

The Race in the Cannabis Screening Device Industry: Will Guard-Ex Be a Winner?

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On February 4, 2019 Dastiger Khan, CEO of Guard-Ex Corporation and his team were preparing for a meeting with the Ontario Association of Chiefs of Police to present the implementation plan for the new cannabis screening device their firm had designed and developed – the GX420. Guard-Ex was part of the Waterloo Accelerator Center’s JumpStart program located within the Schlegel Center for Entrepreneurship & Innovation at Wilfrid Laurier University, Waterloo, Ontario Canada. Khan wondered what implementation strategy Guard-Ex should adopt to achieve the firm’s goal of becoming a global leader in the emerging marijuana screening device industry.

Keywords: information systems, technology, management information systems, project management

INTRODUCTION

As Dastiger Khan, CEO of Guard-Ex Corp., sat in his office on a chilly Monday, February 4, 2019 morning sipping his cup of steeped tea he wondered what strategy Guard-Ex should implement to achieve the firm’s goal of becoming a global leader in the emerging marijuana screening device industry. Guard-Ex was part of the Waterloo Accelerator Center’s JumpStart program located in the Laurier Launchpad incubator within the Schlegel Center for Entrepreneurship & Innovation at the Wilfrid Laurier University, Waterloo, Ontario, Canada. The firm had designed and developed their own GX420 cannabis screening device. Khan and his team were meeting that morning to prepare for an important presentation with the Ontario Association of Chiefs of Police the following week. Khan urgently needed to finalize an effective implementation strategy for their presentation as he knew that the Association was expecting to learn how the device would be implemented in the field. Khan reflected upon an article he read recently that indicated almost 70% of most IT projects fail, and many of those project failures were due to poor implementation strategies. He did not want the GX420 to become another statistic. The Guard-Ex team was aware that the implementation phase of the GX420 project would be the most delicate phase of the project, and that their next steps were likely to determine whether the GX420 would become readily adopted in the field and position the firm as a leader in the industry or become a victim of the factor of substitution. The race was on...

Khan knew that his firm had developed leading-edge technology that would be in high demand within the marketplace since marijuana was legalized in Canada on October 17, 2018. Many serious questions had been raised by the public, politicians, police services and private organizations regarding how the now-legalized use of weed was going to be monitored. Khan believed Guard-Ex had the answer, and he was not alone. Investors, Police Chiefs, logistic executives all agreed the GX420 was an innovative and effective solution to a growing impairment screening problem in society.

“Considering that impaired driving remains a leading criminal cause of death in Canada, there is a strong incentive to both enforce and deter impaired driving on our roadways,” said Bryan Larkin, Chief of Waterloo Regional Police Service. “I am very excited by the Guard-Ex team and their passionate commitment to the modernization of roadside impairment screening. They are poised to become another shining example of a Waterloo Region-based company that seeks to leverage cutting-edge technology, creative innovation and community collaboration to help improve safety and well-being in our society.”, said Chief Larkin.⁹

Said Laura Allan, Executive Director, Schlegel Center for Entrepreneurship & Social Innovation, “This isn’t just an idea that’s financially great, it’s helping solve a crucial social problem. The response they’ve (Guard-Ex) gotten from police chiefs, police services, politicians and private companies has been unanimous. They (Guard-Ex) are on the right path.”⁹

Guard-Ex was in the later stages of development and testing for their GX420 mobile impairment screening device. Khan was growing anxious as he was still unsure of the optimum implementation strategy the firm should use to launch the GX420... and time was running out. Competition in this space was fierce. Clients were evaluating options and were eager to make decisions to solve the cannabis impairment screening problem. He knew his team had to act quickly if they were going to secure a shot at gaining a foothold in the race to become the device-of-choice in the marijuana screening industry.

