora | Value Propositions, Channels | VP: 30% Labor saving in taking inventory, VP: Cost savings on taking inventory, CH: Direct B2B Sales | | |
| 1/30/19 | Business Model Hypothesis | ERP Vendors | | | Sankalp Arora | | | | |
| 1/24/19 | Team Presentation | 1449_Nabla Ascent Presentation 01/24/2019 | | https://www.dropbox.com/sh/2vdb4jv5e0dfijs/AACvR8hudSSfJD8NDOWSfn_5a?dl=0 | Jessica Fleenor | | | | |
| 1/24/19 | Business Model Hypothesis | Direct store delivery vendors - Operations managers | | | Sankalp Arora | | | | |
| 1/23/19 | Customer Interview | In Person Meeting with Ciannie Rodriguez, Store Manager, IKEA | Ikea's processes are more optimized and automated than any other stores we interviewed, with ordering and placement of goods optimized with minimal human intervention. | So far we have realized that the cost saving in retail, specially to retail store managers because of inventory is minimal. Just wanted to confirm the hypothesis with IKEA. Ikea it turns out is an optimized operation with a central distribution model. Algorithms decide what to order, when to order and fulfilment is done packed trucks with a high packing fraction. In the store, as with any other store every day a team of 5-10 employees manually take inventory for an hour, going around the store. | Sankalp Arora | Customer Segments | | | CS: Retail stores: VP SPL, Store Manager |
| 1/19/19 | Customer Interview | In Person Meeting with Gordon Brown, Ex-Director of operations, Chemicals for Medical supply | Facilities need to shutdown to take physical inventory, especially a problem in mid-size operations. | We were confirming the hypothesis that labor saving through automated inventory is a valid value proposition. And wanted to understand that if there any further problems in the space that we are missing out on. Gordon mentioned that his company was only 2000 sq. ft. warehouse when he started and he was part of the team that grew it to multiple large warehouse locations around the world. Going from a $1M revenue company to $10B annual revenue. Gordon was the director of operations when he moved on. Inventory was one of his biggest pain points because quite often the warehouse and manufacturing would need to be shut down completely for multiple days to take full inventory of the warehouse. The cost in just the manual labor per facility of the warehouse can be added up to 300 people just taking inventory for 3 days. Roughly 3 work hours a day. Even if that is reduced by 30%, that is a significant saving both in labor and operations cost. | Sankalp Arora | Customer Segments, Value Propositions | CS: Distribution Centers: Dir, VP SPL, WM, VP: 30% Labor saving in taking inventory, VP: 40% saving on placement decision making staff due to closed loop nature of inventory monitoring | | |
| 1/23/19 | Customer Interview | Phone Call with Sidhant Arora, Sales, BGIR | Sales people do not care about operations unless the market the squeezed on pricing. | We wanted to confirm the customer upsell of an inventory monitoring solution. Sidhant is a part of mid-size 3rd party logistics, running its sales operations all over India. As a sales person his biggest problem is differentiating his business as compared to others in a competitive market. Currently his differentiation strategy is to provide insurance services on his deliveries and goods being delivered. In terms of operations he thinks transparency is another selling point but is of the opinion that upsell to customer is not so strong. | Sankalp Arora | Customer Segments, Value Propositions | | CS: Distribution Centers: Dir, VP SPL, WM, VP: Upsell to customers | |
| 1/22/19 | Customer Interview | Phone Call with Harish Arora, President, SD Logistics | In live operation, even for a mid-size warehouse, live inventory is needed for operations optimizaton. | We met Harish looking to understand his problems as a medium size warehouse and logistics operator for other companies. His main problem stays that of recruting staff and that of poor operations. One of the key areas of operations optimizations is to continous update of inventory for glass pallets that get lost within the warehouse after every 5 truckloads. Roughly after every couple of hours truck loading is stopped to take inventory of the warehouse and the updated locations are then used to start truck loading again. He is reluctant to put costs on the process, as it might require a study. | Sankalp Arora | Customer Segments, Value Propositions | CS: Distribution Centers: Dir, VP SPL, WM, VP: 30% Labor saving in taking inventory, VP: 40% saving on placement decision making staff due to closed loop nature of inventory monitoring | | |
