

# USING INTEGRATED IT SYSTEMS TO MONITOR DECAY IN WEBSITE PERFORMANCE FOLLOWING INDIVIDUAL IMPROVEMENTS

S Ramlall\*, D A Sanders\*\*, G E Tewkesbury\*\*, H Powell\* and D Ndzi \*\*

\* Motiontouch Ltd, Dunsfold Park, Cranleigh, Surrey GU6 8TB UK.

\*\*Systems Engineering Research Group, University of Portsmouth, Portsmouth, PO1 3DJ UK.

Email: [shalini@motiontouch.com](mailto:shalini@motiontouch.com)

## Abstract

*This paper describes some possible effects observed during the monitoring of commercial websites. The monitoring was to understand some user behaviour and to identify design elements that may have significant impact on that user behaviour. Commercial websites aim to generate sales by selling products and services online or by promoting their products and services online and turning enquiries into later offline sales. The research used data collected to observe and determine how a user might behave in a WWW Site. In order to track customer behaviour online, a custom online tracking system was created to monitor how users behave while browsing a website. Google Analytics was also used to collect behavioural data and other statistics. The rest of the sales cycle was tracked through a Customer Relationship Management (CRM) system, which was customised by implementing extra modules in order to record information at various stages of the sales cycle. The online tracking system was not fully integrated with the CRM system but it was still possible to build customer profiles across the two systems manually.*

**Keywords:** web, user behaviour, WWW, Internet.

## Introduction

The aim of the research was to investigate the use and design of commercial websites with a view to predicting behaviour and identifying web design elements that are key to the success of online business models that rely on Pay Per Click advertising campaigns to attract customers.

Customer profiles were created that covered the various stages of an online business model which relied mainly on PPC to attract customers – starting from the initial visit of the customer to a website to the delivery of the customer's order. In order to do this, different IT systems have been integrated together and customised to collect data to generate customer profiles for the sales cycle. Most of the integration work focused on data and this was accomplished through the introduction of Microsoft CRM (MSCRM), which was used as a central data repository. In order to achieve this, the MSCRM system was extended through the development of a number of custom .NET modules.

A user tracking system was developed for the website. The system recorded detailed browsing history of users as well as information regarding where users came from, for example which search engine or which PPC campaign and search keywords was used. This data provided a customer profile for the initial stage of the business model.

Some website design elements were identified that appeared to increase Website performance and subsequently a business. By experimenting with the design and navigation of a website and then analysing customer profiles, the impact of the changes on a business could begin to be understood. Interestingly, these results appear to be dynamic and sometimes disappear relatively quickly.

Metrics are being identified to measure the impact of changes to web design on various stages of an online business model. So far some of the measures identified include:

- Performance of the site (measured by conversion).
- Quality and number of enquiries.
- Profit per enquiry.
- Number of opportunities turned into orders.
- Type of customers who enquire.
- Potential of an enquiry to generate repeat business.

## Research

The research has been conducted in two stages.

- The first stage consisted of implementing and integrating IT systems. This was vital for creating complete customer profiles that spanned the various stages of the business model. These systems are now collecting data that will be analysed to test hypotheses in the later stages of the research.
- The second stage of the research is focusing on building a dynamic website which can collect data about user behaviour on websites. Layout and navigation are also being experimented with to achieve high conversion rates.

Through integration of websites with systems introduced in Stage One, it will be possible to build user profiles that span the business process. Implementation of stage One and stage Two will provide the ability to collect data and measure performance at various points in a business model and potentially deliver increased information flow, increased productivity and better decision making.

In the first year, the research integrated a MSCRM system with other applications to create new electronic systems. The features of the MSCRM system were extended by building custom modules using .NET. The MSCRM system became the central repository for most of the data collected. The systems were designed to integrate with websites to allow for the automatic handling of enquiries from web sites as well as recording browsing data for users in order to build accurate customer profiles.

The MSCRM system enabled the implementation of business logic through automated processes. Most of the initial research focused on: data migration, data integration, and ways to use .NET to extend existing functionalities and how to build integrated systems. Ways of measuring the benefits of the new system are being investigated and will be measured on the target system implemented at the collaborating company against the “automatic” winning of more business, improvement in sales processes and the faster and more efficient servicing of customers.

Some of the deliverables so far have been:

- A new integrated MSCRM system customised to meet business requirements and deliver benefits in terms of sales management, productivity, information flow and reporting on key performance indicators
- Automated business and engineering processes.
- New custom MSCRM modules that improve project management, quality control management and measure customer satisfaction.
- Ability to generate and view critical engineering and business data and statistics in real time through dashboards and custom reports.