As Khan sipped on his tea, waiting for the rest of the team to arrive, his mind raced with implementation ideas that the team had considered. He wondered if Guard-Ex should initially focus all efforts on gaining adoption within one police service such as the WRPS, or work with several police services to gain more feedback. Should the team work with the WRPS as they are the largest police service in the area and learn how the use of the Guard-Ex device can overcome legal hurdles to best achieve broad adoption of this technology in the policing services. Or implement a pilot approach within one particular Division within the Service to iron out the wrinkles there first on a smaller scale? Train all Police Officers in the Division eligible to use the device to gain feedback, or only a small test group to increase the richness of interaction? Implement a phased approach across all Divisions or add another service to test the device in varying situations? Should Guard-Ex simultaneously focus on private industry, as organizations such as trucking firms had expressed interest in implementing screening devices to ensure their employees were fit for work, given the race to gain a foothold in adoption in these private industries? Should he work with one police division and pilot the technology until the final prototype is developed and then phase the implementation out to other interested services? Address both trucking and policing pilots simultaneously to gain implementation, and perhaps adoption, ground more quickly? Khan knew that private and public sector needs were quite different so developing effective testing in each sector was going to be critical to success. Would the private sector be interested in the device if it was not approved through the judicial system as an acceptable test in the courts? Where should he start? He needed to develop an implementation plan that would allow the firm sufficient time to test their new device in the field and gain feedback from users to ensure the device would be fit to be evaluated and approved within the court system. Khan knew that validation of the GX420 device within the legal system was key to success and Khan knew that short-cuts during the later stages of the development and pilot testing process could seriously compromise the quality of the end-product or, in worst case scenario, derail the entire project during implementation.

Khan was confident that the technology his firm was developing was the right answer to the problem of impairment screening but was less confident in how to ensure that technology was going to be implemented in the field, approved in the courts and adopted as an industry standard. He had good contacts in the areas of policing and trucking, good Advisors and was building important relationships in the industry but was not sure what approach to piloting and finalizing the implementation of the device would best serve the firm to achieve their goals. Khan realized that the technology needed to be ready for implementation before firm plans were made, and that he needed to work with his team and potential clients in policing and private sectors to determine what strategic direction best served the firm for implementation of the device into the field?...Developing a strategic implementation plan for the final prototype would take time... but could Guard-Ex wait? Where should he start?

GUARD-EX INC.

The idea to develop an impairment screening device was originated in Oct. 2016 when Dastiger Khan, Bara Fatal and Anthony Devallis discussed the notion at a party they were hosting. The three colleagues often hosted parties for their peers and this experience provided them with some insight into the urgent need for a process that would help deter people from choosing to drive home impaired.

Guard-Ex was officially incorporated on March 8, 2017 to address the need in the industry for an impairment screening device since the use of marijuana was to be legalized in October 2018. The industry was scrambling to determine how use of this drug was going to be monitored and controlled. After buying out the other co-founders in June 2017 to ensure the firm maintained the strategic focus he envisioned, Khan brought on three colleagues to join his team who were also considered co-founders for the firm. Going forward Guard-Ex was operated by a team of four university students from the Waterloo Region, Khan from the University of Waterloo and the other three from Wilfrid Laurier University. Khan was confident that this new team could work together to manage the firm going forward to achieve his vision.

Guard-Ex worked with the Laurier Centre for Cognitive Neuroscience and the University of Waterloo's School of Optometry and Vision Science to develop the impairment screening device prototype. The Guard-Ex team, along with their Industry Advisor, Retired Waterloo Regional Police Chief Gravill, conducted many presentations within the community to educate and build relationships with key potential clients such as the Ontario Association of Chiefs of Police, the Waterloo Regional Police Service, York, Niagara, Peel and Toronto Police Services and the Challenger Motor Freight logistics partner within the Waterloo Region with the aim of obtaining a signed MOU to conduct a pilot implementation program with their device.

Guard-Ex Organization Roles

The Guard-Ex organizational roles were assigned as follows: Dastiger Khan, Chief Executive Officer; Rahul Malhotra, Chief Research Officer; Baltej Sandhu, Chief Marketing Officer and Harmeet Chauhan, Chief Financial Officer. See Exhibit 1 – Guard-Ex Organization Chart.

Dastiger Khan, CEO

Dastiger Khan graduated from the University of Waterloo, Economics program in April 2019. Khan began his studies at the University of Waterloo in the Mathematics program and realized the program was not aligned with his interests. Once he transferred into the Economics program, he realized that he found a great fit and excelled. Khan played as a flanker for the University of Waterloo's rugby team and was the VP-External Relations at the Kappa Mu Chapter.

