A design blueprint for a social intervention to prevent/reduce obesity

Summary of activity

Background
The INNOVAGE project set out to adopt a user centred design approach with participants from the South Yorkshire cohort to develop a new social innovation. The user centred design process we are following is based on the Design Council’s simplified account of designing presented as the ‘Double Diamond’ model (See figure 1). This model breaks design into four phases as described below:

1. Discover: in this initial stage stakeholders come together to explore the context of the design project and the understandings that different stakeholders have of the current situation and desirable features of future situations.

2. Define: in this phase, stakeholders draw their understandings of the context and aims of the project to: formulate criteria that will be useful in selecting a concept; identify drivers and hurdles that may be relevant to implementing the innovation; and to agree on a core concept for further development.

3. Develop: in this phase the selected concept is once again opened up to explore different ways that the concept could be realised by creating and experimenting with prototypes and investigating the detailed pragmatic challenges that arise in implementing the innovation.

4. Deliver: in this final phase, the innovation is iteratively piloted, evaluated, refined and improved, in collaboration with stakeholders to ensure that the social innovation can be easily adopted and implemented by key social actors.

In the project plan, WP4 Task 2 corresponds to the first two stages of this model leading to a definition, or ‘blueprint’ of a proposed intervention. Our blueprint definition is described in Appendix 1 of this document. Work is already progressing on initial Develop activities to implement (technically) the social networking technologies that are implied by the blueprint.
WP 4 Task 3 will correspond to the development and delivery phases, with the delivery phase following an action cycle approach. During this period we shall work with stakeholders to generate the toolkit of ideas and activities that can be applied to the technical system.

**Discover: Contextual Analysis & Context Mapping**

In parallel with the formal review of published medical literature (WP4 Task 1), we conducted a *contextual analysis* of social innovations and design interventions related to obesity and physical activity. We examined both novel uses of digital and social technologies to address obesity across Europe and North America, as well as the local context of interventions taking place in South Yorkshire that could be drawn in as partners to ensure the sustainability of the innovations.

The range of technology interventions studied included:

- Personal monitoring applications such as *Fitbit* which is a digital movement sensor linked to web services that allows users to closely monitor their physical activity, and *MyFitnessPal* which is a smartphone application (including some social networking capabilities) that helps users to keep track of both their physical activity and their calorie intake;
- General social networking tools such as *MeetUps.com* that enable users to publicise and to find out about events that are happening in their local area;
- Distributed group physical activity initiatives such as *parkrun*, which organises free weekly 5 km runs in 273 parks around the UK and in a growing number of other countries worldwide and allows participants in different events to compare their age-graded performance with their own history.
- Jantastic – a social running motivation website that uses virtual badges and league tables to motivate people to maintain or increase their training.

In our local area of South Yorkshire. We identified and interacted with a number of specific interventions including:

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• Rotherham Institute for Obesity: a specialist NHS clinic providing specialised services and support to obese individuals;
• Doncaster public health Lakeside initiative: an initiative by a local public health team developing a multi-purpose ‘treasure trail’ facility around a lake that is adjacent to a large industrial / trading estate, using QR codes to provide site information with the aim of encouraging staff working on the estate to make more active use of the lakeside environment;
• The ProFit fieldlab at the U-mix Centre, Lowfield, Sheffield. This is an Interreg IVB North West Europe funded programme to stimulate innovation in the sports industry by developing an international network of FieldLabs - research and development locations in real-life settings where citizens engage in sports & play activities and where businesses can test their product prototypes. The Lowfield location particularly focusses on finding innovative ideas to encourage outdoor fitness and exercise in primary school children, and older adults.
• The National Centre for Sports and Exercise Medicine in Sheffield (NCSEM) is a £24 million Olympic Legacy programme to facilitate the co-location of clinical and leisure facilities in Sheffield with the aim of using physical activity to improve the health of the population surrounding Sheffield. The aspiration is to create a culture of physical activity such that Sheffield becomes the most active city in the UK by 2020. “Move More” is the public-facing brand of the NCSEM.
• The Sheffield Move More on-line marketing and engagement team. This team are developing the Move More brand and maintain the on-line presence of the programme at http://www.movemoresheffield.com The site already contains a database of physical activity events and classes and provides visitors with an ‘activity finder’ to enable them to find classes in their area, as well as providing services for employers wanting to promote a healthy workforce. We are maintaining liaison with this team to ensure that the innovation can be integrated with their services after the lifetime of the INNOVAGE project.

