

CeADAR – Centre for Applied Data Analytics Research
Enterprise Ireland Data Analytics Technology Centre

Intelligent Analytic Interfaces: Changing User Behaviours - Technical Specification

Document Type:	Technical Spec
Project Title:	CeADAR
DDN Theme:	1 – Intelligent Analytic Interfaces
Theme Leader:	Brian Mac Namee (DIT)
DDN Sub-Theme:	1.2 – Changing User Behaviours
Authors:	Eoghan O’Shea, Ingo Keck, Sarah Jane Delany and Brian Mac Namee
Document Version:	1.0
Date of Delivery to ISG:	29th May 2013
Number of pages:	4

ABSTRACT

SmartEnergy is a system that generates personalised communications for users in scenarios in which energy usage is monitored. This document will provide a high-level technical specification of this system.

Copyright © the authors. Confidential – not to be circulated without permission.

CeADAR is a research partnership comprising University College Dublin, University College Cork, and Dublin Institute of Technology.

<http://www.ceadar.ie>

Contents

1	Description of Industry Needs	3
2	System(s) Involved	3
3	Approach	3

1 Description of Industry Needs

There is a wide-spread feeling in industry that insights generated by data analytics systems are often ignored by users and so the full return on investment of analytics systems is not recovered. For example, at a small scale, a home owner might install an analytics-driven home heating system that can monitor energy usage and recommend how heating can be used most efficiently, but then ignore the recommendations made by the system. Data analytics can be used to address this situation. Analytics techniques can be used to develop personalised communication strategies that communicate analytics-driven insight in a way that is most likely to lead to the users that receive these communications changing their behaviours.

SmartEnergy is a system that generates personalised communications for users in scenarios in which energy usage is monitored. This document will provide a high-level technical specification of this system.

2 System(s) Involved

The SmartEnergy system relies on access to user monitoring data and communications channels through which users can be contacted. The current version of SmartEnergy is a collaboration with Cylon and Climote, both of whom have offerings in the energy space. The data and communications channels associated with these offerings, however, are quite different. The Cylon data that SmartEnergy accesses is in the form of quarter-hourly totals of the energy used in a particular building. The Climote data, on the other hand, is in the form of interaction messages exchanged between a user and their Climote hub device. For Cylon, communication to building users is primarily through the use of large fixed displays or mass emailings. Climote users can be communicated with directly through SMS, email or in-app messaging. SmartEnergy is being developed in a modular way that allows these different data sources and communication channels to be exploited effectively.

Ultimately evaluating SmartEnergy will require a live deployment. Currently, however, bulk historical test data is being used to develop the system. Once SmartEnergy has been evaluated using this data, test deployments will be undertaken which will require some integration with Cylon and Climote systems (although approaches will be taken that minimise the integration required).

3 Approach

SmartEnergy generates personalised communications for users of energy monitoring systems (in this case Cylon and Climote) so as to drive changes in user behaviour. At present the system is focused on optimising energy usage, although the same approaches could be used to encourage change in any other kind of behaviour. The most interesting aspect of the SmartEnergy system is that it closes the behaviour change cycle shown in Figure 1 - i.e. personalised communications are delivered to users to encourage particular change, the results of these communications are monitored and future communications are designed based on what this monitoring has shown to work in the past.

Figure 2 shows an overview of the SmartEnergy system, that addresses the cycle in Figure 1. User monitoring data comes directly from our partners, Cylon and Climote. This data is captured and aggregated to give a one-row-per-building/user view of user behaviour. The Recommendation Engine is the key component to harnessing this data and using it to drive changes in user behaviour. The recommendation engine uses usage profile data, external data sources, past communication histories, and user responses to communications to compose personalised communications.

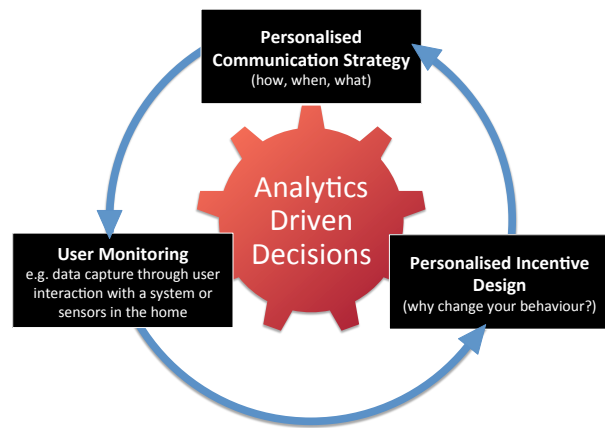


Figure 1: The virtuous cycle of changing user behaviours using data analytics.

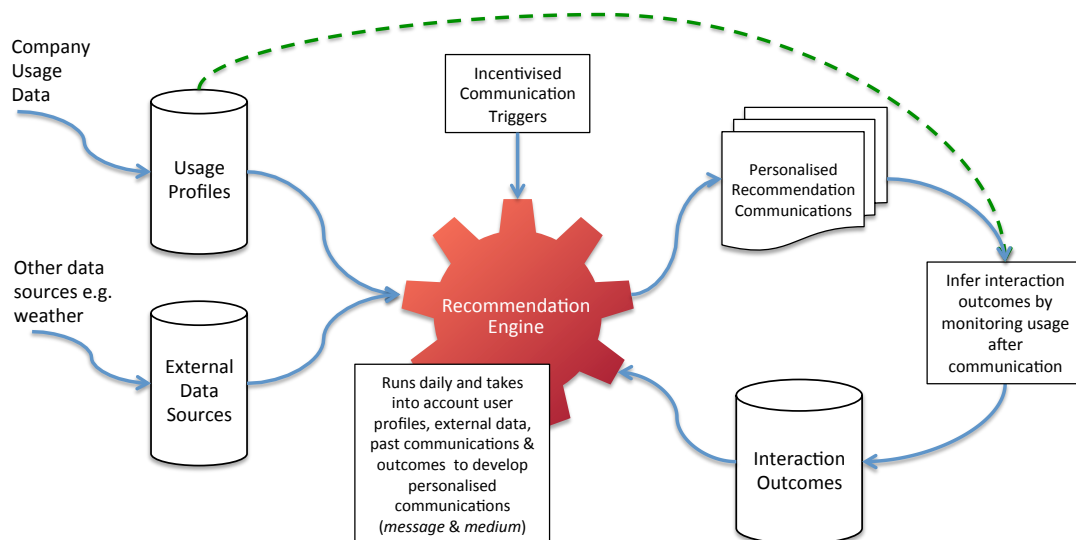


Figure 2: The key components of the SmartEnergy system.

The recommendation is triggered by incentive rules that determine that a message should be sent to a user. The recommendation engine then personalises these messages in terms of the *medium* (e.g. text message, email, large scale displays, maps showing different building usage, etc), the *message* (e.g. just the recommended usage change, the recommended usage change and justification for it, etc), *frequency* (how often recommendations are made to customers) and *variety* (should the messages change from one communication to the next even if the recommendations are the same). The incentives triggers and recommendation engine are run regularly (for example daily) to determine which customers should be communicated with and what form these communications should take. To bootstrap the recommendation engine hand-written rules have been designed to make the required decisions for different cohorts of users identified based on clustering the usage profiles. Once the system is running, however, the recommendation engine uses predictive analytics and case-based reasoning techniques to learn the kinds of communications that are most effective for different user cohorts and tailors communications based on these strategies.