Incubating and Nurturing Sustainable Practices through Staged Social Engagements

Satyakam Sharma[1,*], Kin Wai Michael Siu[1],

[1] School of Design, The Hong Kong Polytechnic University,
Hung Hom, Kowloon, Hong Kong

Abstract. Social interventions emerging from the field of social psychology and sociology have been quite effective in encouraging a positive change in environmental behaviour under the influence of a social setting. They also provide a suitable social environment for learning, adopting, incubating, and nurturing the new behaviour. The study analyzes several such cases through an exhaustive document analysis. It aims at building a deeper understanding of the complex mechanics of such contrived social engagements including their process of encouraging sustainable behaviour. It dissects the whole process into smaller activities, and maps them against the behaviour change techniques (BCT) and the relevant theories to identify their role in the process of change. Further classification of these activities on the basis of their role resulted in a model, which comprises of five key phases through which a participant undergoes during the process of change. The model provides an overview of the process, which can be useful in understanding and devising such social engagements for encouraging a positive change in behaviour for environmental benefit.

Keywords: Sustainable behaviour · social interventions · staged social networks · collaborative networks · behaviour change techniques (BCT)

1 Introduction

A positive change in consumption behavior is required to strive towards the concept of a sustainable society [1]. Design-led approaches drawn heavily on cognitive and environmental psychology have mainly focused on the design of specific products and their interactions to target behaviour towards more efficient usage. Although, these approaches have been quite effective in steering the behaviour towards more efficient usage of the products and resources, they seldom consider the social context in which the practices emerge, evolve, incubate, transform, persist, spread, and defect [1], [2], [3] and [4].

Social interventions emerging from the field of social psychology and sociology have shown that group-level interventions can be an effective way to encourage a positive change in behaviour. Such social interventions are based on the assumption

that human practices are socially grounded, thus influencing the social nature of practices of a unified social group through a devised social network, can be an effective way of encouraging adoption of sustainable behaviour [3], [5], [6], [7], [8], [9], [10], [11]**.**These strategically designed social networks engage the participants towards a common objective, and stimulate them to adopt new practices under the influence of a social setting. The process of engagement typically involves activities like teamwork, competition, collaboration, and rewards. These social engagements also provide a suitable social environment for incubating and nurturing the newly adopted practices, which eventually replace the habitual behaviour. They aim to address the social and systemic nature of practices by engaging the practitioner into an arranged social environment where practices can be shared, restructured and incubated under the influence of the social structure [2].

The term 'staged' conveys that these are strategically and thoughtfully structured engagements, designed to achieve certain objectives inscribed by the designer. Based upon the objectives, these social engagements can broadly be classified into two categories: 1) *educational* – the ones which focus only on educating the participants and 2) *action-oriented* – the ones which focus on the actions taken by the participants in the real-world.

The theoretical constructs provide a foundation for outlining the strategies used in these staged social engagements aiming behavioural change. These theories provide an understanding of the process of behaviour change (from cognitive stand point), the key determinants of behaviour change, and the associated cause and effect [3]. They also provide a basis for predicting the new behaviour patterns, maintenance of already adopted behaviour, and understanding how habitual behaviour gets replaced by conscious decisions. The theories highlight the key motivators of behaviour change as - personal benefits, conformity with social norms and personal values, concern for societal and environmental values, and fear of adverse consequences [3]. The theories from Social sciences consider that behaviour is a consequence of societal norms and expectations held by the system in which the individual is living, therefore a unified social group should be considered for targeting behaviour change [12]. Besides this, the theories such as *social cognitive theory* and *social learning theory* indicate the importance of social engagements in behaviour change. They indicate that a social intervention should allow the individuals to engage, participate, socialize, share, play a role, get incentivized, get hands-on experience, and above all, it should allow the individuals to experience the immediate consequences of their actions [3] and [12]. These social engagements are based on a mix of several such theories.