To develop a deeper understanding of inter an intergenerational communication and experiences of active and healthy ageing, we recruited participants from the South Yorkshire Cohort in a series of workshops using context mapping techniques. After initial piloting and ethical approval for the research techniques we were using, we conducted 6 workshops, involving 26 participants.

Based on early findings from the literature searches, our recruitment criteria prioritized participants who were over 55 years of age, and used post-code selection techniques to encourage the involvement of participants drawn from less affluent social classes. BMI was also considered to ensure each workshop included people with a range of different needs and experiences.

Within the workshops, we conducted a variety of activities including life-mapping that explored how participants levels of physical activity had varied over their life-course, and the key life events that triggered changes (e.g. leaving school/university, childbirth, children leaving home, retirement, major illnesses etc.). Figure 2 shows one of the shared ‘lifemaps’ that was developed.
Define: Knowledge Synthesis
Drawing on the outputs from the context mapping workshops we identified the following themes as important:

- That, as diverse as is the population, so are barriers and motivations for undertaking PA and therefore we needed to design interventions that were open and allowed a very wide range of activity types.
- Choice, both in terms of type of engagement and level of engagement, needs to be broad.
- Key life changes such as leaving school / university, having children, retirement, death of a partner or sudden unpredictable changes (e.g. accidents or onset of long term conditions) impact significantly on motivations and opportunities for undertaking PA.
- A reported disconnect between younger and older generations in relation to PA.

The literature searches and review conducted as part of WP4, Task 1 discovered evidence that interventions that were inter-generational, were personalised, and which seek to actively involve participants had been found to be more effective.

Two important (and original) findings from the literature review were that:

a) Amongst the studies of intergenerational interventions that have been evaluated, there was only one study that had investigated interventions that involve linking young people with their grandparents; and
b) That the direction of influence explored in previous intergenerational studies has always been down the generations, i.e. the potential contribution that parents and grandparents can make to reducing obesity in children. None of the previous studies or interventions has considered potential influences up the generations, from children to adults.

Based on the synthesis of these different knowledge sources, we developed a number of different innovation concepts for discussion and exploration, which are listed below.

- A general gateway and social networking site, focusing particularly on promoting physical activity, and allowing users to find partners with similar physical fitness characteristics who they could interact with remotely (for example through shared challenges or competitions).
- An intelligent ‘activity finder’ (which could be combined with the existing services provided by the movemoresheffield site) that would enable people to search for activities that matched their particular preferences. Figure 2 illustrates this concept.
A general on-line resource supporting and enabling local community organisers to manage and promote physical activity classes – this could include tools to create and print newsletters and event flyers, as well as providing advice and ideas for activities.

A resource more specifically targeted to community walking groups, which allows organisers to publicise local walks and other events (for example including facilities to send out SMS reminders about the walk).

A social network sharing opportunities to engage in voluntary work that is physically active such as community gardening.

Organised physical activities that are prescribed by general practitioners for people who are overweight or obese.

A networking site that allows users to join groups that share a physical activity challenge which they might do in competition with each other, or they might seek to perform as a collaboration. This option could be promoted via schools and encourage children to undertake challenges in co-operation with older relatives.

These concepts were then illustrated in the form of storyboards. Figure 3 shows three example storyboards. These were discussed and explored with both research participants in context mapping workshops, and with expert researchers from the INNOVAGE team. These discussions gave rise to a set of criteria which were used to identify the most promising innovation to take forwards for piloting and implementation. Table 1 shows the criteria identified and explains their origin.
Figure 3: Storyboard illustrating three different innovation concepts.

