Practitioner Article

The agony and the ecstasy of CRM in a smart grid world

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ABSTRACT Can customer relationship management (CRM) prosper in a smart grid world? Although a compelling vision for the CRM and smart grid marriage exists, substantial barriers may derail a successful union. In some utility circles, CRM is a dirty word. Privacy concerns abound. And we are not sure whether customers will actually co-create value.

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INTRODUCTION

In the novel *The Agony and the Ecstasy*, author Irving Stone traces Michelangelo's journey from teenager to renowned artist of the Italian Renaissance. Stone reminds us that creative journeys to construct great works are rarely smooth. Just as Michelangelo endured the agony of doing the work rulers and religious leaders thought best for him (rather than working with marble, which was his true passion), so will those who endeavor to bring customer relationship management (CRM) to the smart grid world.

Merlin Stone (no relation) outlined a vision of CRM for the smart grid that is comparable to a Michelangelo sculpture.¹ Stone envisions a utility landscape of smart customers, who have become smart through more transparent, real-time information,

robust analytics, segmented services, targeted messages and advanced self-service capabilities. To encourage this vision, Stone also outlines an implementation roadmap to move utilities toward this vision.

This article further encourages Stone's vision for utility CRM while exploring the realities and potential agony the industry will have to endure to make his vision a reality. Our research has identified several real barriers to CRM systems for the smart grid, such as regulatory bias, issues surrounding consumer confidence and the ability of customers to co-create value. Our work with US utilities on the customer experience side of the smart grid offers a unique perspective. This work includes planning strategy for award-winning smart meter deployments and architecting randomized controlled pilots that evaluate

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the efficacy of dynamic pricing, energy usage information, customer education and related services. In addition, we have investigated consumer confidence attitudes toward the smart grid and developed customer service strategy for the smart grid, including determining how to embrace a more robust and mature CRM system.

IS CRM A DIRTY WORD?

Before speaking at a recent utility industry conference, we were strongly advised by the organizers of the conference not to say the 'CRM' word during the talk. For this audience of utility executives who had been beaten down by regulators in the past, CRM was a non-starter in any regulatory filing. When some regulators hear CRM, it means that the utility wants to collect data about its customers like the folks at LL Bean do. The logical extension they think is that utilities will market services that potentially threaten low-income customers, or worse sell the data to aggregators who will then resell those data to the direct response marketing machine. We were told that utility executives have become conditioned that CRM equals no recovery of costs! Thus, CRM was verboten.

That is where the regulated utility industry is in the United States today, afraid to say CRM while maintaining a hodgepodge of antiquated customer information systems (CISs) that have been strangled by the lack of recoverable funding, to the point of some not even being able to capture a customer's e-mail address. Furthermore, many CISs have several more years to go before they are fully depreciated and can be proposed as candidates for replacement. For the most part, the regulatory environment for CRM systems does not appear to be fertile yet, but enhanced CIS systems might just fly.

In certain states, namely Texas and Pennsylvania, unregulated retail electric suppliers (RESs) use CRM systems and they are flourishing. CRM systems form

the heart of an RES's competitive advantage. They enable RESs to target and market to new customers, as well as offer an array of customer experience and information services that aim to limit price-driven customer switching when it is time for customers to renew their contracts. One RES that operates in several states is so confident in the power of its homegrown CRM system that it is quietly offering municipal and co-op utilities CRM and call center services as another line of its business. It is clear that RESs get CRM. With that said, this article assumes that RESs are on the path to ecstasy, and as such this article's focus is more on the potential agony faced by regulated utilities.

For a regulated utility deploying smart grid technology to customers, meeting future customer needs and expectations for innovative services will be almost impossible without a CRM system. Our experience deploying dynamic pricing and advanced services enabled by the smart grid illustrates this point. The ComEd Customer Applications Pilot (CAP) was one of the first to explore the integration of CRM technologies with a call center of 'energy advisors' to support a sample population of approximately 8500 customers. These customers were randomly assigned to receive innovative services comprising different rates, usage feedback technologies, customer education and bill protection schemes.² The CAP team established a cloud-based CRM system that managed the entire customer experience and relationship. When a customer called to get information about their bill, the energy advisor not only had information about the bill and the customer's rate, but also detailed information that compared the customer's new rate with the old rate. The energy advisor used the CRM system to determine whether or not the customer had activated their in-home energy display (if one had been provided to the customer) and what customer education had been

provided. The system also incorporated an analytics system that scored customers regarding their level of bill impact, in terms of spending more (negative) or spending less (positive). These analytics enabled the CAP team to identify those customers who were impacted the most by a dynamic rate (as compared with their previous flat rate). In Stone's vision of ecstasy, such analytics enable proactive interventions with those customers.