| 1/23/19 | Customer Interview | In Person Meeting with Micheal Flicklinger, CEO, Bizowie | Mid-size warehouses run on small margins and cannot afford long-term ROI's, bu their problems of manual labor shortage still remains the number one problem. | Wanted to confirm the labor savings hypothesis.Micheal who runs an ERP company confirmed that labor is the biggest problem. He has first hand witnessed how adoption of fully autonomous systems has failed and tools to help in reducing man-power are more deployable. He himself runs a company that serves mid-range warehouses who do not have the money to invest in automation solutions that provide ROI on a long -term bases. The warehouses he supports run at about 20% margin with an annual revenue of $20-30M. Could not confirm the number of hours they spent on inventory, estimated it to be 20-50% of man hours depending on the operation. | Sankalp Arora | Customer Segments, Value Propositions | CS: 3PLs: VP SPL, WM, CS: Distribution Centers: Dir, VP SPL, WM, VP: 30% Labor saving in taking inventory, VP: 40% saving on placement decision making staff due to closed loop nature of inventory monitoring | | |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 1/22/19 | Customer Interview | In Person Meeting with Kit Needham, Early Stage Advisor, Swartz center for entrepreneurship | US Steel has the same inventory problem with outdoor yards. | We conducted this meeting with Kit as we want to move towards interviewing decision makers and influencers in our customer discovery process. Our hypothesis was given her network and understanding for the supply chain, logistics industry, she can connect us to VPs, directors and C-level employees at different companies. She re-affirmed the hypothesis that labour is the biggest problem in the industry and saving of man-hours promises to be lucrative value proposition. She mentioned US Steel, whose operations she was familiar with, have inventory issues not only indoors in their warehouses but outdoors in their storage yard with teams of up to 5-10 people employed full-time to solve the problem. Reduction of those numbers by just 40% should be sufficient to get them interested in a product. | Sankalp Arora | Customer Segments, Value Propositions | CS: Distribution Centers: Dir, VP SPL, WM, VP: 30% Labor saving in taking inventory | | |
| 1/22/19 | Customer Interview | Video Chat with Pano Anthos, Director, XRC Lab | He suggested that accenture, and lowes are actively looking for inventory monitoring solutions that can save even 30% of the cost of labour. | We wanted to understand the landscape of the logistics and supply chain industry a bit better with the added effort to reach out to decision makers. Pano is an influencer in the space. He suggested that accenture, and lowes are actively looking for inventory monitoring solutions that can save even 30% of the cost of labour.He has already made introductions with the director of operations and innovations at Accenture. | Sankalp Arora | Value Propositions, Customer Segments | VP: 30% Labor saving in taking inventory, CS: Retail stores: VP SPL, Store Manager | | |
| 1/21/19 | Customer Interview | Phone Call with Dayna, Associate, NEA | Given there are no changes required in the warehouse system, the adoption of new technology tends to be easier. | Warehoues willdeploy our solution if there is a need. (Hypothesis)Warehouses are looking for human aids to reduce workforce.Most autonmated solutions are nice to haves instead of must haves.<br>Regulations and infrastructure requirements make it hard to transition.<br>Labour savings is major pain point. | Sankalp Arora | Value Propositions | VP: 30% Labor saving in taking inventory | VP: 40% saving on placement decision making staff due to closed loop nature of inventory monitoring | |