The overall objective of the research is to conduct a systematic investigation into several such implemented cases in order to understand how these solutions inspired adoption of sustainable practices. The aim is to build a deeper understanding of the complex mechanics of such contrived social engagements, and the motivation behind adoption of new practices from the perspective of the users. The idea is to understand - the key activities involved in the entire process of behaviour change, the role of these activities, corresponding theories from behavioural science, sociology, and social and cognitive psychology, and the interwoven strategies (behaviour change tech-

niques) that trigger the adoption of new practices. The analysis of the successful cases would provide an understanding of the mechanics of staged social engagements, and an overview of the entire process of change from the perspective of the user (or the participant). This understanding could be useful in devising such arranged social engagements for fostering pro-environmental behaviour.

2 Methodology

Six diverse cases were identified for the analysis. These cases varied from each other in terms of their context of implementation, targeted social group (communities, employees, students etc.), targeted behaviour, method of engagement, and the techniques used for behaviour change. The common factor across all these cases was that they all followed an action-oriented approach, which means that they encouraged performing sustainable actions in the real-world. These cases were implemented for at least 2 months, and had resulted in at least 2% savings on energy bills, or consumption of resources, or resulted in at least 2% savings (calculated on the basis of the actions performed or the points earned by the individuals).

In order to develop a base for studying the cases, in the first phase of the project an in-depth exploration was conducted to identify various theories and models pertaining to behaviour change from the field of behavioural science, sociology, and social psychology. Thenceforth, a systematic review of various behaviour change techniques (BCT) was conducted. These common BCT have been identified by various researchers in the past [13] and [14].

In the second phase, a document analysis was conducted to review the selected cases of staged social networks, which have been effective in fostering a positive change in environmental behaviour. The reviewed published documents included reports on ongoing organizational activities, journal articles, newspapers, training materials, promotional materials, project reports, and project websites.

These documents provided an unbiased insight into each of these cases. These insights were related to the context of implementation, process, functioning, structure, targeted group, activities involved, motivations, effectiveness, and the results of each case. Each document was coded to precisely identify all the activities that take place in the entire process of change, particularly from the perspective of the user. Thereafter, each activity was linked with the relevant BCT and the theories to identify the role of that activity in the process of change. This process of dissection and association helped in understanding the role of each activity in the entire process.

In the third phase, all the activities (across all the cases) were classified into certain recognizable categories based upon their role in the process of change. This categorization symbolized the overview of the key phases involved in the process of change.

3 Cases

3.1 JouleBug

JouleBug is a playful mobile application that encourages its users to adopt sustainable habits in practical, and share their achievements through online social networks. It uses game elements such as competition, rewards, comparative feedback and goal-setting to engage and motivate the users. It provides them with practical, easy-to-implement tips for saving energy in the real world. In its action-oriented approach it rewards its users for the actions taken by them at home, work and play.

JouleBug collects user's utility account bill online and creates an informative graphic that encourages competition among a social group. The players then compete with their Facebook and twitter friends to earn rewards in the form of badges and pins. JouleBug also shows the users their regular progress and the impact of their actions in terms of savings each month. It also learns a user's habit over time and recommends the actions to others in the social group to make the highest impact. It also encourages the users to save water, paper and take other sustainable actions [15].

JouleBug estimates average saving of $200 a year on the basis of the pins and badges earned by its users. According to the reports from I-Cubed and Wesleyan University, there was a significant behaviour change observed among the employees and student respectively because of the intense competition triggered by Joulebug [3], [15].

3.2 Bidgely

Bidgely compares a household's energy use with that of other neighbourhood dwellers and provides this information through a mobile application and a website. It also provides a product-wise and usage-wise breakdown, and its comparison with the average consumption. This information is provided to the users through regular feedbacks in the form of action-oriented messages, which prompts them to take appropriate actions to cut down on energy bills [3], [16].

Its comparative feedbacks, usage-specific breakdown, personalized communications, persuasive actionable messages, and timely reminders keep the customers engaged and motivated. Besides this, it enables the users to see where energy is being consumed at home both historically and in real time. Accordingly, it informs about appliance-specific usage cost, and alerts the users through personalized recommendations when the actions need to be changed. A Study of 300 participants for over 6 months revealed an average reduction of 6% household energy consumption over those who were not exposed [16].