As VP-External Relations Khan gained significant experience in organizing school group activities, motivating members, and managing chapter volunteer hours. Typically, the chapter would log 3000 hours of volunteering annually, approximately 10 hours per meeting. During his year as VP-External Relations the chapter logged over 6000 hours of volunteering and grew a budget of \$3000 to \$9000 through funds generated. This growth was fueled by Khan's passion and his ability to inspire a team. One of Khan's favourite events was the University was the DiABEATthis event. This event raised \$4000 toward finding a cure for Diabetes.

Khan commented, "I feel good about organizing these types of events. It is for a good cause and is worth it. About 2 years ago I loved partying, and now I can go out and have fun, and help others too." Serving as VP External Relations and hosting parties for the Chapter played a key role in sparking his idea for developing a solution to the growing impairment detection problem. Khan explained, 'I saw a need to develop a process that would deter people from driving impaired and wanted to do something about it.' Khan added, 'Me and my partners, we threw a lot of events... and we always promoted designated drivers at our parties. What we often noticed was that individuals would be fine with not drinking and driving (but) they would be fine with smoking a joint or hitting a bong.'⁶

Khan was passionate about his start-up company, his team, and the solution they were developing to solve a major problem for drivers and society. Khan commented, "A lot of startups in Canada don't aim to

be the next Facebook or Google”, said Khan. “They aim to be bought out by them. We’re not doing that. We want to get to the top”.

Dragons’ Den Victory – Guard-Ex Faced the Dragons and Won!

Guard-Ex was invited to attend the Dragons’ Den reality TV show to pitch their impairment screening device business idea to these experienced investors on October 18, 2018, the day after marijuana was legalized in Canada.³ The Guard-Ex team faced the Dragons and won!⁴ Five of the six Dragons were so impressed with the team’s business presentation they offered Guard-Ex a deal even higher than the Guard-Ex team proposed. Seeing potential in the Guard-Ex business plan, the Dragons offered \$300,000 for 15 percent of the business rather than the \$100,000 requested. Guard-Ex accepted the deal and celebrated their epic victory in the Den. After the Dragons’ Den victory, Bob Schlegel, founder of the Schlegel Center of Entrepreneurship & Innovation, offered to invest an additional \$500,000 in the team to help develop their device and implement it into the field. Guard-Ex was thrilled to have secured these investments to fund the development and implementation of their GX420 device.

However, after some review regarding the Dragons’ Den deal, Guard-Ex decided to back out of the deal with the Dragons. Off-camera the Dragons approach regarding the strategic direction of the firm was not in alignment with the direction that Guard-Ex was comfortable with. Given the early stages of their prototype development, Guard-Ex believed that the Dragons were making too many demands. The Dragons wanted to solidify contracts and secure deals before the product was fully developed. Guard-Ex believed it was too soon in the development process to make deals with external parties that were dependent upon the functionality of the end-product. The Guard-Ex team explained that this was one of the most challenging decisions they had to make, but they stood their ground. Khan commented, “Turning down the Dragon’s deal was a tough call for us. It was hard to say no to that. We had to do the cost/benefit analysis. We would be moving a lot faster if we had taken the deal, but we would not have the rights that we have now and the pathway that we have would not be our own. We do not give up our rights, we are not like that.”

Ultimately, the Dragon’s controlling approach was not acceptable to Khan and his Guard-Ex team, so they informed the Dragon’s that, although they appreciated the Dragon’s feedback and support, the deal was off.

INVESTORS & ADVISORS

Robert J. Schlegel, CPA, CEO, Founder, Entrepreneur, Philanthropist, Pavestone Co\Bedrock Logistics\Schlegel Center for Entrepreneurship & Innovation

Schlegel graduated with his B.A. from Wilfrid Laurier University, School of Business and Economics, Waterloo, Ontario, Canada in 1972 and earned his CPA in 1975. Schlegel founded Pavestone Inc. and Bedrock Freight Logistics as well as Schlegel Nursing Homes.