| 1/23/19 | Customer Interview | In Person Meeting with Sunny, Assistant store manager, Hobby Lobby | This store seems to be an outlier relative to the previous retail stores we visited -- despite having relatively large stores, they are reticent to adopt various forms of technology, and do not even use barcode scanners. Despite this the store manager felt they were fairly efficient. The employees needed to learn a large amount about the store to operate inventory in these conditions, but unlike other retail stores, this was not seen as a big issue given that employee turnover was relatively low. | We aimed to further learn about the practices and needs of different types of retail stores in terms of inventory management and analytics, and visited Hobby Lobby as a different type of retail store compared to the ones we have visited.<br>The store manager described briefly how they manage stocking. It was a fairly low-tech process, in stark contrast, to e.g. IKEA, which we had visited the same day. Every week, a truck from Oklahoma City arrives with the stock. This is placed in a backroom warehouse, and the store is required to empty the backroom within 24 hrs. The items are manually sorted and distributed to the different departments/aisles within the store. The sorting process, which was completely manual, was considered to be somewhat cumbersome by the manager, but workable. In terms of stocking requirements, this was also managed manually; if they ran out of some item, they would simply order more of it for next week.†<br>This process required the workers to be highly familiar with the organization and practices of the store, but this was not considered a big issue, unlike other stores we visited. This is because they claim to have low employee turnover, as they offer good benefits and salary. Altogether, all these practices were described as part of the company's distinctive cutlure, originating from its founder.<br>Overall this interview does not provide evidence that retail stores would be strongly interested in the kind of inventory monitoring we could provide. This seemed a fairly strong counterexample, in that e.g., they did not even use barcode scanners, and did not seem highly interested in more sophisticated monitoring or analytics. | Daniel Maturana | Value Propositions | | | VP: 24/7 live inventory, VP: 30% Labor saving in taking inventory |
| 1/23/19 | Customer Interview | In Person Meeting with Patrick H., Store Team Leader, Furniture City | *For smaller stores (i.e. not Walmart), figuring out local demand trends as soon as possible is crucial, given that they want to allocate small amounts of inventory as efficiently as possible to places where they will be sold -- they can not afford to have large amounts of inventory that will possibly go unsold. This is interesting from the viewpoint of what up-to-date analytics can offer for this kind of chains.<br>*Furniture items are valuable enough that some chains identify and track each item uniquely, besides SKU. However, we were not able to learn much about other aspects of the inventory process in this business from this interview. This is an interesting aspect of their inventory needs we would consider for this kind of wares. | We believed that we should learn about a different type of retail business than the ones we had visited before -- furniture.†<br>The store team manager was somewhat concerned about discussing details about the store, but was eager to discuss various aspects of the furniture business and logistics at a higher level. Was of the opinion that figuring out how to efficiently package and transport furniture (usually in containers) was key. Managing business relationships in the countries that manufacture the furniture (China, Vietnam) was also a challenge.<br>Trying to steer the conversation to more concrete aspects of logistics and warehousing, we learned about the importance of understanding and predicting the demand trends of items, which were ever-shifting and fad-driven was key for smaller chains that could not afford large amounts of inventory. We also learned that some furniture chains keep track of individual furniture items, not just SKU.† | Daniel Maturana | Value Propositions | | VP: 10% gain in warehouse throughput efficiency due to continous monitoring of inventory with added data analytics. | |
