UBC Building Operations: Client Project Brief

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COMM 486M

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UBC BUILDING OPERATIONS:
Client Project Brief

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EXECUTIVE SUMMARY

The purpose of this report is to advise UBC Building Operations in how to create a more efficient and cost effective fleet of vehicles, while simultaneously dramatically reducing fleet vehicle greenhouse gas emissions. Building Operations have made significant efforts in addressing the new Climate Action Plan 2020, which identifies a range of actions to reduce GHG emissions from UBC's operations. In 2015, they achieved close to 40% reduction in GHG emissions from the 2007 baseline.

In this report, we have consulted both primary resources from Building Operations, and secondary resources regarding technological solutions to existing problems. Our situation analysis consists of a S.W.O.T analysis that examines Building Operations' internal strengths and external barriers, and a PESTEL analysis that looks at political, economic, social, technological, environmental, and legal external factors that indirectly affect our recommendations and Building Operations operations. Key findings in this regard include the limited availability of cost-efficient technologies, and the lack of centralized decision making regarding vehicle usage at UBC.

Our recommendations aim to address some of these issues and create an opportunity for change and improvements in areas that are important to Building Operations.

The first recommendation addresses the issue of existing vehicles and how replacement of those vehicles will improve efficiency. It includes a BYD program that replaces existing vehicles with a BYD refuse truck that reduces CO_2 emissions by 80,000lbs/year. Secondly, it includes the replacement of vehicles with the Nissan e-NV200, which reduces CO_2 emissions by 2,000lbs/year. Finally, we recommend the addition of a Wrightspeed generation that transforms refuse trucks into hybrid electric trucks.

The second recommendation involves an integrated business intelligence system. This system involves an online dashboard and database which addresses the issue of decentralized systems regarding fleet information. The system displays Building Operations' information graphically to enhance management of fleet model numbers, and provides summary statistics on each unit to enable users quick identification on certain vehicles. Finally, it involves other information such as location of vehicle, GHG emissions, and valuable data that can help Building Operations analyze and optimize their fleet usage.

Our third recommendation looks at building a Central Fleet-Share Committee that aims to centralize decision making regarding GHG emissions from vehicles. This program also aims to bring Building Operations closer to faculties that are not their current customers for the long-term goal of eliminating competition. This program will provide non-customers with some of Building Operations' services so that they experience the benefits they provide.

Our report ends with a schedule and timeline for the implementation of our changes, financial analysis, performance measurements, and risk mitigation strategies to address challenges we may face in our recommendations. In conclusion, we believe that our recommendations can be implemented with success through Kotter's 8-Step Model, and Building Operations can achieve its goals.

UBC Building Operations

Inventory Fleet Management & Greenhouse Gas Emissions Strategy

MEET OUR TEAM

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Business & Technology

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Marketing

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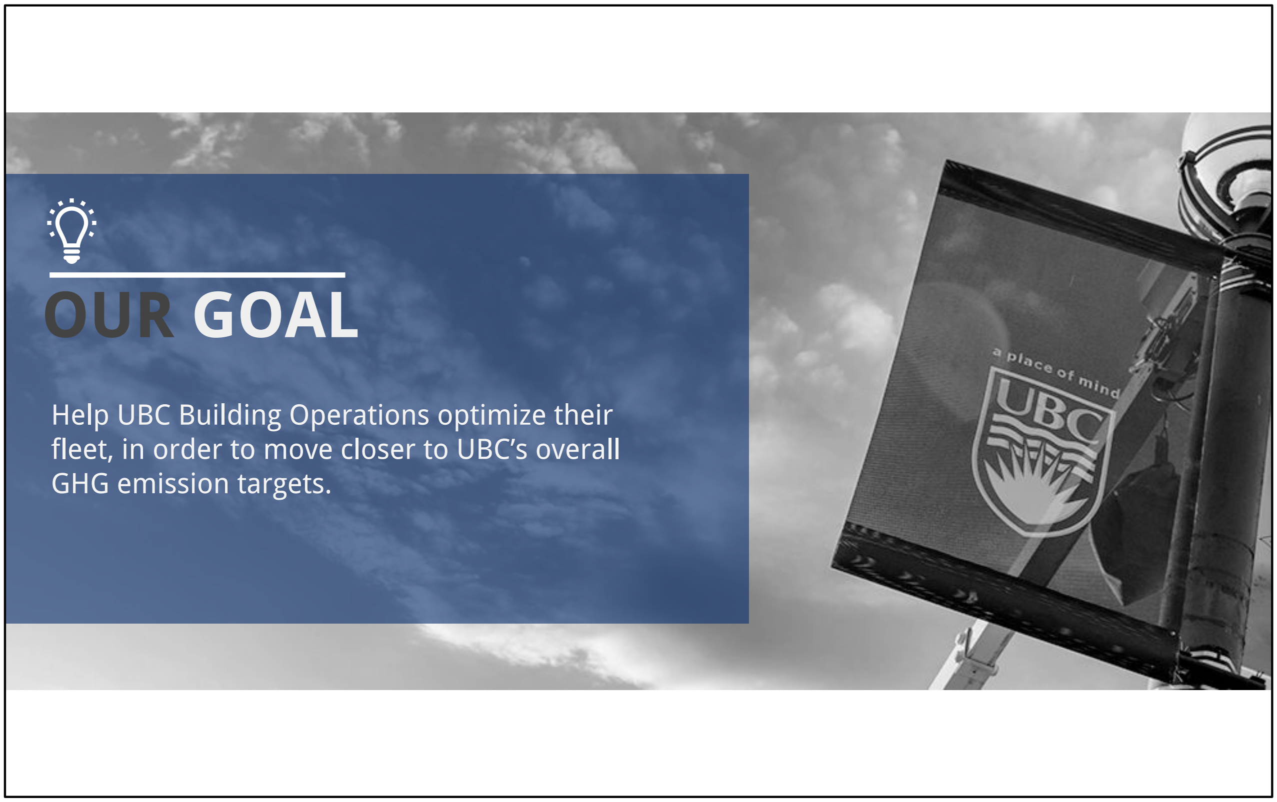
Finance

JESSICA ZHANG

Human Resources

PRESENTATION AGENDA

- About Our Team
- Issue Analysis
- Recommendations
- Timeline
- Performance Measurement
- Risk Mitigation



The overarching goal of our recommendations is to help UBC Building Operations achieve and optimize their fleet, in order to move closer to UBC's overall GHG emission targets. According to Pegasus 5.0, UBC aims to reduce GHG emissions by 67% below the 2007 amount, and to completely eliminate 100% of GHG emissions by 2050.

