February 14th, 2014

***Responses to Reviewer’s comments***

To the reviewers, thank you very much for reading our manuscript, we believe the comments were very pertinent and contributed in enriching the document. We have addressed (in highlighted format) each comment throughout the manuscript

***Responses Reviewer 1***

There should be some indication that snow removal is the greatest need or most significant factor. This would help set the context for the following snow removal section.

*We agree, and we modified the text from the beginning as follows:*

Introduction

Snow is a major problem for accessibility and current snow removal procedures prove to be expensive and inadequate to provide the accessibility required for people with disabilities. The low temperatures and snow precipitations experienced in countries situated in the northern hemisphere, closer to the North Pole, such as Canada, Russia and Scandinavia greatly influence the everyday life of all individuals. For example, winter conditions imply acquiring special clothing, car tires, and sports equipment, as well as snow removal or ploughing from the streets, and the existence of ice patches, along with accidents and illnesses associated with cold weather. Indeed, walking in winter conditions can be dangerous.

There is very little, in the remainder of the narrative, which adequately describes the methods or the findings in relation to the statement of purpose.

*We agree, and we rewrote most of the methodology, please see the manuscript.*

The co-design sessions are inadequately described. At present they read as brainstorming sessions and lack the intellectual rigor to be considered a research methodology.

*We agree, and we rewrote most of the results, please see the manuscript.*

This article does not describe a study as much as it describes the rational for future work. I am not fully convinced that if such is the case, and the methods did not receive the level of scrutiny and reporting one would expect for a study, it is not worth reporting as an independent study.

*The methodology and results were substantially rewritten in order to respond and satisfy this particular comment. Please refer to the manuscript.*

***Responses Reviewer 2***

1. The theme of the paper is very pertinent and the outputs have the potential to be very helpful to solve a well-identified problem. However, the paper shows several weakness that should be revised.

2. Introduction and the goal are clear. The authors should avoid repeating the same sentence in the beginning of the abstract and the introduction.

*We agree, and we rewrote the introduction, please see our answer to reviewer 1.*

3. In the abstract authors refer to the funding by the City of Quebec. Was this project a goal of the City Council, and will it be implemented? Was the development of the design solutions done in parallel with the city council techniques?

*We included the answer for these questions in the new version of the manuscript. It reads as follows in the abtract:*

This project was funded by the City of Quebec in partnership with the Centre interdisciplinaire de recherche en réadaptation et integration sociale (CIRRIS). The project sought to explore possible solutions to be implemented, if feasible, in the future by the municipal government.

*And then again in the discussion:*

This solution will be evaluated in terms of cost/energy investment in order to determine whether or not it shall be implemented by the City of Quebec.

4. In the “current practices” section authors should refer to proven evidences of the disadvantages of using salt to melt snow instead of just saying that salt “could possibly have” disadvantages.

*We agree, and we modified the text as it follows:*

For example, salt damages the pavement, trees, and grass, as well as corroding automobiles and affecting severely ground water, water bodies and roadside vegetation (Remakrishna & Viraraghavan, 2005; Mayer et al., 1999; Demers & Sage, 1990).

5. The integrated building design Model is presented and explained as if it was used in the design proposal. Yet, there is no evidence in the paper that the aspects of Needs, Performance and Design Solution were taken into account. If this models is presented as the basic of the design process the authors should refer to all the criteria address in those or explain why the criteria was not used.

*We agree, and we modified the text accordingly throughout the whole text. Please see the highlighted sections in the manuscript.*

6. The Methodology encompass 2 steps but it should have a 3rd step where the design would be reframed or at least a process to return to step 1 to accomplish that definition. With a reframe of the design step 2 does not have meaning,

*We do not agree with this suggestion. We encourage the reviewer to see some Co-Design methodologies (Morales, Rousseau & Passini, 2012), on which the methodology presented in this research was based. We partially agree in the sense that there has to be a verification of the needs (found in step 1) with a view to achieving optimal performance, however the needs have to be present all the way through the conception of the new design solution and even more so as there are new needs that emerge in step 2 within the group sessions. For these reasons we do not see why there has to be a formal return to step 1 in a third step, as suggested by the reviewer.*

