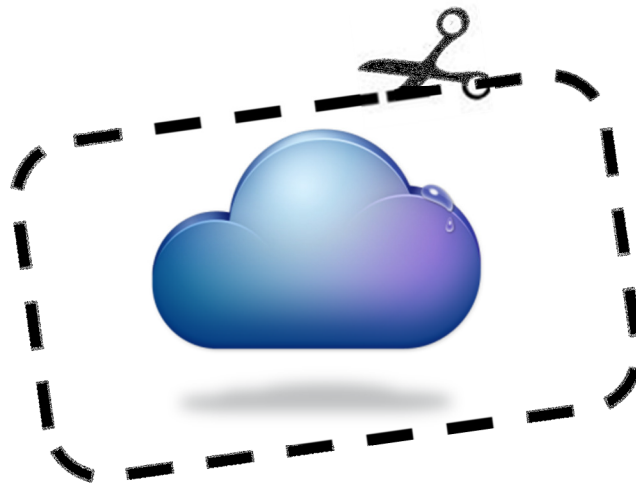


**WHITEPAPER**

# **HOW BIG DATA TECHNOLOGY WILL TRANSFORM RETAIL MARKETING**



# How Big Data will transform retail marketing

## Introduction

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Retail marketers have long tried to approximate the idea of 1-to-1 marketing, in which each client is provided with an individualized consumer experience that caters to her needs. Ideally, marketers want to deliver the most relevant content to the right customer, at the right time.



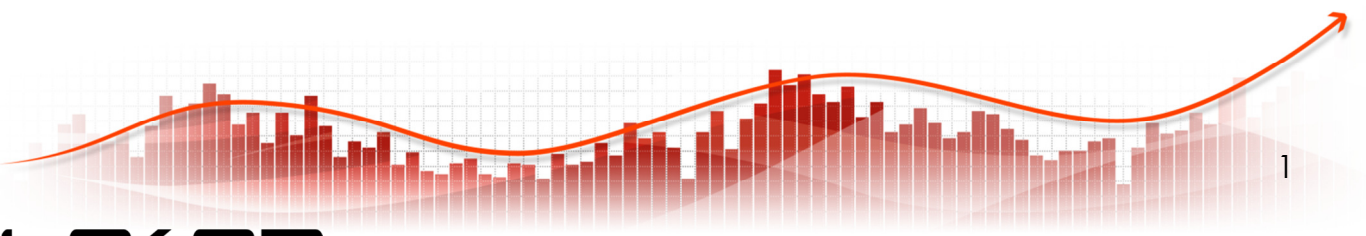
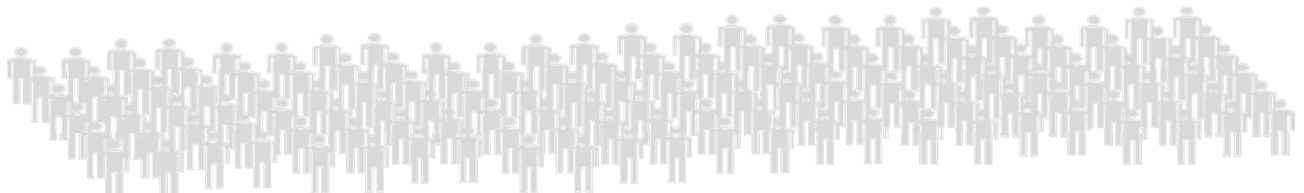
Digital technologies have greatly increased the number of 1-to-1 client communication channels available to retailers. Physical mailings can be customized at print, check-out coupons are issued in real time at the point of sale, and websites, online shopping portals as well as retail smartphone apps create new touch points with customers.

While these channels allow retailers to provide their clients with truly individualized communication, the challenge of identifying the 'right' communication for individual clients remains.

## Retail marketing is constrained by customer segmentation

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Consumer goods companies and retailers alike use market and customer segmentation to determine consumer needs, product preferences and usage occasions in order to design and target marketing campaigns. This task remains challenging because retailers serve a very wide range of customer groups across a huge product portfolio. A rather dynamic market with often pronounced local differences adds to the complexity.