Born and raised in the Waterloo Region with a Mennonite background, Schlegel demonstrated an entrepreneurial spirit early in life and continued to fuel this passion. When the family businesses expanded south of the border in Texas in 1979 the family also decided to move to Texas in 1985 to better support the businesses and reduce travel time. Schlegel had the passion, entrepreneurial spirit and persistence to be successful and wanted to give back to others to educate and inspire those interested in entrepreneurship, so he founded the Schlegel Horizon Foundation from which established the Schlegel Center for Entrepreneurship & Innovation in 1998, located at Wilfrid Laurier University, Waterloo, Ontario. The Schlegel Center for Entrepreneurship & Innovation added the LaunchPad Incubator Program to expand services for Laurier alumni, and this program was where the Guard-Ex venture was formed.

Schlegel was so impressed with the Guard-Ex team that he decided to invest \$1million in the venture in February 2019. This was Schlegel’s first investment in a company being developed through the LaunchPad Centre. “When I first heard about Guard-Ex, I was intrigued by the concept,” Schlegel said. “Everything else out there requires a blood test and that doesn’t prove impairment.”⁶ Schlegel made up his mind to invest \$1 million after meeting the Guard-Ex team. “They were the most energetic guys I had ever seen there.”, said Schlegel.

Laura Allan, Executive Director, Schlegel Center for Entrepreneurship & Innovation and champion of the LaunchPad Incubator, indicated that she was thrilled by the significant investment. Allan commented, “These students are hustlers, and I mean that in the best possible way. They had a business running parties, and they would see people leaving and getting behind the wheel who looked impaired. They thought, ‘this has to be fixed’ and they’re passionate about finding a solution.” said Allan.⁸

Schlegel added that the investment made sense to him as the implementation of the GX420 was well aligned with his own personal principles. He commented, “The tagline in my emails used to be, ‘safety first, then quality, then quantity’. This is a product that’s going to improve safety.”⁹

R. Larry Gravill, Honorary PhD, BA. Guard-Ex Advisor, Retired Waterloo Regional Police Service Police Chief and Citizenship Judge

Gravill served as an Advisor to Guard-Ex and worked with the Guard-Ex team to establish connections in the areas of policing, the judicial system, participated in potential client presentations and provided feedback regarding the use of the GX420 in the field.

Gravill earned his B.A. degree in 1973 and an Honorary Doctor of Laws Degree in 2009 from the University of Waterloo, Waterloo, Ontario, Canada. Gravill served as the Waterloo Regional Police Service (WRPS) Police Chief for 15 years and retired in 2007 after 37 years of experience on the force. Initially, he served 3 years with the Ontario Provincial Police, then he joined the WRPS in 1973 and had many special assignments over the years including a secondment to the Ontario Police Commission for two years, graduate programs at the F.B.I. National Academy and was the President of the Canadian Association of Chiefs of Police. He moved up through the ranks as Executive Officer to the Chief of Police, Superintendent of Field Operations, Deputy Chief of Administration and was appointed Chief of Police in 1992. After retiring as Police Chief Gravill was appointed as a Citizenship Judge for the Waterloo Region and served in this capacity until 2018.

Gravill was no stranger to the world of police-oriented Information Systems. He championed the implementation of the first police network to extend beyond the political and geographical boundaries in 1981 which provided the foundation for more advanced Information System integration among police services in years that followed. The Police Regionalized Information Data Entry (PRIDE) system allowed participating police services to integrate systems and share information electronically. PRIDE grew to include other municipalities such as Stratford, Brantford, and Guelph. WRPS was a leader in the level of systems integration among police services and worked to leverage this resource to provide premium, proactive service to the community.

Schlegel introduced Gravill to the Guard-Ex team in August 2018 as Schlegel was aware of Gravill’s extensive experience in policing, and the two were long-time friends having attended Waterloo-Oxford District High School together. Guard-Ex recognized Gravill’s experience with policing, legal systems, and the relationships he had established in these areas and realized he would be an excellent advisor for their team. They knew that he could provide valuable feedback regarding the prototype and functionality in the field, as well as introduce the team to potential clients such as the Ontario Association of Chiefs of Police, Waterloo Regional Police Service and other police agencies in the Golden Horseshoe. Gravill came on board as an official Advisor for the Guard-Ex team in May 2019.