3.3 Big Energy Race

Big Energy Race was a program developed and run by Global Action Plan in collaboration with four energy companies. The objective was to reduce energy bills of 4000 household by persuading them to take small actions like turning of the lights and other appliances when not in use.

A team of community leaders talked to each household and set them challenges to reduce their energy consumption. Households were provided with supporting materials and information on energy savings tasks with easy, step-wise achievable actions. Communities started working together towards a shared goal, and earned incentives in the form of points for every challenge they completed. A prize of £20k for the winning team to invest in their community was an added incentive for people to take part. Big Energy race used game elements such as competition, challenges, rewards, comparative feedback and goal-setting to engage and motivate the users. And, its informatory sessions which provided breakdown of actions into easy steps, prepared the participants for the challenge [3], [17].

On an average the Big Energy Race saved the participants up to £117 each on their bills, which is equivalent to 484,259 kilowatt hours (kWh) or 239,349kg in CO2 emissions. 90% of the participants said that they will continue with their energy-saving actions in future [17].

3.4 Operation TLC Program

Operation TLC program helped the staff teams at Barts Health NHS Trust save on the energy bills by reducing energy consumption. This was achieved by taking three TLC actions, **T** - turn off equipment when not in use; **L** - switch off lights; **C** - close doors and windows.

Hundreds of staff members participated in the program. The participants were grouped into teams which were engaged and motivated by naming the team of the month, and by providing a luxury hamper of tea for their extra efforts in managing the wards efficiently. To remind the staff of their actions, stickers such as ‘if they could let the sun shine in’ were used as prompts. A “Quiet Time” was also introduced in the routine, during which the staff dimmed the lights, and asked the patients to rest in their rooms [3], [18].

The program used techniques such as prompts (stickers and posters), competition, collaboration (within team members) and rewards. The program has shown effective results for the past two years since its implementation. With savings of £428,000 (approximately 1900 tonnes CO2) annually, Operation TLC delivered long-term cost benefit to the organization [18].

3.5 MyEnergy

MyEnergy helps its consumers make small daily differences by taking control of their personal energy use. MyEnergy collects the data by reading the utility meters through the web. Its website allows the residential users to quickly access a breakdown of their consumption of energy, water and gas. Users can receive tailored tips, and they can compare their consumption patterns to that of their friends in the neighborhood and earn rewards for saving energy. One redeemable point is awarded for every kilowatt hour of energy saved. To engage and motivate the consumers, it provides comparative feedback, break-up information, persuasive messages, tailored tips, prompts and rewards. A study commissioned by the company showed that the consumers saved as much as 14% on their energy bills [3], [19].

3.6 Sainsbury's UK's Greenest Grocer

Sainsbury's UK's Greenest Grocer campaign was designed to raise awareness amongst its store employees and to motivate them to take practical actions for reducing the supermarket's carbon footprint and energy bill. Stores were explained their weekly and monthly performance and a friendly rivalry was created through a competition between stores using league tables. A goal of 3% energy saving was targeted by each store. Monthly events were conducted to guide the staff of specific actions they can take to reduce energy use. This was also supported by visual cues and reminders in the form of posters. The most efficient store team was rewarded.

Strategies such as goal-setting, competition, prompts (posters, stickers) and rewards were used to motivate the employees. Since its implementation, the program has seen a 3.20% reduction in energy against a 3% target. This means a saving of 22m kWh of energy, or 9,000 tonnes of CO2, or a saving of over £2m, or enough energy to power over 4700 homes for a year [3], [20].