Customer segmentation suddenly becomes rather daunting, and its limits painfully obvious. Strategy consultants McKinsey<sup>1</sup> suggests that segmentation efforts will only be practicable and sustainable if the number of segments is below 10. Their research shows that more complex segmentation efforts are prone to failure after the initial initiative has passed and the daily grind sets in.

Marketers struggle to bridge the gap between the needs of several million customers and a single digit number of customer segments. The most advanced retailers currently use complex sets of rules to approximate customer needs in a more sophisticated way. For example, one of the largest food retailers in the world quotes over 1000 rules that are applied to customer data in order to determine the 'right' client communication. While this sounds impressive, it represents a combination of complex technology and a large amount of analysts that often proves to be costly, if not unsustainable in practical application.

## 1. Targeting: Big Data technologies replace customer segmentation with individual client analysis

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Big Data technology will bring marketers a big step closer to the ideal of true 1-to-1 communication, where instead of fitting customers into an existing campaign, the marketing effort is developed around the individual client and his/her needs.

The core idea is intuitive. By comparing a customer's basket and purchase history (if available through loyalty card data) to the baskets and purchase histories of millions of other customers, 'similar' customer profiles can be identified and used to 'learn' which other products and services might appeal to the target customer.



The basis for this analysis is point-of-sale data, i.e. the receipt or basket data produced by each client at the check-out terminal. Add to that the purchase

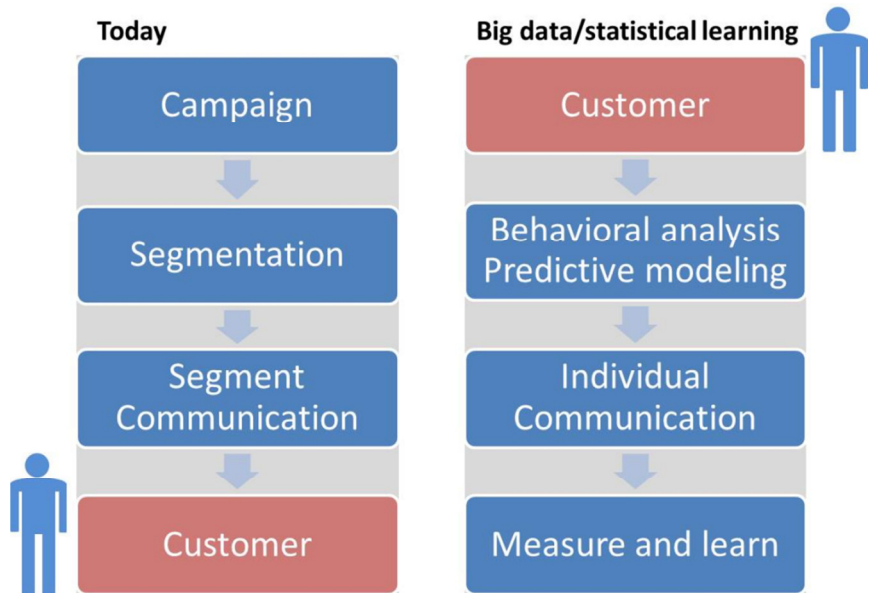
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<sup>1</sup> Jesko Perrey and Dennis Spillecke (2011): *Retail marketing and branding. A definitive guide to maximizing ROI*. First Edition, United Kingdom, John Wiley & Sons.

history recorded via loyalty cards, and an extremely complex, rich, as well as huge data set with billions of transactions is available.