THE IMPAIRMENT SCREENING DEVICE INDUSTRY

In 2018, the marijuana screening industry worldwide was estimated at \$6 billion and was forecasted to increase at a rapid pace.¹ The use of marijuana had transitioned from illegal to legal in Canada on October 17, 2018.⁵ The legalization of marijuana spawned an explosion in the impairment screening device industry. Significant attention was placed on developing effective screening and monitoring of marijuana use. Safety and quality testing in the recreational and medicinal cannabis market had exploded in North America.² The industry was scrambling to solve the problem as now that using marijuana was legal police urgently needed a way to consistently test drug levels roadside.

There were challenges in the industry as developing devices to effectively detect marijuana use required more sophisticated testing than other types of drugs and involved a number of factors, creating many hurdles for start-ups to overcome. Most cannabinoids were fat soluble compounds that could easily store in fat and take a much longer time to be eliminated from the body compared to other recreational drugs. The length of time varied greatly according to the users' metabolism, quantity, and frequency of use. It also depended on whether actual tetrahydrocannabinol (THC) or THC metabolites were being tested for as metabolites had a much longer detection time. Typically, Marijuana could be detected up to 3–5 days after exposure for infrequent users; for heavy users: 1–15 days; for chronic users and/or users with high body fat: 1–30 days. Heavy marijuana users could produce positive tests for 1–3 months after ceasing use.¹²

False Positives were known to be triggered by consuming hemp-seed bars and other products, although the more sophisticated and expensive gas chromatography-mass spectrometer (GCMS) device was able to discern the difference.¹⁴

Research reported that dietary zinc supplements could mask the presence of THC and other drugs.¹⁵ However, a contradictory study refuted the possibility of self-administered zinc producing false-positive results.¹³

Anyone caught with THC levels above regulation could be charged with a summary offence, which was similar to the misdemeanor class of offences in the U.S. If a driver was caught with more than the five nanogram THC limit after already being convicted of a summary offence, they could be indicted on impaired driving which bumps the charge up to the class of offences comparable to those of felonies in the U.S. Effectively detecting levels of THC is critical.¹⁴

Developing a device that was able to avoid False Positives was key to the credibility of the industry. Guard-Ex was confident that their comprehensive testing GX420 device would deliver consistent results given the variety of metrics measured.

COURT SYSTEM CHALLENGES

Challenges resided in the court system for Guard-Ex as hurdles toward formal acceptance for the marijuana testing device results continued to exist. Examples of cases entering the court system protesting the drug screening test results were increasing. For example, a woman in Nova Scotia challenged an impairment test conducted during a routine RCMP checkpoint on Jan. 4, 2019.¹⁰ The driver indicated that she was not worried about the test as she had taken her cannabis at least six hours before the checkpoint to treat her multiple sclerosis symptoms. However, the driver, Michelle Gray, tested positive and was taken to Police Headquarters for an expanded sobriety testing. Gray passed the sobriety test and was let go, however she had to pay \$300 to get her car from the pound, missed 4 days of work and was embarrassed to have had to go through the experience in front of her son who was a passenger in the car. RCMP Corporal Lisa Croteau involved in the case explained, “There is no correlation between the level that you’re at, the active THC in your body, and impairment”. Gray had her license suspended and car impounded as the Motor Vehicle Act instructed police to issue suspensions for drivers who failed a roadside screening test. Hence, it was critical for the devices used in these marijuana screening tests to be accurate and reliable. When testing for marijuana, there were a number of factors that needed to be considered compared to testing for other drug usage such as alcohol.

The formal process that Guard-Ex and other firms hoping to gain a foothold in the impairment detection device industry had to go through was lengthy. First, the firms had to present their solution to in the Drug and Driving Committee to gain obtain their approval. After approval, the Drug and Driving Committee, who were part of the Canadian Forensic Society, would send the information to the Attorney General to be incorporated into the Criminal Code as a device included in the Criminal Code Device Appendix. Once the new device was included in this Appendix it could formally be used in the process to convict offenders.