SWOT **ANALYSIS**

STRENGTHS

- Relatively low level of GHG emissions
- Previously implemented successful emissions-reductions initiatives
- Efficient in-house operations

OPPORTUNITIES

- Grow ***strategic partnerships***
- ***Reduce inefficiency*** of large vehicles
- Improve ***data integration*** to produce useful emissions analytics
- Get closer to UBC's overarching goals

USING THE SWOT ANALYSIS TOOL

We chose to frame our situational analysis within a SWOT, as it provides us with a holistic understanding of not only what UBC Business Operations is currently doing well (Strengths), but also what Opportunities the client has yet to capture and capitalize on. Additionally, it allows us to better understand the major Weaknesses and Threats that face UBC Building Operations today. We've identified that these Weaknesses are current barriers that prevent UBC Buildings Operations from capitalizing on an array of opportunities.

STRENGTHS & OPPORTUNITIES

UBC Building Operations, although owning almost 50% of all vehicles on campus, emits only 1.6% of all on-campus GHG emissions. In 2015, UBC Building Operations achieved close to 40% reduction in GHG emissions from the 2007 baseline. This low GHG emission rate is attributed to our client having previously implemented several successful efforts to reduce total GHG emissions of their fleet. A few of these previous initiatives include the successful installation of electric car charging stations at the UBC Building Services building for UBC Building Operations' 'Smart forTwo' vehicles, a comprehensive fleet standardization plan, and an effective fuel efficiency purchasing strategy. Additionally, most of UBC Building Operations' vehicles are maintained in-house using on-campus labour and parts sourced from various strategic partners. This has proven efficient in reducing variable maintenance costs and GHG emissions from vehicles that do not need to drive out to a third party location to seek maintenance. In addition to these Strengths, we've identified an array of opportunities that our client has yet to capture and capitalize on. These opportunities mainly focus on leveraging existing technologies and operations, to move UBC Building Operations closer to UBC's long-term, Pegasus 5.0 GHG emission goals.

- The first opportunity we've identified is to Grow Strategic Partnerships, in one of two ways - through partnerships with major Original Equipment Manufacturers (OEMs) and with key campus groups that operate UBC Building Operations' vehicles.
- Secondly, to Reduce Inefficiency of Large Vehicles, by replacing older vans, trucks, and large vehicles within the fleet with electric, emission-friendly options.
- With 9 unintegrated fleet inventory management systems, the third opportunity to capture is the Improvement of Data Integration and Production of Useful Analytics. UBC Building Operations needs to improve the way their important fleet data is captured and processed, in order to pull useful, intelligent analytics to monitor fleet emissions.

SWOT **ANALYSIS**

WEAKNESSES

- No vans or trucks in electric category
- Decentralized decision-making for vehicle usage at UBC
- 9 systems with ***no integration***
- Inability to effectively organize data

THREATS

- Existing partnerships with niche companies
- External competition from car sharing companies
- No departmental integration
- Lack of mainstream technologies

WEAKNESSES & THREATS

There are four threats to UBC Building Operations, its desire to reach UBC-wide emissions targets, and its percentage of vehicle market share on campus. Our client has previously worked with small, niche manufacturer companies to provide the necessary parts for maintenance. Unfortunately, a few of these niche companies have also gone bankrupt and out of business, leaving UBC Building Operations with no direct supplier for the parts that were required. This resulted in a lot of operational chaos, and as a result, our client's goal is to ensure that UBC Building Operations will not risk facing similar problems in the future. At present, selected vehicle parts are still being supplied to our client by niche manufacturers, and this could pose a threat. Due to departments not being fully integrated, UBC Building Operations is currently unable to understand the driving behaviors of Building Operations' cars that belong to other faculties or campus groups. As a result, our client does not have direct control over mitigating emissions from departmental vehicles yet. This presents a barrier to calculating and accurately analyzing overall emissions data across all Building Operations' vehicles on-campus.

Under Weaknesses, we've identified four major challenges currently facing our client:

- No vans or trucks in electric category
- Decentralized decision-making for vehicle usage at UBC
- 9 systems with no integration
- Inability to effectively organize data

We will further expand on these issues on the following page, and provide solutions to each with our recommendations. Our recommendations will focus on how UBC Building Operations can overcome these Weaknesses to capture and capitalize on their opportunities, as UBC Building Operations strives to help UBC achieve its 2020 and 2050 emission goals.

KEY ISSUES

1. Large, Inefficient Vehicles Produce High GHG emissions
2. 9 Systems with No Integration Leads to Inability to Effectively Organize Data
3. Decentralized Decision-Making for Vehicle Usage on Campus Leads to Low Utilization

From our Weaknesses section of the SWOT analysis, we have extracted three key challenges our client is currently facing. These challenges are:

Large, Inefficient Vehicles Produce High GHG emissions

- There are currently no trucks or vans in the electric category. Trucks and vans currently pose the biggest threat to GHG emission levels within the fleet.
- These recycling trucks drive full-time on campus for over 10 hours a day, and are never idle. As a result, a big threat to Building Operations would be the difficulty of replacing these recycling trucks in a manner that wouldn't disrupt their day-to-day operations.

9 Systems with No Integration and Inability to Effectively Organize Data

- Inventory and fleet data are stored in various systems - on Excel spreadsheets, folders, and files. There is no central database or hub for fleet-related data.
- As a result of these 9 systems not talking to each other, Building Operations' fleet data is mostly siloed. Building Operations is, thus, unable to extract effective GHG emissions analytics to monitor fleet activity.
- If not fixed in the short-term, this inability to extract useful emissions-related data from fleet activity, telematics data, and more, could pose a big barrier to moving Building Operations' emissions levels closer to UBC's 2020 and 2050 goals.

Decentralized Decision-Making for Vehicle Usage on Campus Leads to Low Utilization

- Currently, on-campus vehicle usage decisions are made independently by individual departments and campus groups. All utilization and emissions data for departmental vehicles are owned and managed by the department themselves.
- This decentralized decision-making model means that UBC currently has no ability to control, analyze, or mitigate the GHG emissions of departmental cars, even though Building Operations owns nearly 50% of all on-campus vehicles, including departmental ones.
- As a result, UBC does not have full access to all data to effectively reduce their overall GHG emissions.

RECOMMENDATION ONE

REPLACE AND MODIFY EXISTING FLEET

- **BYD PILOT PROGRAM:** Replacing existing high emissions vehicles with BYD refuse truck
  - Reduces CO_2 emissions by 80,000lbs/year
- **NISSAN e-NV200:** Slowly replace the Ford Transit Connect fleet with electric vehicles
  - Reduces CO_2 emissions by 2,000lbs/year
- **WRIGHTSPEED GENERATOR:** Initiating a pilot program to retrofit the Range-Extended Electric Powertrain into CNG waste truck
  - Reduces PM2.5 from CNG Refuse Truck

BYD Pilot Program

The vehicles that produce the most emissions are recycling and garbage trucks, specifically the Waste Management Roll-Off, Compactor, Recycle Truck and CNG Refuse. Because of their large size and lack of technological development in previous years, they have been the most difficult to replace. However, Chinese automobile manufacturer, BYD Auto Co., and Wayne Engineering, have recently launched an “all-electric, long-range electric garbage truck”. The truck weighs 3.9 tons.

