

Transportation Report to  
Priorities and Finance Committee  
2017 September 17

ISC: UNRESTRICTED  
PFC2019-1096

## **University of Calgary – Citizen Scientist Wearables Program**

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**Council Innovation Fund Application**  
**Council Sponsor: Councillor Gondek**  
**Internal Sponsor(s): Transportation**

### **EXECUTIVE SUMMARY**

Wearable sensor technology (e.g. smartwatches and activity monitors) is one of the fastest growing technology fields in the world, and Calgary is well placed to be a global leader in research, product development and job creation in the sector. To meet a growing demand for qualified professionals, the University of Calgary launched Canada's first wearables program in September 2018 called Wearable Technology Research and Collaboration (We-TRAC) Training Program. The first project of the We-TRAC training program involves collecting data from Olympic, Varsity and Intramural athletes using wearable devices.

The same type of device that measures activity and stress levels of an Olympic athlete can also be used to measure these parameters for a person driving, walking or cycling. Thus, for the second project of the We-TRAC program, the University of Calgary is looking to collaborate with The City of Calgary to collect data from 10,000 voluntary participants in urban environments with the purpose of making better planning, engineering and infrastructure investment decisions.

The University of Calgary would run the project and would give The City of Calgary an anonymized aggregate data set, which would be hosted on Calgary's Open Data Catalogue for all the public to see and use. The data set could be used for a variety of planning and engineering purposes. For example, data could reveal that Calgarians feel higher stress on certain sections of roadway, The City, in collaboration with the University of Calgary could then investigate what is causing the stress and look at mitigation strategies.

The project also benefits the research and development, and the economic growth of the wearables industry in Calgary. Calgary is a global leader in wearable technologies with over 100 Life Science companies in the Calgary region, and over 50% of those companies in Health IT and medical device space. The wearables market is expected to grow from \$5 billion USD in 2013 to an expected \$51.6 billion by 2022.

For the University of Calgary to pursue this collaborative project, they need matching funding of \$57,500 from the Council Innovation Fund. The funding would make it possible to hire a local web developer to develop a web-portal.

### **ADMINISTRATION RECOMMENDATION:**

1. That the Priorities and Finance Committee recommend that Council approve this application for the Council Innovation Fund for the University of Calgary Citizen Scientist Wearables Program in the amount of \$57,500.
2. That the Priorities and Finance Committee direct Administration to report back to PFC indicating how the money was spent and outcomes of the projects no later than Q2 2021, as per the Council Innovation Fund Terms of Reference.

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**PREVIOUS COUNCIL DIRECTION / POLICY**

The Council Innovation Fund (CIF) has been in place since 2011 to encourage innovative and pilot projects that have the potential to support or contribute to the goals of Council and that have city-wide application. At the April 29, 2019 Combined Meeting of Council, Council approved updates to the CIF's Terms of Reference and introduced a new fund dedicated to community-driven projects called the Council Community Fund (CCF).

**BACKGROUND**

*Wearables Devices*

Wearable technology, such as smartwatches, activity monitors, and smartphones, have revolutionized the ability to collect scientifically-valid biometric data regarding health and activity. Devices that were once used to track fitness are now being applied in many ways from navigating the land to monitoring blood pressure. This technology can provide university researchers with an unprecedented opportunity to better understand what people are doing and how that relates to their health and wellbeing.

*Background on the Wearables program at The University of Calgary*

Due to the fast economic growth of the sector, there is a growing demand, and undersupply of qualified professionals in the field. It is estimated that for every wearable job posting there are only 16 qualified professionals. This compares to an average of 59 applicants for any other technology-related job posting. The University of Calgary started Canada's first wearables program in September 2018 in order to train qualified professionals in the wearables field.

Researchers at the University of Calgary are currently leading Canada's first graduate training program specializing in wearable technology, the NSERC Wearable Technology Research and Collaboration (We-TRAC) CREATE training program. We-TRAC is developing the next generation of wearable tech experts and focusing on using wearable technology to revolutionize sport performance, healthcare, and health research. The goal is to train upwards of 80 master's and PhD students from multiple faculties over the next six years. Students receive training in the biomechanics of human motion, data science, data visualization, knowledge translation, and entrepreneurship. The We-TRAC program is within the Faculty of Kinesiology and involves Schulich School of Engineering departments of electrical and computer engineering, mechanical and materials engineering and biomedical engineering; Haskayne School of Business; Faculty of Science's Department of Computer Science; and the Faculty of Nursing.

*Economics of Wearables*

The global wearable market for wearables is demonstrating rapid growth in recent years, currently expanding at a compound annual growth rate (CAGR) of 15.5% from an estimated \$5 billion USD in 2013 to an expected \$51.6 billion by 2022. Moreover, the wearable market is promising, as the number of people using wearable technology is expected to jump to over 1.1 billion in 2022. Thus, there are currently tens-of-thousands of Calgarians using wearable technology as part of their daily lives.