Despite these challenges in the impairment device screening industry, screening device start-ups were forming throughout North America and firms were investing significant resources in the race to develop the ideal marijuana screening device that would be adopted across the industry as a standard.

The Guard-Ex device had a strong position compared to competitors in the industry as the GX420 did not simply test for THC levels. The Guard-Ex device tested five different physiological factors to determine impairment and was substantially more reliable than a single-factor test, especially considering the impact of marijuana use on the human body and longer lasting effects.

COMPETITION

Competition in the impairment screening device was high. There were several key competitors located in the technology triangle who were developing devices to detect substance use and were supported by research hubs in the area. The race was on to determine who would implement their technology in the field first and gain a strong foothold in the growing industry. See Exhibit 2 - Competitor Comparison Chart.

SannTek was based in the Velocity Garage in downtown Kitchener and used nanotechnology to analyze breath samples to detect impairment. Both Waterloo startups were developing hand-held devices that police could use to quickly determine if a driver has been participating in substance abuse but had taken drastically different approaches to solving the problem. SannTek was based upon a vastly different technology and testing approach compared to Guard-Ex.

Cannabix Technologies Inc. focused on marijuana breathalyzer development for law enforcement and the workplace. Cannabix was developing breath testing technologies that were durable and portable to enhance screening of marijuana impaired driving offences on roads. Cannabix was working to develop drug-testing devices that would detect Tetrahydrocannabinol (THC), the psychoactive component of marijuana that causes intoxication, using breath samples. These devices would be used to provide screening of THC at roadside and identify drivers under the influence of marijuana. In particular, Cannabix was focused on developing breath testing devices for THC screening that would target recent use of THC, (within a 2- or 3-hour time period at time of testing) in contrast to saliva or urine testing for THC which could be invasive and take a considerable amount of time for laboratory analysis. The Cannabix devices were also intended to be useful for other practical applications such as testing employees in the workplace where impairment by THC could be hazardous. Cannabix did not have a device that was federally approved and had not made it to market yet. The firm was following the reverse Initial Public Offering strategy to try and get to market as quickly as possible.

Draeger was the only competitor with a solution, the Draeger DrugTest 5000, that was Federally approved. The Draeger solution was adopted by Manitoba police with mixed results.¹³

Abbot was a healthcare firm based in Illinois, U.S. who had recently had their SoToxa hand-held impairment detection approved to be part of the Criminal Code Device Appendix. Abbot acquired Alere, a Massachusetts manufacturer of saliva-testing drug devices, for \$5.3 billion USD and indicated that the SoToxa hand-held device was able to produce test results in less than five minutes.¹⁰

INFORMATION TECHNOLOGY – THE GX420 DEVICE

The GX420 marijuana screening device was designed primarily to be used for roadside impairment screening purposes. The device examined physiological signs such as eye movement, body temperature, muscle activity, brain waves and heart rate and used machine learning to accurately identify key indicators exhibited by an impaired individual. The measurement of five physiological indicators to detect impairment provided the GX420 device with an advantage over other devices being developed as the competing products were more limited in screening abilities and were more invasive to administer when compared to the GX420 as their process measured chemicals from saliva, breath or urine.

Guard-Ex partnered with SnapPea Design, located in Waterloo, Ontario, for product design and development. Khan commented, “Choosing the right firm to help with the product design and development was relatively easy as we already had a good relationship with SnapPea. We did look at other firms, but some did not have the software capabilities we needed, and the price was pretty much the same across the board. SnapPea was one of our advisors. They already had an idea of our focus, so it was easy to talk to the

about what we wanted to do. Their approach fit with what we wanted to do, and this fit was a priority. We go to their office two to three times per week and email or call them often.”

The GX420 device operated based upon machine learning, python programming and Artificial Intelligence technology. The device was easy-to-use and small which provided benefits for mobile use in the field. Officers or others administering the test could be trained in one or two sessions to operate the device and perform the necessary tests. The device was a VR headset placed upon the user’s head as it measured physiological reaction time to determine any impairment. If a police officer suspected that a driver may be impaired the Guard-Ex device would be strapped over the driver’s face. The officer could read the driver’s eye movement and other biological indications of impairment on the laptop screen located in the cruise. The process to gather the physiological measurements took approximately one minute.