The research is now focusing on the development and integration of websites with the MSCRM system. Websites at the collaborating company were static at the beginning of the research. Little was known about customer behaviour on websites or sources of traffic, etc. At the time the use of web analytics was just starting to become the norm for any good online strategy. The launch of Google Analytics made the use of analytics more widespread. Small companies which had previously not been able to afford expensive web analytics packages such as WebTrend now had access to the same technology as bigger companies. Web analytics allowed websites to be designed to meet the specific needs of customers.

The back end of a website at the collaborating company was changed in order to make the website dynamic. As part of this a custom tracking module was created to track users and build a history of their activity on the website. Ways of integrating the website with the MSCRM systems are now being investigated. This will allow emails from the website to be automatically converted into lead records and assigned to a sales person. Also user activity will be recorded in the MSCRM system to provide a complete profile of each customer.

As well as changing the back end of the website, the look, layout and content of the website were also updated. This required an understanding of who the site visitors are and what they are looking for. The data collected by the back end answered these questions, in order to work out where redesign was required and what the best design would be. The data collected by the tracking module has so far been successfully used to identify browsing patterns and build customer profiles. This has helped identify customer segments, which have been targeted via segment specific online marketing campaigns and web pages. So far, results have shown an increase in conversion rate on the website.

Some of the deliverables from this work have been:

- New dynamic website which can track user activity and customise website content based on the user’s browsing history and search keyword.

- New improved layout, look, navigation and content for the website.
- Improved conversion rate on the website due to changes made to landing pages based on data analysis carried out using the customer profile built using data from the online tracking module and MSCRM.

The work carried out so far with the integration of MSCRM and the development of the website has enabled the collection of a large amount of data that can now be used to build customer profiles which can be used to make informed decisions regarding the management of a number of business processes and to drive marketing efforts by:

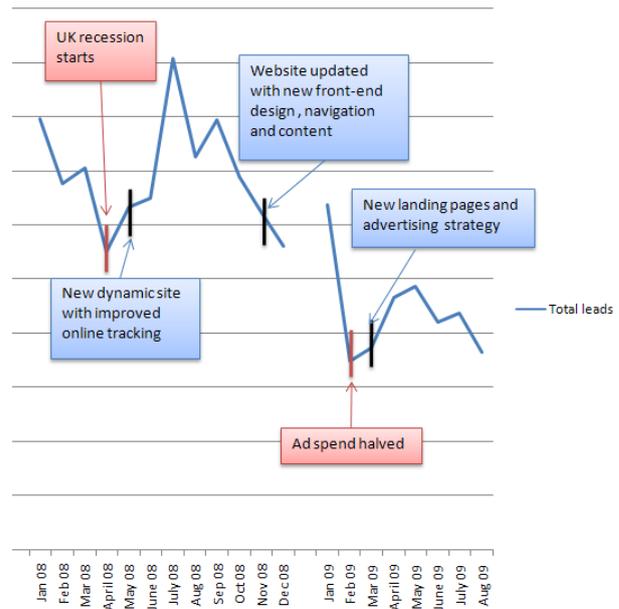
- Better targeting advertising by identifying market segments and niches
- Identifying and understanding the requirement and expectations of web site users. This knowledge can be used to improve the website and increase conversion rates
- Measure business performance at different stages in business processes.

The research is now investigating ways to use customer profiles to drive marketing initiatives. This is still in its early stages. The goal of commercial websites is to generate sales by selling products and services online or by promoting their products and services online and then turning enquiries into later offline sales. The design of a site and its navigation can have a significant impact on the site’s usability, which can in turn affect the users’ experience with the site.

The research is identifying design elements that may have an impact on user behaviour.

The literature review for this part of the work has identified key design elements as well as human factors, which are affected by these design elements. A new basic model has been developed and data is being collected through a series of online experiments. These experiments have investigated (and are investigating) how users react to changes made to specific design elements on web pages. The experiments are being carried out on dummy web sites and on company websites at the collaborating company. Some preliminary analysis has already shown that small changes to a page’s design can have a big impact on lead generation and cost per lead but it has been suggested by David Sanders (Editor of JCISE) that these improvements may tend to decay over time.