4 Result

The analysis resulted in a comprehensive understanding of the mechanics of the staged social networks, and how they encourage a change in behaviour through social engagement. The dissection of the entire phenomenon into smaller activities, and the linking of these activities with the relevant BCT and theories helped in understanding the role of each activity in the process of change. The categorization of these activities on the basis of their role resulted in the formulation of a model comprising of five key phases (Fig. 1). These phases are: 1) association, 2) preparation, 3) engagement, 4) experimentation, and 4) incubation. These five phases provide a general overview of the process of change that takes place through these staged social engagements. They also represent the stages through which a participant undergoes during the process of change. Each phase comprises of a large number of activities. The tables 1,2,3,4 and 5 show the BCT used in each phase and the supporting theories and models.

Although each case followed a unique approach to make the participants interact, share, observe, learn, collaborate, compete and restructure their practices, they still had certain common touch points in terms of their objective, the BCT used, and the outlining theoretical constructs. It was also observed across the cases that most of the activities were designed to target multiple levels of motivations to encourage a change in behavior. These motivations include - desire for personal gain (money, time, reward, resources), desire for approval by peers (conformity with social norms, expectations), desire for self-approval (conformity with personal values, commitment and self-image), and the concern for societal values (altruism, environmental concern) [21].

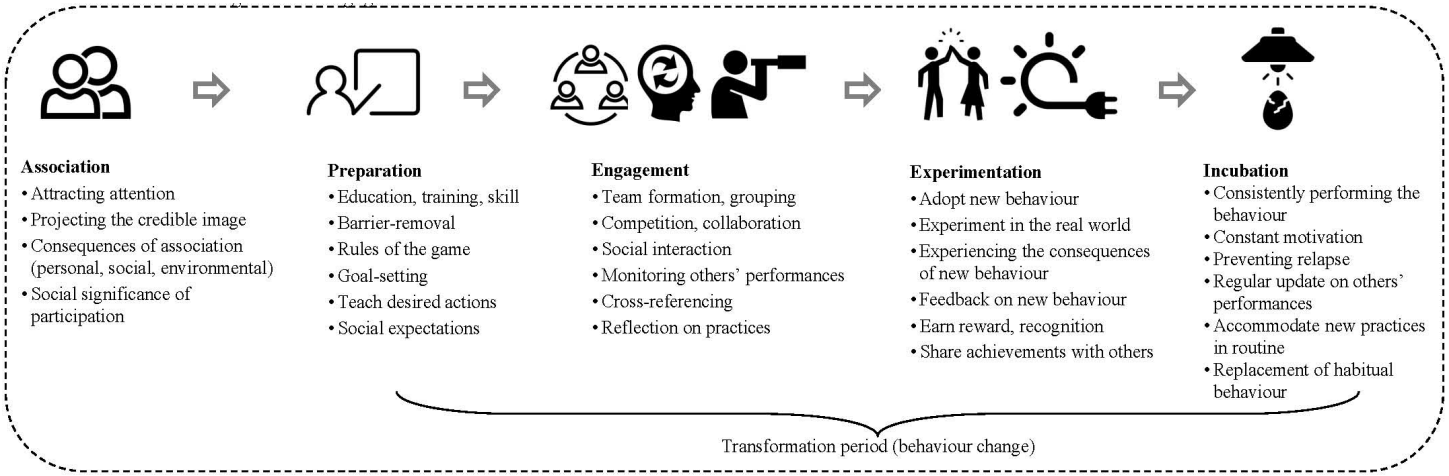

Fig. 1. Model representing five key phases in the process of behaviour change through staged social engagements

4.1 Association

The Association phase (table 1) refers to the first phase wherein the activities primarily focus on attracting the attention of the individuals to encourage them to associate and engage with the network. This phase involve promotional activities such as advertisements through social media and even direct communication with the individuals. During this communication, people are informed about the benefits of associating with the network (including the personal, social and environmental benefits). Social proof is one of the most commonly used strategies focusing on portraying that a large number of people have already participated and are being benefited. During this stage, the system also tries to portray its image to the users by communicating the credibility of the system they are associating with, and the social and symbolic significance of participation. From the perspective of the user, this stage is important because he gets to know about the benefits of associating with the network. Accordingly, he decides whether he should associate with the network or not.