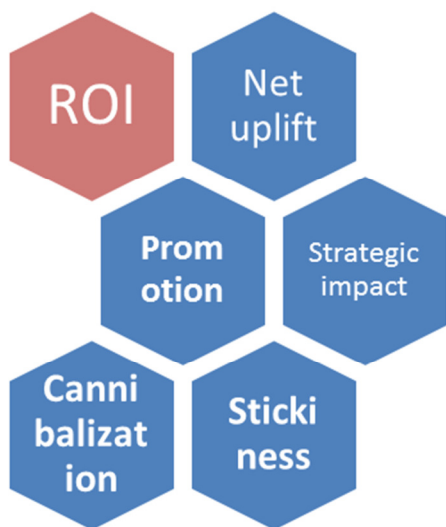
Behavioral analytics combined with modern 'Big Data' technology powered by the cloud allow us to make sense of this huge amount of information in a 'bottom-up' way that begins with the individual customer.

For many possible applications in 1-to-1 marketing, the 'near real time' capability of a



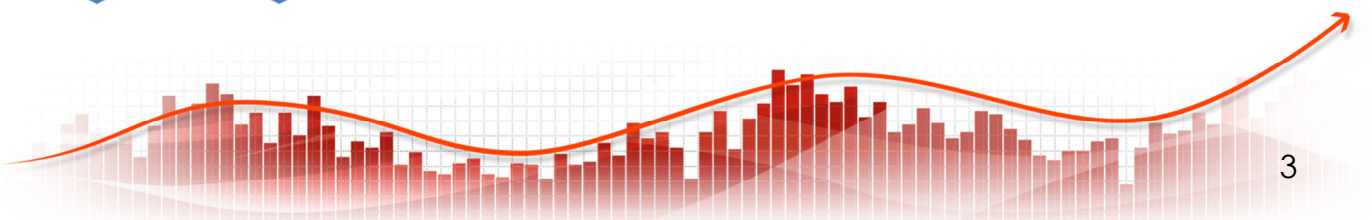
cloud-based system is required. This requirement can be met through 'smart' architecture that allows efficient storage and rapid retrieval of huge amounts of data.

**2. Measurement: Client history and basket analysis allow the measurement of conversion, cannibalization, and long term effects.**



Quantifying the ROI of a marketing initiative in retail is complex, given that a promotion or voucher often impacts the promoted product as well as the wider product portfolio. Has the customer made an unplanned purchase, or has she merely substituted a product and the promotion thus cannibalized sales?

Another important question is the long term impact of a promotion on any given customer. Has the promotion sustainably shaped the



client's behavior, or was his/her response a time-limited reaction during the promotion phase?

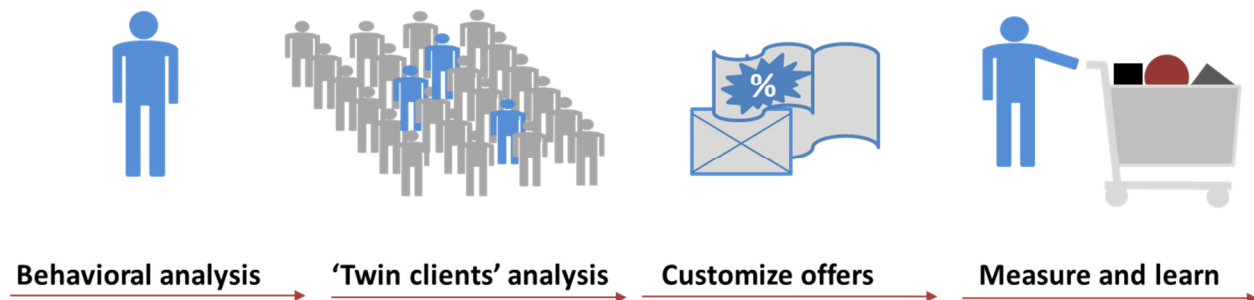
Marketers today are largely deprived of a direct feedback loop on their initiatives, even though the value in measuring the direct short and long term effects of their marketing initiatives is high. Campaign strategies can significantly improve if their ROIs can be closely measured and optimized. For example, if, as a result of analysis, marketers can target products with vouchers that have a high probability of triggering 'follow-on' purchases, ROI can be further improved.

What sounds like science fiction has become a reality with Big Data technology that provides the resources and capability to analyze a client's purchase history and basket in relation to past and ongoing promotions and vouchers. By leveraging the basket data, a bottom-up analysis across thousands of customers can be conducted that provides a direct and detailed reporting on the impact of promotions. Again, the individual client-level purchase history and basket analysis is the centerpiece of 'smart' heuristics.