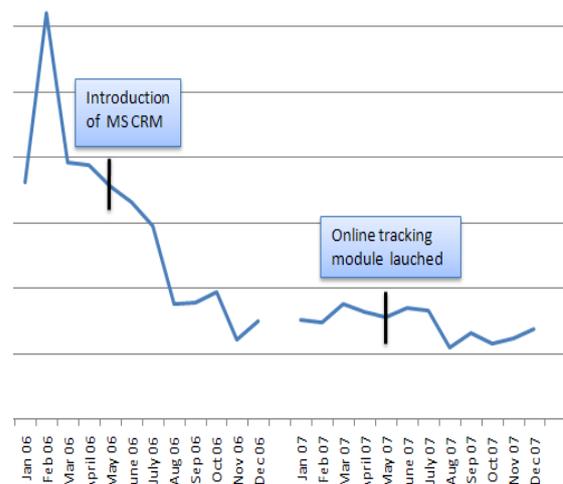
The figures show how the number of leads and the cost of leads have varied from month to month at the collaborating company as various changes have been made. The figures also show some of the significant external factors that are thought to have affected lead generation.



**Figure 1 – Improvement and decay in average leads after introducing a new WWW Site in May 08.**

Figure 1 shows the average leads over time. An improvement can clearly be seen after introduction of a new and dynamic WWW Site in May 2008. That effect can then be seen decaying over time. There is then a relatively large drop in the number of leads in February 2009 because advertising spend was halved. Despite that, the number of leads produced was still relatively high.

Another example of an effect decaying over time can be seen in figure 2. Figure 2 shows the average cost per lead between 2006 and 2007.



**Figure 2 – Improvement and decay in average cost per lead after introducing MS CRM in April 2006.**

The average cost per lead can be seen reducing in mid 2006 after the introduction of MS CRM but although

that effect is also significant at first, the effect levels off over time (possible as a decaying exponential).

From 2005 to 2006 there had been a significant increase in cost per lead that suggested online advertising and website performance were poor. The cost per lead has been steadily going down since April 2006. There was a significant drop in cost between July 2007 and August 2007. This was due to changes made to the advertising campaigns and landing pages based on data analysis carried out using data gathered by the online tracking system that was implemented on the main website. By combining the data captured by the online tracking system with the data in MSCRM it was possible to identify, for the first time, the type of leads that each of the online advertising campaigns were generating.

In May 2008, the back end of the main website was updated to capture more behavioural data. Some elements of the website were also changed from static to dynamic, for example navigation was made dynamic and displayed different links depending on the advertising campaign that users had come from. By the end of June 2008, enough data had been captured by the new system to carry out analysis. As a result of the analysis, the landing page of one of the main advertising campaigns was replaced by a different landing page. The campaign ran two adverts with different messages but the same landing page. Using the new dynamic features now available on the site, the title of the landing page was set to change on the fly to match the exact title of the advert that the user had clicked on. The idea was to increase relevancy between the advert and the landing page to promote conversion. The new landing page combined with the dynamic title, brought a significant increase in performance, which contributed to an increase in number of leads in July 2008 and a lowering of the cost per lead from July 2008 onwards.

In November 2008, the main website was redesigned to have a new look, updated navigation and updated content. The layout of the site stayed the same, as did most of the content. The look of the site however was changed to give the site a more modern look. The new site was launched at the end of November 2008, but changes were made over the next two months to refine the website in order to bring the advertising and website performance back to what it was before the launch of the site.

In February 2009, due to the economic downturn, the advertising budget was halved and the advertising campaigns were targeted to the UK only. In order to generate a high number of leads with half the budget, it was crucial to increase the performance of all landing pages. As the data in the MS CRM system and the online tracking module was getting richer, the customer profiles were also expanding. As a result of this better

understanding of customers, segmentation was now an option. It was decided that there were two ways of achieving segmentation on a landing page:

1. Have a number (it was decided that 4 might be the optimum number) of options (in graphical form) for users to choose from.
2. Have a short questionnaire and allow user to effectively choose the services that they required.

In March 2009 both landing pages were tested on different campaigns. They both performed better than the "non-segmented" landing pages achieving higher conversion rates than the latter. This also contributed in lowering the cost of leads between March 2009 and August 2009.

## Conclusion

All of the changes made to the website so far have relied heavily on data analysis. The data for this comes from the MS CRM system and the online tracking system. By combining data from the two systems, it has been possible to build customer profiles which play a crucial role in understanding the users who visit the website. This in turn allowed better targeting of online advertising and also better landing page design.

Initial data analysis has indicated improved customer generation both from a quantitative point of view and a cost point of view. It appears that this improved customer generation may be the result of improved website performance and integrated IT systems.

An interesting result has been that improvements made to WWW Sites appear to decay over time.