Project number: 305058
<table>
<thead>
<tr>
<th>Criterion</th>
<th>Explanation</th>
<th>Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intergenerational</td>
<td>The Description of Work explicitly aimed at creating an innovation that linked older and younger people</td>
<td>Literature review (D4.1) and Description of work</td>
</tr>
<tr>
<td>Upward influence</td>
<td>The literature review revealed that no previous trials had been reported where the aim was to have younger people influencing older people into healthier behaviours</td>
<td>Literature review</td>
</tr>
<tr>
<td>Playful</td>
<td>The concept of ‘gamification’ is being widely used to promote behavior change. Playfulness can provide important intrinsic rewards for a behavior.</td>
<td>Description of Work</td>
</tr>
<tr>
<td>Does not require ‘high end’ technology to access</td>
<td>Rates of obesity are inversely correlated with socio-economic status, so an intervention that targets those at highest risk needs to be affordable and accessible. Many of our target participants may not be on-line, and will not have smart phones</td>
<td>Literature review? Context mapping workshops</td>
</tr>
<tr>
<td>Avoids duplicating existing efforts</td>
<td>There is no added value in developing an innovation that has already been used elsewhere</td>
<td>Contextual analysis</td>
</tr>
<tr>
<td>Limits dependence on external partners to deliver, recruit participants</td>
<td>Iterative development and implementation of the innovation requires active participation in trials.</td>
<td>Pragmatic</td>
</tr>
<tr>
<td>Includes mechanisms for self/monitoring and feedback</td>
<td></td>
<td>Health behaviour change literature. Contextual Analysis</td>
</tr>
<tr>
<td>Allows for diverse types of PA</td>
<td>To reach as broad an audience as possible, the innovation needs to allow different individuals to find physical activities that they enjoy or find acceptable.</td>
<td>Context mapping workshops</td>
</tr>
<tr>
<td>Degree of human support / participation required to operate the system</td>
<td>The degree of active human support will have a major impact on the operating cost of the innovation.</td>
<td>Pragmatic</td>
</tr>
<tr>
<td>Makes use of existing</td>
<td>Successful social innovation needs to be integrated into existing structures</td>
<td>Pragmatic</td>
</tr>
</tbody>
</table>
Before selecting a concept for further exploration, potential risks need to be considered, and minimized.

Technical simplicity will increase chances of sustainability & replication

Table 1: Criteria used to guide the selection of which innovation to develop

Based on the criteria in table 1, we selected *iStep* as the concept for further development. *iStep* encourages school children to recruit parents, grandparents or other older people to engage in collaborative challenges and competitions, using the motivations of supporting and interacting with their younger relatives to encourage older people to be more physically active. The blueprint for *iStep* is included as appendix 1 to this report.

**Develop**
*iStep* is a radical social innovation that seeks to encourage more active lifestyles for older people through playful links between generations. Because school teachers will be critical stakeholders in delivering the *iStep* intervention, we are now working with a small group of teachers at St Marie’s School in Sheffield, to develop a first pilot implementation of *iStep* in autumn 2014. This pilot exercise will allow us to identify challenges in both the practical implementation of the *iStep* concept, and technical issues involved in implementing the necessary technologies, as well as engaging the teachers in generating a wider selection of ideas and activities that can be supported with *iStep*. We are also discussing the potential to pilot the *iStep* system with older adults in an ethnic minority community association.

In parallel with the piloting, we are continuing our engagement with the MoveMoreSheffield team so that as *iStep* is refined and implemented, the system can be integrated with the MoveMore initiative to ensure sustainability.

**Achievements**
Please see appendix 1 which describes the *iStep* social innovation concept.

**Additional information**
We have purchased the domain name: [www.istep.org.uk](http://www.istep.org.uk) for the service. As the technology is implemented and refined, we will make it available at this URL. Currently, the development version of the software is deployed at [http://www.sparksfantastic.com/innovage/](http://www.sparksfantastic.com/innovage/)
Appendix 1: The iStep social innovation

The iStep concept
At the heart of the iStep concept is the creation of partnerships between a younger and an older person to encourage both partners to increase their levels of physical activity. Each partner will be given a pedometer to track how much physical activity they do. Each day, both participants will report to a website to record the number of steps they have taken. A combined score will be calculated taking into account the activities of both partners.

Users of the system can then see how much activity they have done, compare their progress with other dyads teams, or work towards collective goals.

An example activity for individual dyads (i.e. an older person & a younger person together) could be: the round Sheffield walk (see figure A1).