### 3. Performance: A closed feedback loop creates a learning system

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Applying behavioral analysis to purchase data in order to build a recommendation engine is only half of the equation of a truly ground-breaking system. Just as marketers crave transparency on conversion and marketing ROI, recommendation engines will vastly improve if they can directly measure the quality of applied behavioral analytics, and improve through iterations. Such a technology is called machine learning.



Machine learning, which is a branch of artificial intelligence, describes the design and development of algorithms that evolve based on empirical data. A major focus of machine learning research is to automatically learn to recognize complex

patterns and make intelligent decisions based on data; the difficulty lies in the fact that the set of all possible behaviors given all possible inputs is too large to be covered by the set of observed examples. Hence the learner must generalize from the given examples so as to be able to produce useful output in new cases.

In order to apply machine learning technology to a marketing recommendation engine, clearly defined success/failure criteria (markers) that can be tracked automatically are required. In 1-to-1 marketing, many of the possible types of



communication provide such a marker: for example, vouchers, promotions, events, and other forms of action that are unmistakably linked to marketing communication can be automatically measured.

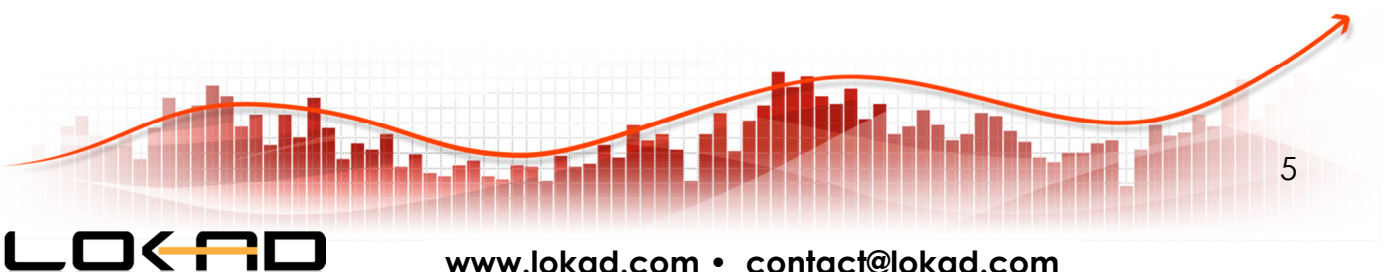
A closed feedback loop can thus be established, which will result in a learning system that improves, and adapts its performance continuously.

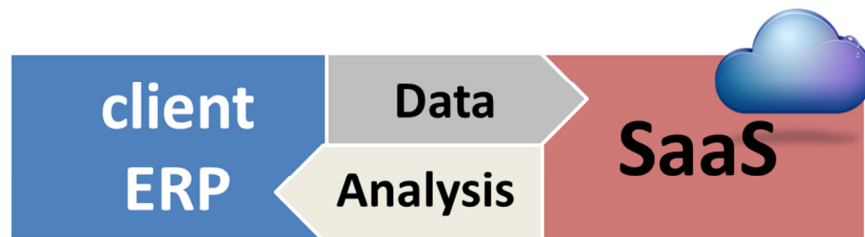
#### **4. Cost: Full automation enables a massive scalability at low cost**

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It is clear that the technology used for such an endeavor must scale to the size and complexity of large retail networks. However, what is often a large constraint is the available and capable human capacity to operate systems that require manual intervention. Today, this is even truer, as labor is a scarce and valuable resource that has a big impact on system cost and ROI. In our view, any modern analytics system, be it for inventory optimization, store optimization or marketing optimization, must therefore work fully automated.

This is not to say that human intelligence is made obsolete. On the contrary, technology should provide a massively scalable, high ROI solution in itself that takes over the 'bulk' or base load of operations. Humans should rather spend their time focusing on strategic aspects and 'orchestrate', control and strategically guide a marketing engine, focusing their time where artificial intelligence reaches its limits.