- BYD expects these trucks to help vehicle fleets save approximately $10,000 per year in operating and fuel costs.
- Warrantied for 8 years and have a life expectancy up to 15 years.
- The truck has a range of 100 miles on a single charge (a full charge only takes 2.5 hours). This takes into consideration the vehicle leaving its garage empty and gradually filling up throughout the day.
- The BYD chassis and powertrain will sell for $180,000 altogether

After the purchase of the truck, BYD promise that it will have a 58% reduction in operating costs per mile. We are aware of the issue of partnering with niche companies because of the low success rate. However, BYD is a large company with a history of reliable innovation, making it one of the top electric car manufacturers. The trucks are currently being used in China.

Nissan e-NV200

While the client mentioned the NV200 has lower fuel efficiency than the fleet of Ford Transit Connects, the Nissan e-NV200 is a an electric version and is similar to the Ford Transit Connect which is currently in use in europe and soon to be produced for North America. With some of the lowest power prices on earth, UBC Building Operations is situated in one of the best locations on earth to use electric vehicles.

- The e-NV200 has an MSRP of $12,000 more than the present value of the Transit Connect and results in savings of about $600/year in fuel costs and $700/year in maintenance costs.
- The vehicle is projected to hold it’s value much longer than a traditional work van and as such has an average lifespan of about 12 years.
- The $12,000 price difference financed over the vehicle’s lifespan at a rate of 4% results in a payment of $1300 annually, which is the amount of projected savings

The vehicle is expected to enter the North American market in the next 18 months. We believe that a bulk order should be placed upon rollout to capitalize on a volume discount with a caveat that 1-2 vehicles be provided for a 3 month period for UBC Building Operations to gather data. The vehicles must perform as advertised for UBC Building Operations to honor the order.

Wrightspeed Generator

Although electric cars have been implemented into Building Operations fleet, very few are being used. The ones that have been transitioned into the fleet cannot carry large loads, which carry into the inefficiency of the fleet.For example, the Smart Fortwo. We are recommending a pilot program with Wrightspeed’s micro-turbine generator, labeled as the “range-extended electric powertrain”. It can replace fuel motors.

- Can power a 66,000-pound garbage truck, delivering up to 24 miles on battery power before range-extender powers in
- Range is unlimited as long as there is fuel for the turbine.
- Can cut annual fuel consumption by 50-80% compared with the average diesel garbage truck
- FedEx bought 2 units in 2013 as part of their own pilot program and has placed an order for 25 more units since then.
- The Ratto Group, a California-based junk removal and hauling company, has partnered with them to pursue an ongoing relationship to replace 130 of their trucks.

RECOMMENDATION TWO

INTEGRATED BUSINESS INTELLIGENCE

DASHBOARD & DATABASE:

Centralized fleet database & real time fleet monitoring

- **Benefits**: Extract insights from data, identify risks and capitalize on opportunities
    1. In-depth data on each vehicle and by department
    2. Optimize fleet utilization
- **Why?** Nine systems with no integration
- **How?** Partner with UBC Computer Science/IT departments to design a personalized BI system

A second integral suggestion to ensure the future long-term success of the recommendations proposed previously is the development of a centralized Business Intelligence Dashboard and Database. This system will resolve UBC Building Operations' current challenge of having nine different fleet management systems in place without consistency or integration.

What will this achieve?

Implementing a centralized fleet management system and database would provide UBC Building Operations with the capability to monitor its fleet in real time, organize fleet and inventory data, and sync this data to all department devices. Hence, ensuring organizational transparency and productivity.

From research into different telematics and business intelligence programs on the market such as Go Fleet, Fleetmatics and IBM Analytics, it was found that these programs could facilitate the reduction of a fleet's idle times and dispatch times, optimize fleet utilization, reduce labour and other costs, as well as enhance the safety and security of the UBC fleet.

Similarly, according to IBM, well designed business intelligence systems "provide the edge in extracting insights from data. Identify risk, capitalize on opportunities and gain a deep understanding of your business with reports, dashboards, visualizations and analysis of information."

How can this be achieved?

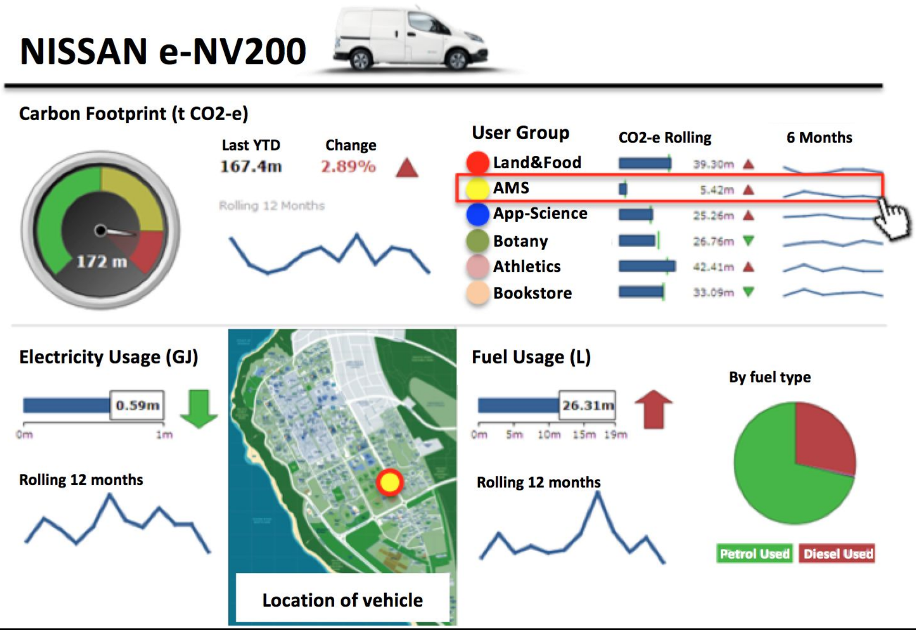
1. **Using local UBC talent:** Low Cost, More Time-Consuming

Like UBC Building Operations' consulting partnership with UBC Sauder students, they should partner with UBC Computer Science and IT departments to design a personalized Business Intelligence system. This will allow Building Operations to reduce costs and gain innovative insights from students, as well as enabling these students to gain real project experience. Our suggested recommendation is for UBC Building Operations to bring this idea to on-campus programming competitions, like UBC-wide or faculty-wide hackathons. This allows Building Operations' to tap into student talent and achieve a lower cost solution.

2. **Using Industry Standard Basic Software:** Higher Cost, Less Time-Consuming

Many software vendors are able to provide basic solutions used within other organizations in the industry. For example ARI Fleet Management Analytics, as evidenced in Appendix F.

RECOMMENDATION TWO



This is an example of the user interface that is displayed once a specific vehicle is chosen. Information regarding its carbon footprint, fuel usage, GHG emissions, live location on campus, and what groups are using it can be displayed. The design and layout is subject to change, but the concept of having everything visually represented and easy to grasp will help improve efficiency in the management of information regarding Building Operations vehicles.