![Figure A1: Round Sheffield Walk route on iStep](image)

In this exercise, the dyad log their steps each day, and this is mapped against the walking route. As the dyad progress around the route, they will pass key landmarks which could be represented by images or multimedia content that allow the young person to learn about their home city, and give the older person an opportunity to share their knowledge.

The score or distance covered for a dyad will (in the first pilot) be based around a geometric mean of the steps taken by the younger and the older person (i.e. $\sqrt{Y \cdot O}$ or $\sqrt{f(Y) \cdot g(O)}$) with the consequence that if either partner is not maintaining their levels of activity, the score of the whole team will suffer, and it will be difficult for the other partner to increase scores to compensate.

Some other activities that might be supported the iStep system are listed below:
- A challenge for a whole class of school children to walk sufficient steps to get from Lands End (Great Britain’s most South Western point), to John O’Groats (Great Britain’s most northerly point). In this type of challenge, the school childrens’ individual steps are combined with their classmates to calculate progress.
- A challenge to walk the Tour de France 2014 route (or another grand tour).
- A competition or race between pupils in a single class.

Each of these group challenges could be conducted purely by a group of individuals, or could be conducted by a group of intergenerational dyads. The approach is not limited to use in school settings, but could also be used by other social and community organizations.

**iStep scenarios**

**Part 1 - awareness and engagement**

Following a 'briefing' from a children's class leader / teacher, that will include two principal aspects (registration and pedometer use), children will be issued two pedometer units.

![Figure A2](image)

Figure A2 Following an introduction of the iStep initiative by the class lead, children register (including paper based clearances) and are issued two pedometer units.

At the next / nearest opportunity, the children will approach grandparents with the idea that they could help the child to live more healthier lifestyles by using a pedometer during *their* everyday lives, and, that by doing a little more physical activity themselves would help them at school. If in agreement, the older person also signs up, with the child taking relevant details and giving the older person the second pedometer.
Figure A3: Children introduce and sign up an older relative ‘dyad’ partner and give them the second pedometer.

Where IT (home computing, mobiles and tablets) are available to the family, the child then registers the partnership at the iStep web portal. In one situation, the older dyad partner may wish to manage registration themselves.

Figure A4: Both younger and older dyad partners register at the iStep portal, together or separately.

Further to this scenario, the school lead (teacher) may enter the partnership details at a later date, back at school.

Figure A5. School lead / teacher enter dyads and/or individual child’s details in the school setting.

A prototype iStep web portal is now under development.
Part 2 - undertaking physical activity

Once a child and an older participant have partnered and registered and understand how to use the pedometer and the iStep portal, they both conduct their usual physical activity. In addition, physical activity suggestions are given on the iStep website.

We also propose to provide a number of ways to review each person's and dyad's progress against physical activity tasks. More details of this are given in Part 3, 'user output measures and feedback'.

At regular intervals (once per week / day), the child and older dyad partners review the step count on their pedometers, log on to the iStep portal and enter their step count information.
Figure A8: Periodically (e.g. at one week intervals) pedometer step counts are recorded on the dyads user account at / on the iStep portal.

A number of different formulae can be used to combine the step count values for each dyad pairing. The simplest model is to sum both parties. However, other possibilities include:

- Differentially weighting the contributions of the two partners to take into account age or disability;
- Using the geometric mean ($\sqrt{\frac{A*B}{O}}$) of the two values – thus requiring both partners to make a good contribution.

In conducting pilot testing and developing our implementation strategy (WP4 Task 3), we will investigate how different formulae may affect motivation of participants.

**Part 3 - user ‘output’ measures and feedback**

A number of ways for user to review their progress and to see how their activity levels compare with others are possible. We are currently implementing the following techniques.

1. **Step by step**
   In this approach, the feedback is provided in the form of graphs or tables, but could also include opportunities for the dyad pairing to compare their progress with those of other classmates (see figure A9).

2. **Specific (localised) challenge**
   In this model, the steps taken by the dyad are used to calculate progress around a particular walking route. This feedback technique could be combined with other
educational content. For example, passing waypoints on the route could lead to presentation of content about interesting waypoints. Using a route that was relevant to the local area might also offer opportunities for intergenerational conversations about local history and culture (see figure A10).