Table 1. Association phase: Behaviour change techniques (BCT) and supporting theories

	Association
Behaviour Change Techniques (BCT)	Provide information about the system, its image and credibility; information on likely consequences of association and benefits of performing the behaviour (personal, social and environmental); information on the process of engagement (interactive, fun, entertaining); information about the social and symbolic significance of participation, and how the participant may feel ones associated; information on social proof (that others have already associated, improved, contributed, and had also been benefitted).
Theories and Model	Information-Motivation-Behavioural Theory; Theory of Planned Behaviour; Theory of Reasoned Action; Rational Choice Theory; Stages of Change; Social marketing; Social proof; Self-Determination Theory; Diffusion of Innovation Theory; Framing Theory; Self-Verification Theory

4.2 Preparation

Once an individual (or a social group) associates with the network, he undergoes through the Preparation Phase (table 2). This is an important stage because it trains and prepares the participants to effectively engage, learn the desired actions, understand the tools and technology, develop essential competence, understand the rules of the game, and infer the meaning of the cues during the process. Besides this, it also hints at the anticipated personal gains (points, savings, rewards), social benefits (social image, status), and other positive consequences of the new actions that will be performed. Participants are also informed of the environmental consequences of their actions and their social and environmental responsibility. Although the mode and techniques used for preparation differed from case to case, but the objectives were same i.e. to educate, motivate and prepare the users for active participation.

Table 2. Preparation phase: Behaviour change techniques (BCT) and supporting theories

	Preparation
Behaviour Change Techniques (BCT)	Skill and competence development (training and education); barrier removal; instructions about the rules; teach to use prompts (reminders, cues, feedback, when to perform etc.); setting graded tasks; prompt specific goal-setting; information on making the desired behaviour easy to perform (self-efficacy); demonstrate the behaviour; information on when and where to perform the behaviour; information on - likely consequences of performing the behaviour (personal, social and environmental); provide information about rewards; provide information about others' approval; prompt intention formation; communicate expected social norms; provide general encouragement; action planning (step-by-step instructions on achieving the goals).
Theories and Model	Information-Motivation-Behavioural Theory; Self-Efficacy; Theory of Planned Behaviour; Theory of Reasoned Action; Rational Choice Theory; Control Theory; Stages of Change; Social Marketing; Social Proof; Elaboration Likelihood Model; Self-Determination Theory; Framing Theory; Social Norms; Nudge Theory

4.3 Engagement

The activities such as group or team formation, monitoring of others' behaviour, sharing of practices, cross-referencing, social comparison, competition, collaboration, goal-setting, learning from others, and reflection on one's own behaviour play a key role in pursuing the user to perform the desired actions. All these activities are grouped under the Engagement Phase (table 3). The objective of these activities is to motivate the participants to adopt certain practices as a part of the engagement process. While the participants are engaged, they can monitor the actions performed by others, which helps them in comparing, cross-referencing and reflecting on their own actions. This motivates them to make a positive change in their practices in order to compete with others. It was observed that technology plays a key role in this process. It provides an indispensable platform for sharing, interacting, monitoring and cross-referencing of practices even if the participants are geographically far apart.

Table 3. Engagement phase: Behaviour change techniques (BCT) and supporting theories

	Engagement
Behaviour Change Techniques (BCT)	Provide normative information about others' behaviour; provide opportunities for social comparison and monitoring of others' actions; facilitate social interaction (sharing practices, learning from others); grouping and team formation; encouraging competition; prompt intention formation; provide specific goal setting; action planning; stimulate anticipation of future rewards; provide information on when and where to perform the behaviour; provide specific action-oriented messages (ex: appliance-specific breakdown and action).
Theories and Model	Drive Theory; Goal Setting Theory; Goal Commitment; Social Comparison Theory; Social Cognitive Theory; Social Learning Theory; Social Identity Theory; Social Proof; Social Norms; Situated Learning Theory; Nudge Theory; Self-verification Theory; Observational Learning (social learning); Control Theory.