Because a large amount of computing power is needed, cloud computing is a prerequisite for implementing advanced behavioral analytic technology. Data privacy issues are high priority; the ability to fully obfuscate ('codify') data before taking it into the cloud along with modern high security technologies used in financial systems provides highly secure cloud-based services.

## 5. ROI: Instant ROI provided by 1-to-1 marketing

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Cloud-based services have fundamentally changed technology-based business models. It is now possible to conduct full scale trials without spending money on infrastructure, thus allowing for full scale testing prior to purchasing. Furthermore, the transition into production occurs with little investment beyond the 'installation' of data pipes, and services are paid from operating budgets at monthly cost.

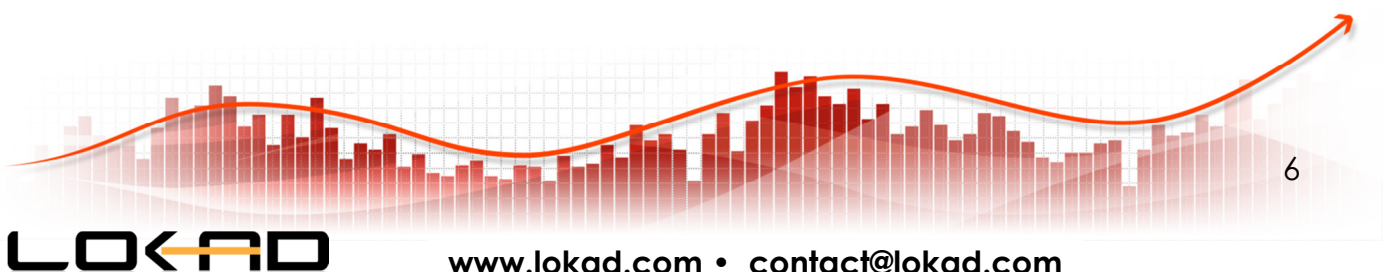
The profitability of a software as a service can thus be monitored from day 1. In our opinion, retail technology initiatives, be they in marketing, supply chain or store optimization, should be priced on the additional profit they create at a rate of approximately 1:10: For each dollar or Euro of cost, 10 dollars or Euro of profits should be generated.

## 6. Innovation: Intelligent client applications powered by Big Data technology

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Not only can Big Data technology transform existing marketing practices by making them more relevant, measurable and cost efficient, it also opens a world of opportunities for marketing innovation.

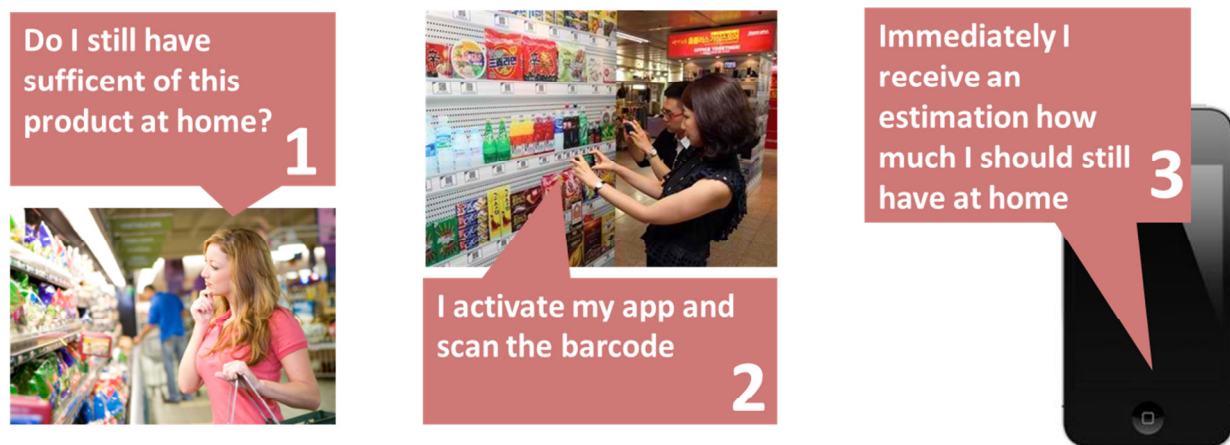
Adding 'personalized' intelligence to retail smartphone apps is only one possible opportunity. For example, customers can be provided with a personalized



'shopping assistant' that gives suggestions based on the customer's purchase history. At check-out, the application could alert the customer to products that he/she might have forgotten to buy.