| 1/19/19 | Customer Interview | In Person Meeting with Samantha Sklencar, Asst. Store Manager, Bed, Bath & Beyond | Continous inventory taking is required and can be reduced | We thought store managers have inventory monitoring needs for labor saving.In this store there is a team of three people that monitors inventory continuously.Their volume is 120 cartons, 250 pallets everyday.store associates use pictures to match how shelves should be lined up.Sarris candy and card spinner are their dsd's.They would pay if we can reduce the inventory taking team to 1, but that is not the store managers decision. | Sankalp Arora | Customer Segments | | CS: Retail stores: VP SPL, Store Manager | |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 1/23/19 | Customer Interview | In Person Meeting with Nick Sakmar, Sr. store manager, Target | Direct store delivery vendors spend money to audit shelves multiple times a week. (Find out how much money) | Direct store delivery vendors control specific shelves.Pepsi, Coke, Frito Lay to name a few.They have contracts with the stores about shelf layouts, and maintain their own stock.Multiple times a week their representative shows up and inspects the shelves.Register is linked to these vendors.<br>Call guest relations at 1800-440-0680 to reach out to Operation director | Sankalp Arora | Customer Segments | | | CS: Retail stores: VP SPL, Store Manager |
| 1/19/19 | Customer Interview | In Person Meeting with Matt, Store Manager, Target | Store managers inventory problems are mainly hours spent in restocking. | There is shrinkage of 1% but it is mainly due to theft.Asset protection team takes care of it.Out of stock detection is done manually, each truck takes 200 man hours to unload and 130 man-hours for backroom stockingTarget has started a new pilot program where† sku's are loaded according to the retail store position, making loading easier.Does not see inventory a problem, even though shrinkage is about $700K. | Sankalp Arora | Value Propositions, Customer Segments | | CS: Retail stores: VP SPL, Store Manager | VP: Reduced losses from missing/mismatched inventory |
| 1/18/19 | Team Presentation | 1449_Nabla Ascent Presentation 01/18/2019 | | https://www.dropbox.com/sh/ng2yj2lnvedqsg6/AABguu3dv8Q2P_B40-FxaKWTa?dl=0 | Jessica Fleenor | | | | |
| 1/17/19 | Customer Interview | In Person Meeting with Douglas Jost, Owner, Jost Chemical | Expanded applications for robotics | Makes chemicals in large volumes.<br>Lose inventory before shipping. †Maintains 9 months inventory on some products.† | Robb Myer | Customer Segments | | CS: Factories with need for asset tracking: Dir, VP SPL, Floor Manager | |
| 1/17/19 | Customer Interview | In Person Meeting with Andrew, Front Manager, Target | Back of store used for picking for online orders | Use RFID Tags on clothes]<br>2x physical investor.† | Robb Myer | Customer Segments | | CS: Retail stores: VP SPL, Store Manager | |
| 1/17/19 | Customer Interview | In Person Meeting with Wade Long, Floor Manager, ODW Logistrics | Spends a lot of time updating inventory locations.<br>Just wants to updated itself. | Turn over very common.†<br>Training 1 day. †Everyone trained on Fork Lift† | Robb Myer | Customer Segments, Value Propositions | CS: 3PLs: VP SPL, WM, VP: 24/7 live inventory, VP: 30% Labor saving in taking inventory, VP: Upsell to customers | | |
| 1/17/19 | Customer Interview | In Person Meeting with Kevin Labadie, Manager Operations, ODW Logistrics | Big challenge Inventory Keeps up | 75% times inbound †- Retagging†<br>25% times outbound | Robb Myer | Customer Segments, Value Propositions | CS: 3PLs: VP SPL, WM, VP: 24/7 live inventory, VP: 30% Labor saving in taking inventory, VP: Upsell to customers | | |
| 1/17/19 | Customer Interview | In Person Meeting with Charles, Manager Operations, Quiet Logistics | Items need to have temp tags in staging area before placed in location. | In charge of in processing†<br>3 people pulling off the track<br>9 people for incoming<br>5 walkers† | Robb Myer | Customer Segments, Value Propositions | CS: 3PLs: VP SPL, WM, VP: 10% gain in warehouse throughput efficiency due to continous monitoring of inventory with added data analytics., VP: 30% Labor saving in taking inventory | | |