7. Why the 1 step did not involve elderly people and people with disabilities, the “experts in their own experience”?

*We agree and we include this in a new section of limitations of the study at the end of the manuscript. It reads as follows:*

Limitations of the study

This project should have included senior participants in its development; however the focus of our recruitment was to recruit adults with motor, audio and visual disabilities and age was not a limitation. Moreover a cost/energy investment study of the solutions proposed has not been developed yet. However, such an assessment will be undertaken in the near future with additional funding for its development. We are currently in the process of writing and sending grant applications to meet this end.

8. “Co-design sessions” Was the design done during the sessions or the sessions were only to exchange ideas and the real design was done by a group after the meetings? What type of design was done – reports, drawings, models…? The design solutions from step 1 are never shown.

*We agree with the fact that this was not clear in the previous version of the manuscript. In order to answer these questions we substantially rewrote the methodology and results sections. Concerning the design solutions that came out of Step 1, we presented an example to provide the reader with a better idea of the development of this step. We provide as well an example in Step 2. Please see the highlighted text in the manuscript.*

9. How was the design presented to the focus groups? Need to explain this stage in more detail. What elements were shown to them? The results evaluation was written by the participants or just collected by the researcher? And how was it collected?

*We agree with the fact that this was not clear in the previous version of the manuscript. In order to answer all these questions we substantially rewrote the methodology and results sections. Please see the highlighted text in the manuscript.*

10. How was the design done in the 1st step improved after discussion of the 2nd step? It’s not clear what part of the design was done in step1 and what were the benefits of step2 in improving the design.

*This is also addressed in the new version of the manuscript. We included an example in order to clarify what was presented to the participants in the individual sessions in step 1, along with what was presented in step 2, in order to provide the reader with a clear understanding of the enrichment of the idea from one step 1 to step 2.*

11. Part of section “Improve snow removal processes” is existing design. Those should be in the framework section.

*The “Improve snow removal processes” was one result that became evident in all the group sessions. This was not mentioned in the literature review or in the individual sessions. This aspect was addresses significantly in the last group session with the representatives of the City of Quebec. Therefore this element had to be included as part of the results.*

12. Will the metallic grating be a problem to the wheelchairs or to the cane of the visually impaired? Was it done a study on its usability?

*We are currently in the process of looking for a research grant to built the prototype and test it. However this idea was proposed and endorsed by the blind participants and the wheelchair users in the first group session. Additional specifications of the metallic grating were added to the manuscript and it reads as follows:*

The idea is to have a reservoir or trough the width of the curb cuts’ incline, roughly 300 mm in depth. This reservoir would be covered with a metallic grating for the snow to fall through. The metallic grating was thought to be of 15mm by 15mm with a 200 mm solid strap at the center of the grating to allow women with high heels to pass.

13. One possible presented solution for the public transportation is the driver-free transportation. Although there is no references on the use of this service. A simple SWOT analysis should be shown in order to understand why this is a good proposal.

*We have not done a SWOT analysis, however we included in the manuscript the references of the CATS project developed in Strasbourg, France that includes this kind of transportation. We modified the text as it follows:*

It was proposed to incorporate driver-free electric transportation, which has already been implemented in France (see CATS project – City Alternative Transportation System, www.parc-innovation-strasbourg.eu/CATS-project, and http://induct-technology.com/produits/navia-2).

14. What are the main differences between the proposed method to melt snow and the existing ones, in terms of costs, functionality, etc? It would be nice to have a drawing on those.

As mentioned in point 12, *we are currently in the process of looking for a research grant to build the prototype and test it, therefore we do not have that kind of information yet. We hypothesize that the amount of electricity for the resistor will not be of great significance and that the source could be the same as the public lamps in the street. However the resistance does not have to be turned on every day, only during a storm and during snow ploughing activities in the area where the curb cut is located.*