There were two lights on the front of the device headset. One light was the color red and the other light was the color green. If the red light was on after the driver completed the physiological measurement process the driver was free to go as this meant that there were no indicators of impairment in the readings. If the green light was on after the test, the procedure required the officer to take the driver to the station for additional testing.

Chemicals such as THC can remain in the body for extended periods of time and tests based upon competing devices that evaluate only current levels of chemicals using breath or saliva samples did not consider the cumulative effects of chemicals in the body. This was an additional advantage that the Guard-Ex GX420 device had over other devices on the market in detecting impairment. Not only did the device detect marijuana and a long list of other drug use including cocaine and opiates, but it also determined whether a person was fit to perform responsible actions such as driving a truck, operating a machine or flying an airplane.

DEVICE TESTING

Testing of the GX420 device was conducted at the Laurier Center for Cognitive Neuroscience to ensure the technology was operating as intended, and to finalize the design. See Exhibit 3 – GX420 Device Pilot Testing Flowchart. After the Center for Cognitive Neuroscience validated the technology, Guard-Ex produced 10 prototypes for the police cruisers for testing in July 2019. Initial testing was focused within the Waterloo Regional Police Service to achieve most efficient and streamlined data collection. The Waterloo Regional Police Service used all 10 GX420 devices for testing purposes. Members of the police service also volunteered to test the device before and after their shifts to provide Guard-Ex with additional feedback and data regarding their unit. Many roadside pilot tests were organized in combination with the standard police roadside testing during holiday weekends and other events. During these pilot tests the Guard-Ex team asked civilians if they were interested in participating in the pilot test, and most civilians agreed to volunteer to participate in the study. The pilot tests provided Guard-Ex with useful data for further development of their device and the data was also helpful toward the implementation of machine learning algorithms. 10,000 sets of data were required to implement the Guard-Ex machine learning model. Therefore, testing the device as frequently as possible to obtain the necessary data was important.

Another GX420 device was given to Challenger Motor Freight for pilot testing purposes. 15 employees within the Challenger Motor Freight company volunteered to check their vital signals before and after every shift.

The Guard-Ex team setup a testing booth, manned by Guard-Ex team members and WRPS officers, at the popular EverAfter event in Waterloo, Ontario in June 2019 to recruit volunteers to use their device.

PRICING

There were two pricing models for the Guard-Ex solution. One pricing model was based upon a purchase of GX420 device for \$4000 Cdn. per unit plus a \$350 monthly fee for the software. The second pricing model was based upon a monthly subscription for both the hardware and software. The monthly hardware subscription price was \$300, and the monthly software subscription was \$350.

GOING FORWARD

Khan realized that evaluating the options to determine the best implementation plan for the GX420 impairment-testing device was critical and that organizing an ideal implementation plan would take time, but could Guard-Ex wait? Where should he start to prepare his recommendation for the roll-out of the Guard-Ex device in the field to ensure the strategy would secure clients, pass hurdles in court and gain the firm a strong foothold in the marijuana screening device industry fast enough to remain competitive?

As his team members began entering the boardroom to prepare for the upcoming presentation to the Chiefs of Police, Khan knew what he had to do.