Another possibility is a smartphone app that tells a customer whether a certain product should still be available at home or whether the product should be purchased. All the customer needs to do is scan the barcode of the product, and a "stock out analysis" for the customer's kitchen is returned.

Retailers will vary greatly in the ideas and options they pursue in order to provide their customers with added value. The good news is that the possibilities created by rapid and 'smart' analysis of sales data are plentiful.

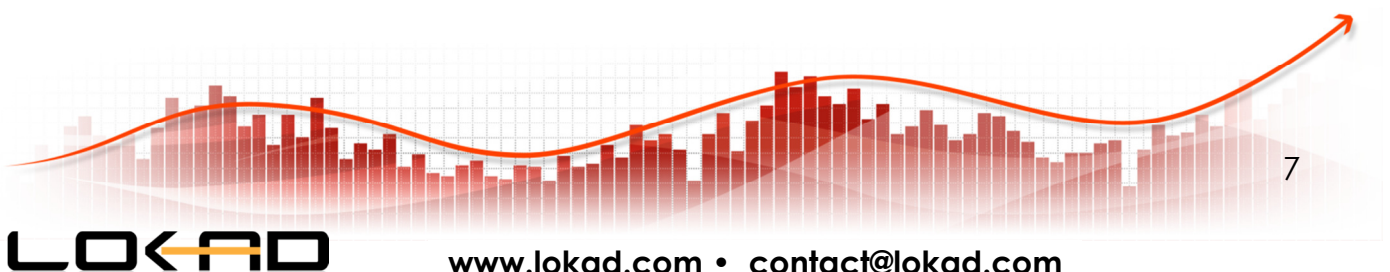


### **Infrastructure: The required infrastructure is available, cheap and capable**

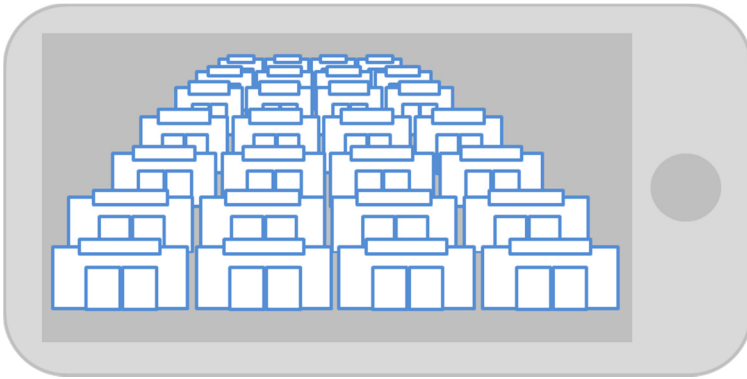
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Retail networks have been among the pioneers in dealing with the large amounts of data that is produced by their supply chain and their point of sale systems. Recognizing the richness and immense value of their data, heavy IT infrastructure investments have been made in many cases.

However, to date, the limitations and cost of the required infrastructure has made it difficult to realize ambition. This is particularly true for the richest retail data source, which also dwarfs all others in size: receipts generated by point of sale systems.







Today, storing and accessing receipt and loyalty data does not need to be difficult nor expensive. In a recent whitepaper, we have shown that all receipt data of even the largest retail networks can be processed on a smartphone.

Setting up the data infrastructure for behavioral analytics based on POS data today is therefore a matter of execution rather than financial means.