| 1/17/19 | Customer Interview | In Person Meeting with Kevin Shepard, Shift Manager, Quiet Logistics | Labor turnover biggest issue. | †† | Robb Myer | Customer Segments, Value Propositions | CS: 3PLs: VP SPL, WM, VP: 10% gain in warehouse throughput efficiency due to continous monitoring of inventory with added data analytics. | VP: 30% Labor saving in taking inventory | |
| 1/17/19 | Customer Interview | In Person Meeting with Matt Rego, Sr. Manager of Operations, Quiet Logistics | 300 Hr / week (50%) spent on Inventory Control | 270K ft | Robb Myer | Customer Segments, Value Propositions | CS: 3PLs: VP SPL, WM, VP: 10% gain in warehouse throughput efficiency due to continous monitoring of inventory with added data analytics., VP: 30% Labor saving in taking inventory | VP: Upsell to customers | |
| 1/17/19 | Business Model Hypothesis | 30% Labor saving in taking inventory | | | Sankalp Arora | | | | |
| 1/16/19 | Customer Interview | In Person Meeting with Ellen Yuan, Director of Sourcing, Grabber Construction Products | Didn't have many insights. | Didn't have many insights | Robb Myer | Customer Segments | | CS: Distribution Centers: Dir, VP SPL, WM | |
| 1/16/19 | Customer Interview | In Person Meeting with Matt, Shift Manager, Sam's Club | | Physical inventory end of January each year. †<br>Use 3rd party to count.†<br>Scan rack location, scan item. Don't really lose items often. †<br>Department leads make visual check of stock outs each night at close. Make "drop" list for night crew to restock.†<br>Doesn't really take that much time. † | Robb Myer | Customer Segments | | | CS: Retail stores: VP SPL, Store Manager |
| 1/16/19 | Customer Interview | In Person Meeting with Kraig Shoemaker, Regional Operation Manager, Grabber Construction Products | Not really a problem to find missing products. They don't really move from different bins.<br>Was very interested in seeing demo in Ohio location | turn over 3.5 per year<br>Inventory mismatches ~ $30K per year<br>Year end Full inventory†<br>8 hours 3 - 6 people = 48 man hours†<br>Don't use RFID, too expensive.<br>No standard Bar codes†<br>26 Distribution centers across US and Canada†<br>1 CA location automated. Smaller aisle 5ft instead of 10ft. †Can't pick by forklift when broken.<br>150K vs. 22k forklift.† | Robb Myer | Customer Segments | | CS: Distribution Centers: Dir, VP SPL, WM | |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| 1/16/19 | Customer Interview | In Person Meeting with Heath Hunter, VP Corp Dev, Dot Family Holdings | 1) Pain is driver shortage<br>2) Pain is warehouse personal shortage. high turn over rate.<br>Real-time inventory not super important. Most of inventor has fixed locations and don't change. Do not have a high misplacement rate. | LTL = Less Than Truck freight.†<br>Take large food shipments and split up to last mile distribution like Sysco and US Foods.†<br>Charge by the pallet at fixed rate even if not full.†<br>Interested in warehouse automation.†<br>one warehouse 1.5M Ft has "Master Case" level picking.†<br>payback period longer than expected because of higher maintenance costs.†<br>Still will automate future warehouses when built.†<br>In food. †inventory turns over 14x per year<br>1 cycle count per category per month<br>Not sure the "cost" of people turnover. Recruiting + Training. But would like to know.†<br>People change jobs for $0.10 per hour more.† | Robb Myer | Customer Segments | | CS: Distribution Centers: Dir, VP SPL, WM | |
| 1/16/19 | Customer Interview | In Person Meeting with Pam Heaps, Store Manager, Lowes | Restocking of inventory and detection of out of stock items is done manually and needs to be automated, But the higher shelf inventory itself is automatically tracked and no automation is needed there. | We expected the store manager to report inventory shrinkage and the effort gone into tracking that shrinkage or lost items to be the main pain point.Another expected pain point was filling empty shelves or reporting out of stock timesBut she did not care about shrinkage and specified it was 0.7% of the store sales ($38M) so around $250K. A VP might care about it, but seems to be a small number.But lack of trained workforce to enable efficient restocking was major pain point, where she wanted to redirect workforce from detecting out of stocks to selling products.Out of stocks was also causing customer attrition.However, she was reluctant to put numbers to the problem and wasn't sure how much she could share. | Sankalp Arora | Value Propositions | VP: Product visibility | VP: Cost savings on taking inventory, VP: Upsell to customers | VP: 24/7 live inventory, VP: Reduced losses from missing/mismatched inventory |