The CRM system used by the ComEd CAP team not only enhanced the customer's experience, it also enhanced the team's ability to make data-driven decisions. For example, one of the challenges faced by the team was encouraging customers to activate self-installed in-home energy displays. As the CRM system tracked activations, the team received weekly dashboard reports indicating activation rates. When the team decided that the activation rates were too low, the CRM system enabled the targeting of customers for follow-up direct mail and e-mail reminders, which the CRM system managed and tracked.

Pilots such as the ComEd CAP demonstrate the need for CRM systems in regulated utilities. Customer expectations for innovative services, like they receive from their telecom, satellite TV, and banking providers, is driving increased customer expectations for service and support that the utility must meet and that the regulator must allow. Although the primary mission of a regulated utility is to provide safe and reliable service, it is also being asked to do so in an environment that demands it to reduce costs while encouraging customers to be more efficient in their energy use and to shift their energy use to different times.^{3,4} To achieve these goals, regulated utilities must transition their call centers from task-oriented 'transactionists' to service-oriented 'energy advisors', and enhance their self-service systems from being rudimentary to robust. In this environment, several things

are clear about the CRM systems they will need to adopt:

- *CRMs must be 1-to-N.* Most utility CIS systems are based on a 1-to-1 architecture, meaning that for each premise in the CIS there can be only one customer. This also means that if the utility has an online My Account system for self-service transactions, only one username is allowed for the account. It is evident from focus group research that many premises have multiple people living in them, whether it is family members, roommates or renters. As utilities begin providing enhanced energy information services, such as bill-to-date, 15-min usage graphs and peak day alerts, it is clear that these services should be accessible to all who reside in a premise, as well as the account holder. That means CRMs must be 1-to-N: one premise with multiple occupants with different data access privileges.
- *CRMs must be able to reflect the customer's physical world.* Our research has engaged utility leadership to envision future customer scenarios for innovative services, suggesting that a CRM must be able to reflect the customer's physical world. For example, one scenario imagines an auto body shop. Within the auto body shop is a compressor. The utility has provided the auto body shop a service for a monthly fee that monitors the electric use of the compressor. In a CRM, these physical relationships are represented in the data and can be tied to analytics. Thus, when the utility's analytics determine that the compressor is beginning to fail, the utility notifies the auto body shop and suggests an energy efficient replacement. This kind of service already exists in the auto industry. This story illustrates the need for a CRM system to reflect in data the physical relationship between premise, room and appliance, as such data will be a foundation for providing new, innovative services.

WILL PRIVACY TRUMP CRM?

In summer 2009, the first wave of customer backlash hit smart metering. Some customers in California and Texas who had smart meters installed at their homes complained to their respective utilities that smart meters were not accurate and causing higher bills. With limited CIS systems and a regulated utility customer services attitude, customers were unsatisfied with the responses.⁵ Therefore, customers escalated their complaints to their elected representatives and the agony intensified.

As soon as the ink was dry on commissioned third-party reports in California and Texas that demonstrated that smart meters were very accurate, the second wave of backlash hit in summer 2010 causing more agony. This time, the issue was not accuracy. Instead, it was perceived issues with smart meter privacy and health threats involving smart meter wireless radio frequency (RF) transmissions. The issue heated up in summer 2011 when an enterprising, grandfatherly video producer with privacy concerns posted a compelling YouTube video of himself eloquently warning people about perceived smart meter privacy threats. Viewed over a million times, the video advises citizens to send their utilities a legal form letter (included on the YouTube site) denying permission to

install a smart meter.⁶ By now, it should be clear to utilities that consumer confidence, which reflects customer attitudes toward accuracy, security, privacy, health and value, must be understood, respected and planned.

The privacy challenge to smart metering stems from a smart meter's capability to record electric usage in 15-min increments. With 15-min data, one can make crude 'behavioral inferences' about what is going on inside a home. For example, in Figure 1, one can infer that the homeowner left home for work around 07:00, that their air conditioner cycled on and off during the day, with increasing frequency when it got hot after 12:00. The homeowner returned home at about 19:30, suggested by the usage peaks most likely caused by lowering the thermostat, which called for more air conditioning to make the house cooler.

Beyond the 15-min data, there are additional perceptions (or misperceptions, depending on which side of the fence one sits) regarding a smart meter's capability to invade one's privacy. For example, some believe a smart meter can determine how much energy a specific appliance is consuming and send those data to the utility. Technically, smart meters cannot do this (unless recent research from Germany, if it gets published in a peer-reviewed journal, proves otherwise).⁷ Achieving this

Figure 1: Fifteen-minute energy usage from a display in a Web-enabled tool.

level of precision requires additional hardware the customer must purchase. One would need to install special wireless plugs on appliances to determine individual appliance consumption, or install special clamps on the wires entering a home and acquire special software that can discern and learn the power signatures of various home appliances over time.⁸

In the eyes of privacy activists, a smart meter system coupled with a CRM system is a significant threat. They envision the utility peeking into their lives, collecting data about their habits, storing the data in the CRM system and then selling that data to third parties who will then use it to flood the market with even more direct marketing offers. Such utility behavior, were it to be true, would be abhorrent, even in our eyes. What is not considered by privacy activists in this scenario are the existing privacy regulations by which utilities must abide and the potential social benefits that robust data can provide.