Figure A10: A localised challenge such as a local walking route is given. Equivalent progress around the track is shown.

3. Shared challenge
In this model a large group combine all their steps to tackle a major challenge, such as walking from one end to the other of a country. In the UK there is a traditional route from Lands End in the South West of England to John O’Groats in the North East of Scotland, however, it may be possible to expand the scale as far as walking to the moon! (see figure A11)

Figure A11: A trip to the moon graphic is given and progress toward target objective shown.

Further user outcome measures and progress feedback vehicles are being developed however the key aim will be the development of the physical activity interrelationships between the older and younger participants in a team.

Figure A12: Older and younger participants working together to achieve aims.
The iStep technical platform
The iStep prototype is being built on top of WordPress. WordPress is a free and open source content management system (CMS). Currently WordPress is the used for over 22% of the websites on the internet, making it the most popular content management software in the world.

WordPress Core:
WordPress adheres to a standard LAMP/WAMP architecture. That is to say that it can be hosted on a Windows or Linux system and has three primary software components: Apache, MySQL and PHP. The core system code allows for the management of users, pages, posts and simple media content. In addition WordPress features a plugin architecture and a theme system. The generic architecture is illustrated in figure A13.

WordPress Themes:
A WordPress theme controls the visual aesthetic of a site through the layout, colours, navigation, font/typeface and page templates. There are 1,000 of WordPress themes available on the internet many of which are free. WordPress users can install these themes easily through the administrator interface without having to worry about affecting the site contents or having to know how to code themselves. This approach means that the iStep technology can be adopted by other social actors and rebranded to match with local health related interventions.

WordPress Plugins:
A large amount of the flexibility of WordPress comes from the wide variety of free high quality plugins. Plugins are tools that extend the functionality of a basic WordPress site. Each plugin is a software component designed to perform a single specific task. These plugins can be developed to do almost anything. The official WordPress plugin directory as over 31,000 plugins. In most cases they can be installed and configured easily without any prior coding knowledge. Wherever possible, iStep is making use of existing plugins and avoiding the creation of bespoke software that would not be supported after the completion of the research project.
Key pre-existing plugins and themes in the iStep system are:

- Buddypress: Social networking in a box.
- Invite Anyone: Allows group admins to invite any member of their BuddyPress community to a group or to the site
- WP-Mail_SMTP: Reconfigures the wp_mail() function to use SMTP instead of mail() and creates an options page to manage the settings.
- TwentyThirteen: One of the default themes that comes with a wordpress install

We are also developing a number of custom plugins and themes, including:

- Innovage BuddyPress Group Challenge: Allows Buddypress Groups to choose a generic text challenge and set an end date.
- Innovage FPDF: A custom pdf generator that can be used to allow teachers to provide information about challenges to children, parents & grandparents
- Innovage Partner: Allows users to create a partnership (e.g. between a younger and an older person) whose steps will be combined
- Innovage Special User: Allows a one user in a partnership to manage the details of their partner - for example, allowing a young person to manage data for a parent or grandparent.
Wordpress: Dashboard
Each user on a wordpress site is provided with a ‘dashboard’ which acts as their landing page when they log into the site. The dashboard collates all the information relevant to that user, and provides the user with controls to access the functionality of the site. In the first pilot studies, we have deliberately limited the functionality in the dashboard to support the most basic functions. Our intention is to develop extensions in response to the input from stakeholders within each pilot study following an ‘agile’ software development process. Figure A14 shows the dashboard design being created for the pilot studies in Autumn 2014.

Welcome to the iStep dashboard

Extension and integration
In our first pilot studies we shall be using basic pedometers and the web interface to allow users to input the number of steps they have taken each day, and to provide feedback. Future extensions that may be developed include:

- Integration with google maps to present progress in geographical challenges
- Integration with automated SMS services so that the number of steps could be collected using text messaging to the wearer
- Integration with other media platforms to present content related to the routes
- Integration with other digital pedometer systems to simplify the capture of physical activity data.
Decisions about which extensions are developed and at what point will be guided and governed by the experiences in the development & delivery phases (WP4: Task 3) responding to user feedback and the results of evaluation studies.