RECOMMENDATION THREE

CENTRAL FLEET-SHARE COMMITTEE
FOR GHG EMISSION REDUCTIONS

- **HIGHER UTILIZATION OF VEHICLES**
  Rather than vehicles remaining idle, they can be shared and used regularly
- **VOLUME DISCOUNTS**
  “Buy together” to get discounts in bulk from emissions
- **HELPS UBC REACH GHG GOALS**
  Long-term alignment and coordination between faculties and campus groups

Decentralized decision-making for vehicles at UBC poses a few problems for UBC Building Operations. To recap, issues from decentralized decision-making include:

- All utilization and emissions data for departmental vehicles are owned and managed by individual departments, and out of control or visibility of Building Operations.
- As a result, Building Operations has no ability to control, analyze, or mitigate the GHG emissions of departmental cars, even though Building Operations owns nearly 50% of all on-campus vehicles, including departmental ones. Therefore, Building Operations does not have full access to all data to effectively reduce their overall GHG emissions.

Our recommendation is for UBC Building Operations to spearhead the creation of a **UBC Central Fleet-Share Committee for GHG emission reductions.** The main goal of this committee will be to integrate stakeholders within different UBC departments and campus groups, to work towards the central goal of creating a more sustainable campus (and subsequently, also towards UBC’s 2020 and 2050 emissions goals). The creation of such a committee will generate two positive business impacts on UBC Building Operations:

Higher Utilization of Vehicles

1. Vehicles no longer need to remain idle or parked for long durations of time.

Currently, departments and groups that use UBC Building Operations’ vehicle use them independently. Usage is not shared and departments own their individual vehicles. This means that when a department isn’t using one or more of their respective vehicles, these vehicles remain parked and unused. With a central fleet-share committee, each department will be able to use a shared vehicle at different times. This reduces the amount of overall vehicles needed in the on-campus fleet, reducing the amount of GHG emissions that come from idling vehicles and unused vehicles.

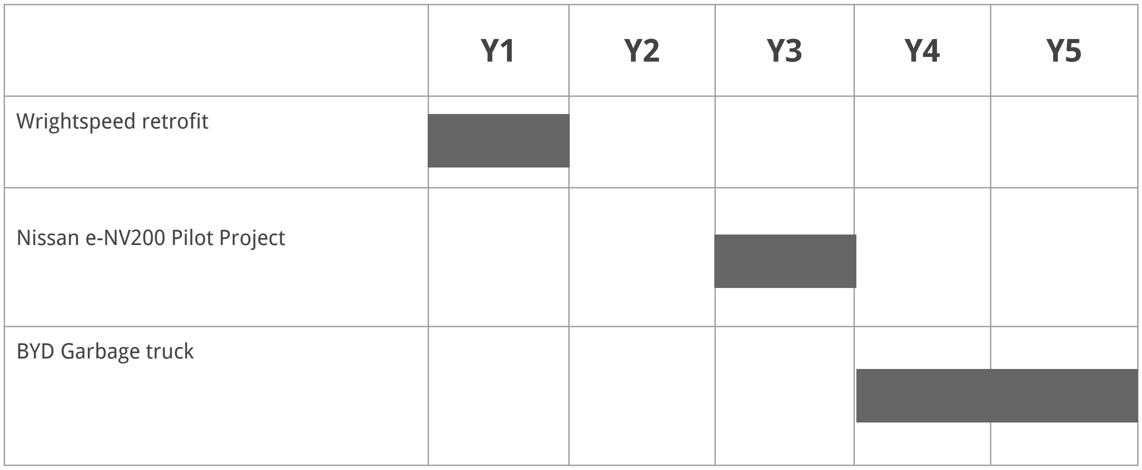
2. Volume Discounts

Additional positive effects, as a result of the creation of the committee, include:

- Potential to capture greater market share of on-campus vehicles- Greater awareness of UBC Building Operations
- When sharing the fleet, all departments can decide which vehicle to buy, and from this can gain economies of scale and a volume discount.

SCHEDULE FOR FIVE YEARS

REPLACE AND MODIFY EXISTING FLEET



Wrightspeed retrofit

- We estimate that Wrightspeed will be able to retrofit one refuse truck with their generator per every 6 months - 1 year

Nissan e-NV200 Pilot Project

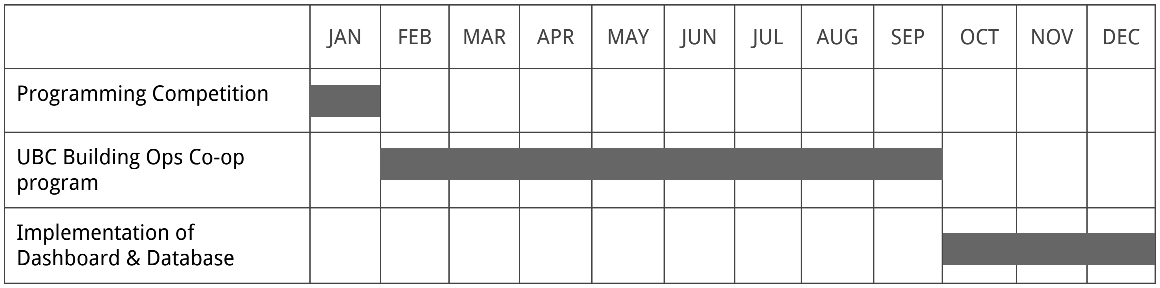
- The vehicle is expected to enter the North American market in the next 18 months. We believe that a bulk order should be placed upon rollout to capitalize on a volume discount with a caveat that 1-2 vehicles be provided for a 3 month period for UBC Building Operations to gather data.

BYD Garbage truck

- BYD has operated in China for sometime but only announced the launch of their truck in November 2016. We estimate that the california based operation will be able to provide UBC Building Operations with a truck after 3 years

INTEGRATED BI DASHBOARD & DATABASE

SCHEDULE FOR ONE YEAR - UBC CO-OP PROGRAM



UBC Programming Competition

- Hold an on-campus programming competition with UBC Building Operations as the real case client. Provide UBC students with the incentive to join a hackathon-style or case competition with the intention of working to build the database and integrated BI dashboard. Suggested faculties and students to tap into include the Sauder School of Business (Business and Computer Science), Applied Science and Computer Science Departments.