4.4 Experimentation

Once the participant is actively engaged in the social network, he is motivated to perform the new behaviour in the real-world. Since it is the first time he is trying out the new behaviour, this phase is termed as Experimentation phase (table 4). During this phase he experiments with the new behaviour in the real context, receives feedback on the new actions, monitors the consequences of actions (personal, social and environmental), compares his performance with the social group, learns where he needs to improve, and sets new performance target to gain more benefits. This phase is important from the participant's perspective because, it is the first time he adopts the new behaviour and experiences its consequences. Based upon this experience and the feedback on his performance, he decides whether to perform the behaviour again or not. Therefore, constructive, action-oriented, and practical feedbacks are usually provided to motivate the participants to perform consistently. For instance, JouleBug immediately provides the consequence of the actions in terms of points, and also makes the actions visible to others.

Table 4. Experimentation phase: Behaviour change techniques (BCT) and supporting theories

	Experimentation
Behaviour Change Techniques (BCT)	Remind when and where to perform the behaviour; use of follow up prompts; provide immediate rewards (or praise) for attempting the behaviour; provide immediate feedback; provide immediate consequences of new behaviour (personal, social and environmental); provide immediate positive constructive feedback; provide social comparison, provide specific feedback for improvement; provide action-oriented persuasive messages; share new behaviour and consequences with social group (social media, friends); stimulate anticipation of more rewards in future with consistent performance; prompt review of behavioural goals; goal setting (new goals); prompt self-monitoring of behavioural outcome.
Theories and Model	Goal Setting Theory; Elaboration Likelihood Model; Stages of Change; Social Cognitive Theory; Social Learning Theory; Social Comparison Theory; Social Identity Theory; Social Proof; Social Norms; Situated Learning Theory; Nudge Theory; Cognitive Behavioural Therapy; Drive Theory; Cognitive Dissonance; Self-Verification Theory; Observational Learning; Self Enhancement Theory; Operant Conditioning; Control Theory;

4.5 Incubation

Once the participant has performed the new behaviour and has experienced its consequences, the next step is to incubate this new behaviour by encouraging him to perform consistently so that it becomes a part of the routine and replaces the old habitual behaviour. All activities falling under this zone have been grouped under the Incubation phase (table 5). The purpose of the Incubation phase is to prevent the relapse by encouraging the user to stay engaged with the system and perform the new action consistently. During this period the participants receive persuasive action-oriented messages, reminders informing when to perform, new goals and challenges, information on more rewards, and regular update on the performance of others.

Table 5. Incubation phase: Behaviour change techniques (BCT) and supporting theories

	Incubation
Behaviour Change Techniques (BCT)	Prevent relapse (coping planning); prompt practice (consistency in performance); prompt self-monitoring of behaviour; provide regular information on when and where to perform the behaviour; provide information on others' actions; reward consistent performances; reward successful behaviour; prompting focus on past success; facilitate social comparison; stimulate anticipation of more rewards in future with consistent performance; encourage setting new targets; share performance in social group; prompt review of behavioural goals, prompting identification as a role model; prompt focus on past success
Theories and Model	Goal Setting Theory; Stages of Change; Social Cognitive Theory; Social Comparison Theory; Social Identity Theory; Social Proof; Social Norms; Situated Learning Theory; Nudge Theory; Cognitive Behavioural Therapy; Drive Theory; Cognitive Dissonance; Self-Verification Theory; Self-Enhancement Theory; Operant Conditioning; Control Theory.

5 Conclusion

The study provides an exhaustive understanding of the mechanics behind the staged social networks, and how they encourage adoption of sustainable behaviour through social engagements. The model provides an overview of the entire phenomenon in the form of five key phases through which a participant undergoes in the process of behaviour change. The BCT and the underlying theoretical foundation establish the objectives of the activities involved in each phase. The model can be useful in understanding and devising such social engagements for encouraging a positive change in behaviour for environmental benefit.

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