| 1/17/19 | Team Presentation | 1449_Nabla Ascent Presentation 01/17/2019 | | https://www.dropbox.com/sh/d3lizpre2xpwp0r/AAB1I5_yZKdmoNs5c7G7fcEVa?dl=0 | Jessica Fleenor | | | | |
| 1/16/19 | Business Model Hypothesis | Sensor developers/Hardware manufacturers | | | Sankalp Arora | | | | |
| 1/16/19 | Business Model Hypothesis | Consultants to develop initial dashboards | | | Sankalp Arora | | | | |
| 1/16/19 | Business Model Hypothesis | Drone manufacturers | | | Sankalp Arora | | | | |
| 1/16/19 | Business Model Hypothesis | Reduced losses from missing/mismatched inventory | | | Sankalp Arora | | | | |
| 1/16/19 | Business Model Hypothesis | Cost savings on taking inventory | | | Sankalp Arora | | | | |
| 1/16/19 | Business Model Hypothesis | Upsell analytics as value-add | | | Sankalp Arora | | | | |
| 1/16/19 | Business Model Hypothesis | Monthly subscription inventory services | | | Sankalp Arora | | | | |
| 1/16/19 | Business Model Hypothesis | Maintenance | | | Sankalp Arora | | | | |
| 1/16/19 | Business Model Hypothesis | Battery procurement and shipping | | | Sankalp Arora | | | | |
| 1/16/19 | Business Model Hypothesis | Hardware purchases | | | Sankalp Arora | | | | |
| 1/16/19 | Business Model Hypothesis | Employee Salaries | | | Sankalp Arora | | | | |
| 1/16/19 | Business Model Hypothesis | Customer relationship managers | | | Sankalp Arora | | | | |
| 1/16/19 | Business Model Hypothesis | Hardware suppliers for the solution | | | Sankalp Arora | | | | |
| 1/16/19 | Business Model Hypothesis | Software/Hardware robotics developers | | | Sankalp Arora | | | | |
| 1/16/19 | Business Model Hypothesis | Customer support through setup, install and maintanence | | | Sankalp Arora | | | | |

| | | | | |
|---|---|---|---|---|
| 1/16/19 | Business Model Hypothesis | Maintiaining Online dashboard for analytics | | Sankalp Arora |
| 1/16/19 | Business Model Hypothesis | Development of autonomous solutions | | Sankalp Arora |
| 1/16/19 | Business Model Hypothesis | Customer Service | | Sankalp Arora |
| 1/16/19 | Business Model Hypothesis | subsidized customer trials | | Sankalp Arora |
| 1/16/19 | Business Model Hypothesis | Marketing campaign in relevant conferences | | Sankalp Arora |
| 1/16/19 | Business Model Hypothesis | References and cold calls | | Sankalp Arora |
| 1/16/19 | Business Model Hypothesis | Online self-setup kits | | Sankalp Arora |
| 1/16/19 | Business Model Hypothesis | Direct B2B Sales | | Sankalp Arora |
| 1/16/19 | Business Model Hypothesis | Upsell to customers | | Sankalp Arora |
| 1/16/19 | Business Model Hypothesis | 10% gain in warehouse throughput efficiency due to continous monitoring of inventory with added data analytics. | | Sankalp Arora |
| 1/16/19 | Business Model Hypothesis | Product visibility | | Sankalp Arora |
| 1/16/19 | Business Model Hypothesis | 40% saving on placement decision making staff due to closed loop nature of inventory monitoring | | Sankalp Arora |
| 1/16/19 | Business Model Hypothesis | 24/7 live inventory | | Sankalp Arora |
| 1/16/19 | Business Model Hypothesis | Retail stores: VP SPL, Store Manager | | Sankalp Arora |
| 1/16/19 | Business Model Hypothesis | Factories with need for asset tracking: Dir, VP SPL, Floor Manager | | Sankalp Arora |
| 1/16/19 | Business Model Hypothesis | Distribution Centers: Dir, VP SPL, WM | | Sankalp Arora |
| 1/16/19 | Business Model Hypothesis | 3PLs: VP SPL, WM | | Sankalp Arora |
| 1/16/19 | Business Model Hypothesis | Air Cargo: VP SPL, WM | | Sankalp Arora |
| 1/16/19 | Business Model Hypothesis | Warehouses with daily or weekly inventory taking requirements - VP SPL, Warehouse Manager | | Sankalp Arora |
| 1/16/19 | Team Presentation | 1449_Nabla Ascent Presentation 01/16/2019 | https://www.dropbox.com/sh/rf8an267uj4ubrh/AAC3hZ4rPAIrjIwijDSnOOhHa?dl=0 | Jessica Fleenor |