UBC Building Operations' Co-op Program

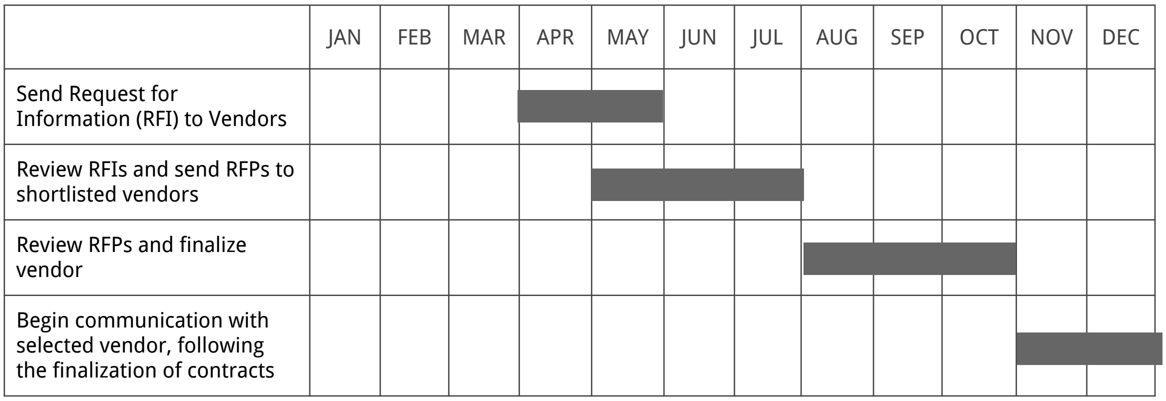
- A suggested incentive for students to design a winning dashboard solution could be to provide the winning team of this competition with a paid co-op placement within UBC Building Operations, to further implement and design the custom BI dashboard.

Implementation of Dashboard and Database

- Continue working with students, as outlined above, to build the custom BI dashboard.

INTEGRATED BI DASHBOARD & DATABASE

SCHEDULE FOR ONE YEAR - PRE-DESIGNED SOFTWARE



This implementation plan showcases how UBC Building Operations can start reaching out to vendors to find the best software to implement. As this is only a one-year plan, it mainly focuses on the vendor procurement process.

Request for Information (RFI)

- Send invitation letters to 10 to 15 external service providers, in order to gather general information of what solutions different vendors can offer.
- Review and shortlist vendors according to satisfaction with RFI.

Request for Proposal (RFP)

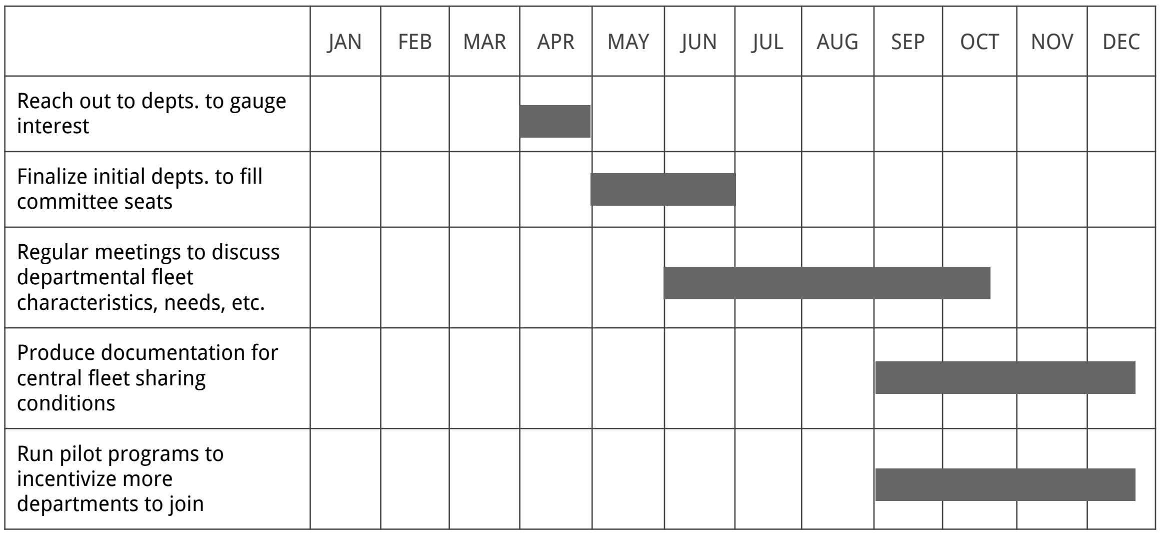
- Collect detailed proposals from shortlisted vendors.
- Review RFPs and shortlist again, based on cost, features, capabilities, and more.

Invitation to Offer (ITO)

- Extend final offer to selected vendor and begin building the solution together, once contracts are finalized.

CENTRAL FLEET-SHARE COMMITTEE

SCHEDULE FOR ONE YEAR



Reach out to departments to gauge interest

- Speak to UBC departments that currently use Building Operations' vehicles, and have strategic partnerships with Building Operations. One example is Student Housing and Hospitality Services, a campus group that have been long-term supporters of Building Operations' initiatives to reduce GHG emissions and optimize their fleet.
- Our recommended communication strategy would be to begin in-person meetings with strategic department partners. We believe that starting with their strategic partners is the best way to grow interest in the CFC amongst campus groups.
- Other departments that will be easier to convince include those that hold strong eco-friendly or 'green' values (an example would be UBC Food Services).

Finalize initial departments to fill committee seats

- Fill the first few seats of the CFC to commence the committee's official kick-off and work.

Regular meetings to discuss departmental fleet characteristics and needs

- To better understand the vehicle usage within each department, each department representative on the CFC can be expected to produce an outline that covers:
  - How many vehicles are in their respective fleet, vehicle usage patterns, most common uses of vehicles in their fleet, how many hours an average vehicle is in use in their fleet on any given day, etc.
  - This information helps Building Operations' better understand how to allocate vehicle usage times, determine how many of each vehicle to maintain in a central shared fleet, and develop documentation, terms and conditions for campus fleet sharing at a later stage of the implementation plan.

Produce documentation for central fleet sharing conditions

- Work with UBC and CFC to build documentation for fleet sharing conditions. This documentation should include:
  - Name of primary committee head responsible for all major decisions
  - Names of key stakeholders involved in process, departments they belong to, and respective responsibilities
  - Type of vehicles to be included in initial fleet sharing pilot program
  - Length of testing phase for the fleet sharing program
  - Methods of measuring user satisfaction and success of the fleet sharing program, etc.

Run pilot programs to incentivize more departments to join

- Continue running pilot programs (for example, the Sustainable Solutions & Services Program), in order to continue bringing more UBC departments on-board.

COST-BENEFIT ANALYSIS

RECOMMENDATION 1

Costs	Benefits
BYD Electric Garbage Truck	
$250,000 price	$20,000 in fuel savings 80,000lbs of CO_2 Reduction Elimination of PM2.5
Nissan e-NV200	
$12,000/unit	$1300 in fuel and maintenance savings
Wrightspeed Generator Retrofit	
$200,000	$11k-$18k in fuel savings 40,000 lbs in CO_2 Reduction

RECOMMENDATION 2

Costs	Benefits
Co-op student compensation Telematics integration	Higher utilization of fleet More efficient route planning

RECOMMENDATION 3

Costs	Benefits
Consulting costs	Higher utilization of fleet Lower GHG emissions

Fuel reduction costs are based on:

- An EIA rate of 5.28 pounds of CO_2 per litre of gasoline
- A waste refuse truck rate fuel consumption rate of 15,000 litres/year.
- A fuel price of $1.33/litre.