### Implementation: Examples for today's use of Big Data technology in retail marketing

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Concrete marketing-related examples where Big Data technologies can be applied rapidly to existing infrastructure include:

**Vouchers/Coupons:** 1-to-1 targeting can be added to existing loyalty programs by adding a recommendation/voucher engine that creates vouchers on an individual client basis. This voucher is then printed and included in client mailings. The main benefits include increased targeting accuracy and conversion, greater transparency of impact, and reduced cost.

**Check-out couponing:** At check-out, individualized coupons can be printed as an annex to the receipt, which are generated by a recommendation engine that leverages in real time the client's individual purchase history (loyalty card) and/or basket data. Reaching the client at a moment of high attention, increased targeting accuracy and conversion as well as greater transparency of impact are the main benefits.

**Promotion tracking:** By leveraging individual client baskets, the short and long term impact and ROI of promotions can be measured by taking into account direct impact, cannibalization, and long-term conversion.

**Online recommendation engine:** Online retail portals are proliferating, and targeted advertising and recommendations based on the individual customer's history help to increase basket size and customer satisfaction.



**Smartphone applications:** Retail smartphone apps can be made more useful and attractive to customers through added functionalities that help solve customer problems.

## Summary

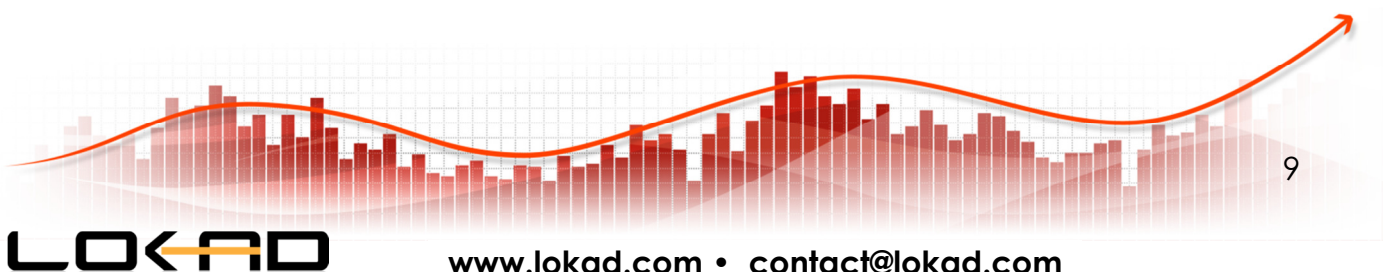
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We believe Big Data technology will play an important role in the future of retail marketing because it helps to address the single most important goal of 1-to-1 marketing: providing the most relevant communication to the individual client at the right moment in time.

The stage is set for what we believe will be fundamental improvements in the way marketing can target, assess, optimize and ultimately convert their campaigns into profits for the company.

The technologies are ready and software-as-a-service delivery models have significantly lowered the barriers to adoption by removing the need for investment and allowing for full-scale testing prior making any decisions.

The technology barriers for innovation in retail have never been lower, and we believe first movers will create competitive pressures that will transform the industry. Exciting times are ahead!



## Authors

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### Joannes Vermorel

An internationally recognized expert on cloud computing and statistical learning, Joannes Vermorel holds a Master of Science degree from the 'École Normale Supérieure de Paris' (ENS Ulm). In 2010, Joannes won the worldwide Microsoft Windows Azure Partner of the Year Award in recognition for his pioneering work in the cloud. Joannes also teaches a software engineering course at the École Normale Supérieure in Paris and is the founder of Lokad.



### Matthias Steinberg

CEO of Lokad, Matthias Steinberg was previously Vice President at Summit Partners LTD, a leading global private equity and venture capital firm. His prior experience includes Airbus Industries and The Boston Consulting Group. He holds a Master of Engineering from RWTH Aachen and an MBA from INSEAD.

## Lokad

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Lokad is a technology company that focuses on Big Data analytics software for retail networks, wholesale and eCommerce. Client solutions include inventory optimization, (loyalty) marketing optimization, and out-of-shelf monitoring. The company is the winner of the 2010 Microsoft Worldwide Partner of the Year Award and is recognized as an international leader in cloud computing technology.



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