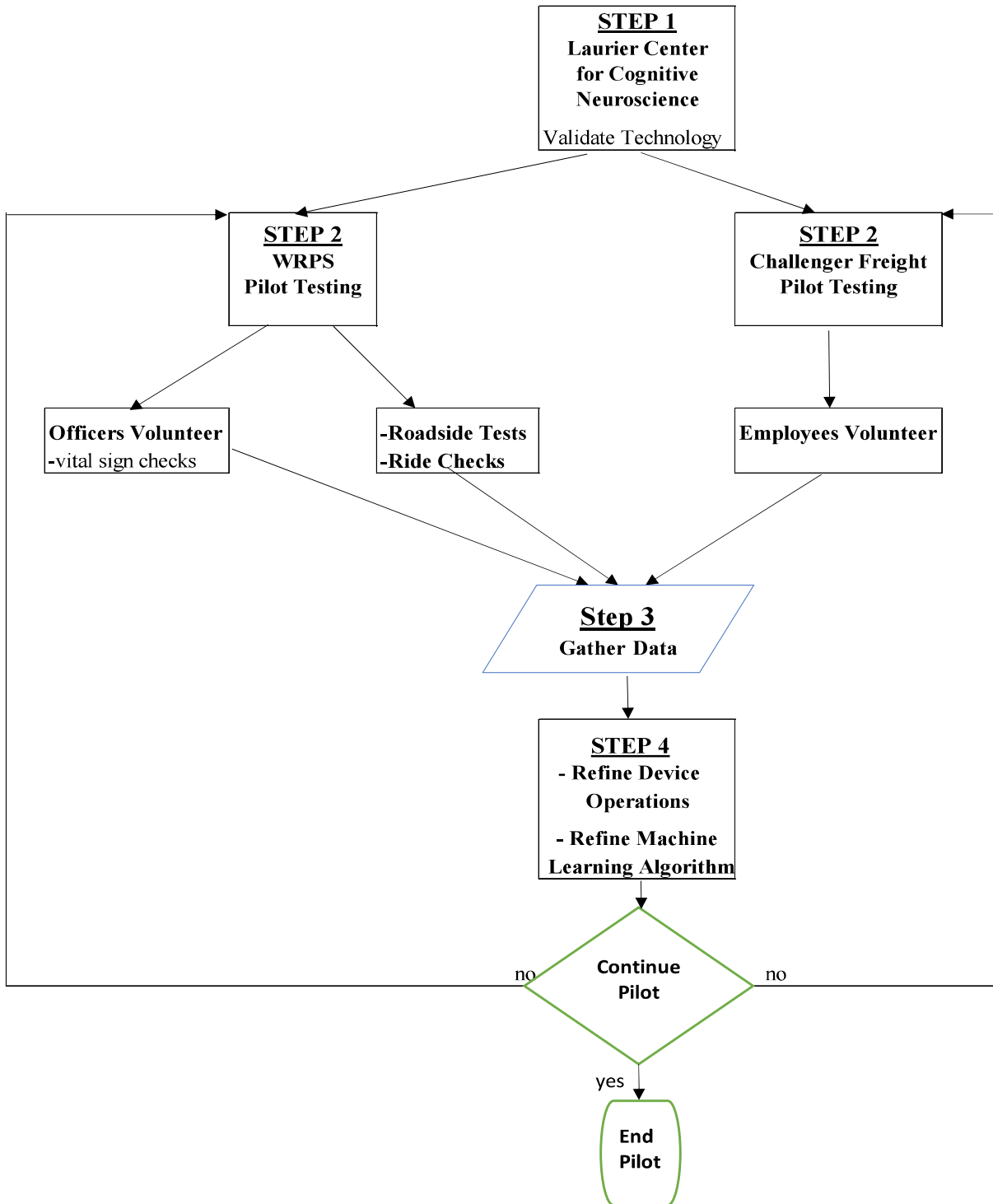
**FIGURE 1
GUARD-EX CORPORATION ORGANIZATION CHART**



**FIGURE 2
COMPETITOR COMPARISON CHART**

Competitor	Technology	Federally Approved	Substance Measured	Application
SanTek	nanotechnology, hand-held device to analyze breath samples	X	THC via breath sample	Roadside testing
Cannabix	breathalyzer device used to sample breath	X	THC via breath sample	Roadside testing, workplace application in progress
Draeger	Daeger DrugTest 5000 device, oral fluid test	Yes	THC, Cannabinoids, Cocaine, amphetamines, opiates	Roadside testing
Abbott	SoToxa handheld device, oral fluid test	Approved Criminal Code Device Appendix	THC via saliva sample	Roadside testing
Guard-Ex	GX420 VR Headset, machine learning, AI	X	5 physiological reaction times to measure fitness for driving, work	Roadside testing, workplace application in progress

FIGURE 3
GX420 DEVICE PLOT TESTING FLOW CHART



ACKNOWLEDGEMENT

All the quotes included in this case have been obtained by the case writer through personal interviews with Dastiger Khan and his team or citation provided.

ENDNOTES

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