PERFORMANCE MEASUREMENT

Recommendation	Suggested Key Performance Indicators
Business Intelligence Dashboard and Database	• User Satisfaction • Usability • Data Quality • Information Security
Central Fleet-Share Committee	• Enhanced usage of UBC fleet vehicles between department groups.
Replacement and modification of existing fleet	• Reduced annual CO_2 emissions • Reduced annual fuel and maintenance costs

BI DASHBOARD

- User Satisfaction: User satisfaction is reliant on the usability of the software, as well as how well prepared and trained the end users are in the use of the BI solution. Building Operation should aim to have 90% of end users of the BI dashboard 'very satisfied' with its functionality.
- Usability: Data should be consolidated and displayed in a way that enables Building Operations to easily analyze data, gain and share insights and answer business questions.
- Data Quality: How accurate and clean the data is.
- Security: Level of confidence that confidential data will be secure

CENTRAL FLEET-SHARE COMMITTEE

- Enhanced Usage of UBC fleet vehicles between department groups: increasing vehicle utilization rates, decreased idle times etc.

REPLACEMENT & MODIFICATION OF FLEET

- Reduced annual CO_2 emissions: 50% reduction by 2020, 100% reduction by 2050
- Reduced annual fuel and maintenance costs

RISK MITIGATION STRATEGY

Recommendation	Potential Risks	Severity Level	Mitigation Tactics
Business Intelligence Dashboard and Database	• **Human error** • **Misuse of data**	**Moderate**	1. With training, error is reduced. 2. Consolidate & display data in a way that is practical in terms of cost, time, and usability.
Central Fleet-Share Committee	• **Resistance to change** • **Lack of department interest**	**Moderate** to **High**	1. Quantify dep. savings. 2. Pilot program. 3. Encourage UBC BOG to mandate the program.
Replacement and Modification of Existing Fleet	• **Committing to a large order of new vehicles that don't match our needs**	**High**	1. Pilot program

Business Intelligence Dashboard and Database

When it comes to business intelligence and analytics, two of the key risks are human error and the misuse of data. Firstly, manual integration takes a lot of time, isn't repeatable, and introduces human error. In order to mitigate this, companies who want to capitalize on their data need to automate the process to completely reduce risk, however with training, error is low for usage in this case. Secondly, often you can collect data from various sources, but it is not practical to do anything with it. In order to most effectively analyse data, the business intelligence dashboard and database should be designed to consolidate and display data in a way that is practical in terms of cost, time, and usability.

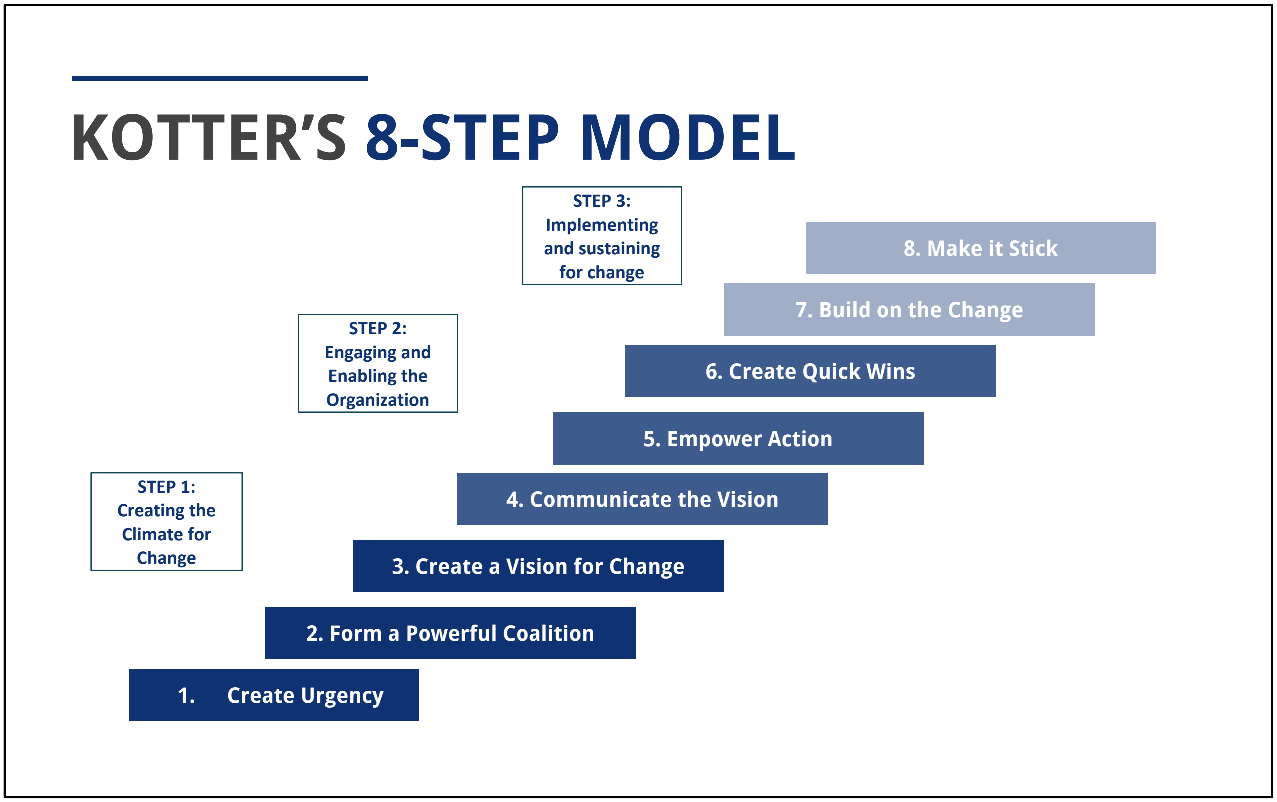
Central Fleet-Share Committee

A key risk identified for this recommendation is the different faculties resistance to change as well as a lack of department interest in the better utilization of Building Operations fleets. In order to mitigate these risks, Building Operations should;

1. Quantify savings to individual departments
2. Offer a Pilot program free of charge
3. Approach UBC from the top (board of governors) and encourage them to mandate the central fleet-share program.

Replacement and Modification of Existing Fleet

A key risk in the vehicle replacement is whether the product works as advertised and successfully integrates into the UBC Building Operations system. Mitigation of this risk will come from attempting to engage in new vehicle pilot projects and structuring purchase orders such that large orders can be cancelled if the first vehicles don't serve as appropriate solutions.



It is important to note that all our recommendations entail either organizational, cultural, or operational changes to UBC Building Operations' business.

With that in mind, the 3 most important and challenging steps in Kotter's 8-step model regarding our recommendation changes are: Step 1.) Create Urgency, Step 2.) Form a Powerful Coalition, and Step 5.) Empower Action.

Create Urgency

- Creating urgency will be challenging for most of our changes as Building Operations has many important priorities including vehicle replacement, reducing costs, and reducing GHG emissions. Some of our recommendations might be costly. This may coincide with current priorities and resistance to change could be high.
- Creating urgency for important issues in the efficiency of a company's operations will speed up the process of change and implementation. Reducing the time it takes for change to occur will save a company a lot of money as new systems can hit the ground running and start operating. In addition, identifying issues in change will occur faster if urgency is created and established as soon as possible, further helping the company to continue improving as it climbs the steps.