*Calgary's Place in the Wearables Market*

Calgary has become a global talent hub of wearable technology research and product development. Industry leaders like Garmin are headquartered in the Calgary region due to the

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business ecosystem and the local talent in the sector. Calgary Economic Development has identified Health IT/Medical Devices as a subsector focus of the Life Sciences strategy because of the approximately 100 Life Science companies in the Calgary region, over 50% of them are in Health IT and medical device space. Considering that over 60% of the University's students stay and work in Calgary after graduating, the combination of the We-TRAC program and the proposed Citizen Scientist program further supports Calgary becoming a global leader in the wearable technology sector.

### *Background on the Citizen Scientist Project – Project details in Attachment 1*

The first We-TRAC project is looking at elite athletes to identify how to better their performance, and then working with the athletes and coaches to implement those improvements. This second We-TRAC project is looking at everyday citizens, and how they are affected by and interact with their environment.

Examples of possible research studies range from understanding heart rate and stress levels while cycling, walking or driving to work, determining how the layout and connectivity of the street network is amenable to design by urban planners and developers, investigating sleep patterns and its effect on quality of life for clinical patients, collecting data on green space utilisation in order to aid in promoting physical activity resulting in healthier communities, and monitoring running patterns while Calgarians run and train on our pathways and trails.

In order to leverage wearable technology to help Calgary become a leading smart city, the most urgent need is to engage Calgarians as citizen scientists. The Wearable Technology Citizen Scientist Program will encourage the regular contribution of ideas, wearable tech data, questions, requests, and criticisms. Policy makers can use this information to develop new ideas to improve citizens' lives, which in turn reinforces citizen participation.

## **INVESTIGATION: ALTERNATIVES AND ANALYSIS**

See Attachment 1 for more details.

### **Stakeholder Engagement, Research and Communication**

Civic Tech YYC, healthYYC, and Calgary Economic Development have been engaged throughout the development of the proposal and are aware of the steps to formally create the web-portal.

### **Strategic Alignment**

See Attachment 1 for more details.

### **Social, Environmental, Economic (External)**

See Attachment 1 for more details.

### **Financial Capacity**

#### ***Current and Future Operating Budget:***

No operating budget impacts.

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### ***Current and Future Capital Budget:***

Currently, there is \$4,091,621 remaining in the Council Innovation Fund. This would draw down the Council Innovation Fund by \$57,500. Should Council approve this application, the remaining balance in the Council Innovation Fund would be \$4,034,121.

The data generated from the program could help prioritize future capital projects, and may identify the need for more capital investment in certain programs e.g. the need for traffic calming in a community.

### **Risk Assessment**

*Data Privacy* – the data collected by the University would contain an individual's movements and biometric data. If there were a data breach, the study's participant's personal information could be compromised. To mitigate this concern, the University is storing the data in a level 3 database. Level 3 Security (L3S) is referred to as the most in-depth and highest security level technology for securing identities and identity documents. The City of Calgary is not collecting, nor storing an individual data set. The only data set that The City will have is an anonymized aggregate data set that will be open to the public to use.

*Lack of Participants* – The success of the Citizen Scientist program relies on there being a statistically significant amount of participants, approximately 10,000 Calgarians. Activity data sharing programs like Strava, to which users upload their workouts, have attracted over 42 million accounts worldwide and adds approximately 1 million new users every month. Regardless, there might be fewer who sign up to be part of the Calgary study and the primary research questions we plan to investigate do not require data from thousands of participants.

*Optics* – There could be a reaction from the media and public that the government is tracking citizen movements. By having, only volunteers participate, having the University store the raw data, anonymizing and aggregating the data, and by making the data open to the public, this will hopefully alleviate most concerns.

*Inability to pull meaningful data from the devices* – There is the possibility that the data extracted from the wearable devices will provide insufficient information about how citizens "feel" in a space and will not be practical to use. However, the portal will allow for collection of not only quantitative wearable sensor data but also qualitative survey data. Thus, the University plans to blend the qualitative and quantitative data together in order to ensure we understand people's behaviour holistically. Furthermore, by establishing the program, The University of Calgary can be well placed for technological improvements in the wearable devices, and improvements in data science, that would make the data and data analysis more accurate and better suited for planning and engineering purposes.

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#### **REASON(S) FOR RECOMMENDATION(S):**

This application meets the Terms of Reference for the Council Innovation Fund. This project is a one-time funding request that has the potential to have a city-wide impact. Calgary is a world leader in the both the business and research side of wearable devices. By supporting the University of Calgary in their development of the Citizen Scientist Wearables program, The City is fostering economic development and diversification by supporting research and development, and is making use of University research expertise to solve City problems.

#### **ATTACHMENT(S)**

Attachment 1 – Councillor Gondek CIF Application: University of Calgary, Faculty of Kinesiology, Citizen Scientist Wearables Project