Form a Powerful Coalition

- While this step does involve the internal alignment of views in the company and the agreement between different functions of a business, this also involves our fleet-share committee recommendation. Forming a powerful coalition with key stakeholders outside of Building Operations control is integral at helping the organization achieve its long term goals and eliminate competition.
- Convincing people to join you is very difficult. It requires having strong evidence to support your argument, but to also appeal to stakeholders. Building Operations can leverage the importance of sustainability and the environment to generate support from different departments involved in the creation of the dashboard UI.
- This step is challenging as gaining support will require convincing different audiences at different levels, requiring customized arguments tailored to that specific group.

Empower Action

- Empowering action is key to implementing change and ensuring the communicated vision has been received. If action is not taken quickly, then the company will not be able to create quick wins, and also not be able to build on any change as nothing has been done yet.
- Building Operations will need to ensure that the technological requirements in our recommendations are executed without delay. If everyone is empowered to act and motivated to carry out change, then barriers on the road will become much easier to deal with as the right attitude will reduce conflict. The success of forming a powerful coalition will need to extend to empowering action and be constant in between in order for change to effectively come about.

APPENDICES

APPENDIX A - FORD TRANSIT CONNECT vs. NISSAN e-NV200

	Ford Transit Connect	Nissan e-NV200	Difference
Cargo Area	5.34m^3	4.16m^3	1.18m^3
Present Value	$16,605	$28,809	$12,204
L/100km	19.22	0	-19.22
Average Age	3 years	6 years	3 years
Annual Fuel Cost	$518	$0	-$518
Annual Maintenance Cost	$1082	$300	-$782

$12,204 price difference can be financed over vehicle life by $1,300 in annual savings

- Cargo Area is based on Height, width and length from company specification documents
- Present Value
  - Nissan e-NV200 is current price of vehicle in UK converted to CAD using xe.com
  - Transit connect is based on upper bound of kelley blue book value range
- L/100km is taken from average of all transit connects in Building Operations fleet
- Age:
  - Average age for connect is based on existing fleet
  - Average age of e-NV200 is based on electric vehicle warranty of 12 years
- Fuel cost is based on average fuel consumption of Building Operations fleet at an average gas price of $1.33/litre
- Maintenance costs based on repairpal value converted to CAD
  - http://repairpal.com/ford/transit+connect
- Using a discount rate of 4% and a vehicle life of 12 years, cost difference annualized is $1300.39/year, and results in $1300 in savings

APPENDIX B - SUSTAINABLE SOLUTIONS & SERVICES PROGRAM

WHAT?

- A **pilot program** to complement the Central Fleet-Share Committee, and incentivize all departments to use Building Operations' vehicles

WHY?

- **Build relationships** between departments using Building Operations' vehicles
- Provide **demo and trials** to increase Building Operations' market share of on-campus vehicles

HOW?

- **Free vehicle efficiency services**
- Competitively priced **car sharing options**
- Provide **further incentives for departments** who sign on to use Building Operations' vehicles

APPENDIX C - PESTEL ANALYSIS

POLITICAL	• Trump anti-environmental rhetoric • Lack of technology due to political/legal restrictions • Government support important for environmental efforts
ECONOMIC	• Alberta recession - oil prices increasing unemployment and reducing Canadian GDP • Lack of Government funding for technology due to economic downturn • Wake-up call on dependence on oil, more greener initiatives • Self-sufficiency and sustainability heightened
SOCIAL	• Global warming more widely accepted, social pressure for sustainability • More companies forced into sustainability • Increased competition in green technology improves availability and reliability of alternatives • Social perception affects sales and profitability
TECHNOLOGICAL	• Lack of mainstream, green technologies • Niche companies face lack of support with technological innovations • Unreliable technology as still in development phase • Systems management limited in integration potential • Management of Information Systems limited in flexibility and ability to integrate many systems
ENVIRONMENTAL	• Vehicles responsible for many harmful greenhouse gas emissions • GHG emissions have long-term, negative impacts on the environment • Pressure on emission-heavy activity and stricter regulation • Many stakeholders affected
LEGAL	• Import taxes on vehicles manufactured outside of Canada • Legal requirements on vehicles manufactured outside of Canada • Approval/bureaucracy could take long and be costly

Three of the most important PESTEL factors to consider are:

Political

One of the biggest political threats to companies in the sustainable technology industry is Trump's election. The president of the United States has taken steps in reducing the efforts of environmentally-driven solutions and goals at addressing global warming (Hall, 2017). Actions such as Trump threatening to pull out of all climate change negotiations and treaties (ex.United Nations Paris Climate Agreement) can lead to legislation that prevents sustainable companies from being able to compete against emission-heavy competitors. This further limits the amount of manufacturers that provide renewable energy solutions or technologies such as electric trucks. Government support is integral at addressing the high costs these industries face, especially where research and development is important at constantly providing new and improved solutions (Working with Governments, n.d.). While this is external to Building Operations operations in Canada, it greatly limits their access to more efficient and economic vehicles globally.

Economic

Due to low oil prices, the economy in Alberta is undergoing a recession as revenue in their most active industry has fallen (Gibson, 2016). This affects Building Operations both positively and negatively. Building Operations has access to low cost fuel that can help them save enough capital to invest in more environmentally viable solutions in the future. In addition, it signals our dependence on fossil fuels and can motivate more people to enter the renewable energy market, improving competition and lowering capital costs due to economies of scale. However, the effects on Alberta's economy also affect Canada as a whole, reducing GDP and increasing unemployment. A slow economy means resources will be allocated to more pressing, short-term issues and not long-term efforts such as ones that promote innovation in sustainable technology. This may further limit Building Operations supply of efficient, low-cost solutions.

Environmental

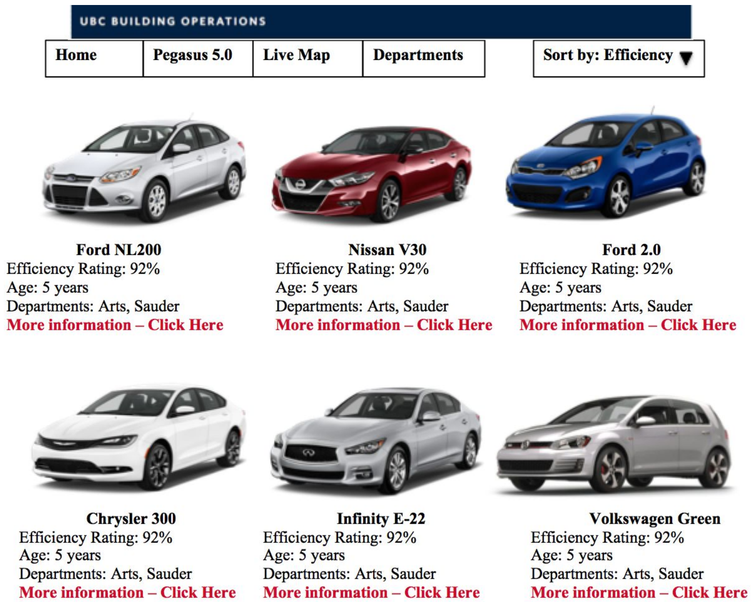
Building on the social factor, global warming is becoming a more widely accepted and prominent issue to address. Greenhouse gas emissions are signaling for change in lifestyle and behaviour. Vehicles are responsible for 75% of carbon monoxide emissions into the atmosphere and 50% - 90% of air pollution in Urban areas (Smith, 2010). GHG emissions contribute to rising global temperatures and many other changes to the climate that will have negative effects on the well-being of societies around the world. The environmental impact fuel consumption is long-term and in some cases irreversible. This prompts people and government to take action on environmentally unsustainable practices. Building Operations is moving in the right direction regarding their impact on the environment, however as stated above, there are many limitations to the accessibility of solutions that are better environmentally (Environmental Law, n.d.).

APPENDIX D - EXISTING DATABASE OF VEHICLES

	A	C	D	E	F	G	H	I
1	**Vehicle #**	**Model Yea**	**Model Name**	**VIN Model**	**Make Name**	**Lic Plate**	**VIN**	**User Group**
2	**Building Operations**							
3	22	1973	CANOX TRAILER	CANOX TRAILER	MISC	UJM25V	827472	Sheet Metal - 12
4	36	1981	FORKLIFT	FORKLIFT	CLARK	X54376	5171366	Shift Engineers - 31
5	73	1991	SEALAND 3500 Flatdeck Trailer	3500 Flatdeck Trailer (Roadsaw)	SEALAND	79377Y	259039	Hard Landscape - 27
6	76	1991	FORKLIFT	FORKLIFT	NISSAN	X46895	2008368	Stores
7	158	1999	EXPRESS 2500	EXPRESS	CHEVROLET	0135JD	113739	Sheet Metal - 12
8	179	2000	SILVERADO 1500	SILVERADO	CHEVROLET	0019KR	253354	Sheet Metal - 12
9	195	1999	EXPRESS 3500	EXPRESS	CHEVROLET	0020KR	110784	Carpentry - 23
10	199	2000	5800	5800	WSTRN STAR	1476KS	969065	Waste Management - 76
11	204	2001	100 PSI AIR COMPRESSOR TRAILER	100 PSI TRAILER (Irrigation)	DOOSAN	86669B	318378	Gardeners - 27
12	207	2001	C7500	C7500	GMC	1852KS	505635	Tool Crib-16/HL-27/MC-76
13	215	2001	SONOMA	SONOMA	GMC	7725LE	227133	Carpentry Roofers - 23R
14	217	2002	SILVERADO 2500	SILVERADO	CHEVROLET	JF7452	281829	Hard Landscape - 27
15	220	2002	EXPRESS 2500	EXPRESS	CHEVROLET	AS5864	1201027	Painting Glaziers - 25G
16	221	2002	EXPRESS 1500	EXPRESS	CHEVROLET	AS5863	202760	Mech Maint - 31 (Filters)
17	223	2002	SILVERADO 2500HD	SILVERADO	CHEVROLET	AS5861	F211620	Mech Maint - 31
18	232	2004	SILVERADO 3500 CHASS	SILVERADO	CHEVROLET	FA3408	F137609	Gardeners - 27
19	234	2003	LOADER-SKID STEER	LOADER	CATERPILLA	X54371	CED02491	Gardeners - 27
20	236	2005	FORTWO	FORTWO	MERCEDES-B	845NKT	J149149	Utilities Plumbers - 71W
21	239	2005	SWEEP	SWEEP	MISC	0126JD	131399	Hard Landscape - 27
22	240	2005	SILVERADO 2500HD	SILVERADO	CHEVROLET	0138JD	E318164	Hard Landscape - 27
23	244	2006	EXPRESS 2500	EXPRESS	CHEVROLET	CN4143	1219703	Electricians - 21
24	245	2006	EXPRESS 2500	EXPRESS	CHEVROLET	CN4144	1229213	Utility Electricians - 71E
25	246	2006	F450	F450	FORD	CN4145	ED90558	Gardeners - 27
26	247	2006	F450	F450	FORD	CN4146	ED90557	Gardeners - 27
27	248	2006	MT45 CHASSIS	MT45 CHASSIS	FREIGHTLIN	CN4147	X68358	Utilities Plumbers - 71W
28	249	2006	SPRINTER 3500	SPRINTER 3500	DODGE	CN4148	5959081	Utilities Plumbers - 71W
29	250	2006	LOADER	LOADER	BOBCAT	X52536	531113407	Hard Landscape - 27
30	251	2006	SPRINTER 2500	SPRINTER 2500	DODGE	CN4155	5964541	Utility Steamfitter - 71ST
31	255	2007	EXPRESS 2500	EXPRESS	CHEVROLET	CN4151	71188060	Mech Maint - 31 (Mech assistant)
32	256	2007	SC8000 CARGO	SC8000 CARGO	STERLING	CN4150	67DX61621	Hard Landscape - 27
33	260	2006	SPRINTER 3500	SPRINTER 3500	DODGE	CN4157	5960225	Painting Glaziers - 25G
34	264	2007	W4500	W4500	GMC	CN4159	7009447	Moving Crew - 76
35	269	2009	M2 106 MEDIUM DUTY	M2 106 MEDIUM DUTY	FREIGHTLIN	CT1221	HAJ4486	Hard Landscape - 27

This is the current database of vehicles owned by Building Ops. It is overwhelming to someone like an external auditor who is not familiar with all the vehicle model numbers and types. It is a potential area of change where improvements can be made at making the information easier to work with.

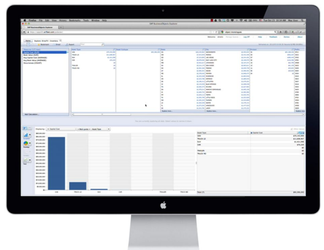
APPENDIX E - EXAMPLE OF DASHBOARD UI



This is another visual example of our proposed dashboard recommendation, specifically the home page. It will include a picture of all the cars with their respective model numbers, and some summary statistics to make it easier for users to get quick access to important information. Clicking one of these vehicles will open up the detailed statistics UI that was presented under the 2nd recommendation slide.

APPENDIX F - ARI analytics Industry Example

ARI *analytics*™



ARI *analytics*™ is an advanced analytics tool powered by revolutionary in-memory technology. Remarkably fast, it delivers the most powerful fleet analytics available. Combined with ARI's business intelligence tools, clients are instantly empowered to forecast and act on fleet needs and costs with uncanny accuracy.

http://www.arifleet.ca/technology/analytics/

APPENDIX G - BUILDING OPS vs. OTHER FACULTIES

	Building Ops	Other Faculties
# of Vehicles	225	303
Average Age of Fleet	5.88 years	10.7 years