PRIVACY REGULATIONS

Our research suggests that utilities take privacy seriously and are good at it. This is primarily due to strong public utility commission privacy regulations. Our evaluation of multiple utility call center operations show that all customers must verify their identity before receiving services. Call quality monitor scorecards have items that evaluate this step, some to the standard of automatically failing the customer service representative if the identity verification step is left out. Utilities also use sophisticated online identity verification services when establishing an account for a customer. Furthermore, when smart meters send usage data from a home or business to the utility, those data are encrypted and contain no personally identifiable information, such as name, address, account number, social security number and so on.

These types of protections are very important, especially in states like Pennsylvania. Like most utilities, Pennsylvania utilities require a customer's social security number to establish service, as the utility is offering the customer credit and must verify the customer's credit worthiness. However, when a customer in Pennsylvania contacts their utility for a payment arrangement (enabling a customer to spread payments on a bill over several months), the utility is required by law to collect the names and social security numbers of all adults living at the premise, as well as the names and ages of all the children living at the premise. It is critical that the utility maintains the privacy of these data.

To address concerns about privacy and to enhance consumer confidence, utilities are going beyond public utility commission regulations and enhancing their own internal privacy policies using Privacy by Design principles.⁹ Developed in collaboration between the Information and Privacy Commissioner, Ontario, Canada, Hydro One, and the Toronto Hydro Corporation, Privacy by Design articulates seven key principles for maintaining data privacy and consumer confidence in the smart grid world:

1. Proactive, not reactive; Preventative, not remedial
2. Privacy as the default
3. Privacy embedded into the design
4. Full functionality – Positive-sum, not zero-sum
5. End-to-end life cycle protection
6. Visibility and transparency
7. Respect for user privacy

A prototypical example of Privacy by Design in practice is the common high bill complaint call. In this scenario, the customer receives their bill and it is much higher than expected. The customer calls the utility to complain and determine the

cause. Because complete privacy is the default (Principle no. 2), the customer must give permission before data from which behavioral inferences can be made are accessed. Thus, before the customer service representative views the customer's 15-min smart meter data, the customer service representative asks the customer's permission to view the data. If permission is granted, then the customer service representative can work with the customer to analyze the data and make behavior inferences that enable the customer to use energy more efficiently, ultimately reducing the customer's bill.

SOCIAL BENEFITS OF ROBUST DATA

As the smart grid continues to mature, the industry is beginning to craft innovative business processes and services that provide important social benefits to customers. Efficiently delivering these kinds of services is dependent on robust customer information and a CRM system to manage it. Here are two stories that illustrate this point.

The most compelling story thus far comes from Southern Company, a utility that serves several states in the southeastern United States. In 2011, tornados ravaged the region, causing massive property damage and electrical outages. In areas where Southern Company had installed smart meters, it was able to determine outages on a premise-by-premise basis. But the company did not stop there. It took that outage data and merged them with data in CIS to determine which of those premises had an occupant with a medical condition. Additional analytics projected the restoration time for those premises. If the restoration time was beyond a threshold, the company proactively contacted those customers and directed them to shelters where they could get power for their oxygen generators or refrigeration for their medicines. The actions taken by Southern

Company helped reduce medical complications.¹⁰

The second story provides an interesting twist. Smart metering and CRM systems may lead to unexpected innovations that deliver exactly what privacy activists desire most, greater privacy. Consider prepayment systems. Historical prepayment schemes involve additional hardware at the customer's home, such as the program Salt River Project offers to customers. The smart grid coupled with a robust CRM system does not require any hardware. In Texas, retail electricity suppliers are beginning to offer prepayment services to customers. It enables a virtual 'gas tank' of electrons that customers can 'fill' using cash, credit or electronic fund transfers through a variety of touchpoints: online, kiosks, in-person payment centers and automated bank withdrawals. The CRM system manages this new relationship, providing customers notifications, alerts and 'fuel gauge apps' on their smartphone. With prepayment, one can also envision a utility offering customers a Total Privacy Plan, in which customers do not have to provide any information about themselves to the utility to establish service, as well as the capability for customers to use cash to pay for their electric service. This is very similar to the prepaid cell phone market.

Just as the World Wide Web and smartphones have created a platform for innovation that addresses a variety of customer problems, smart metering systems will as well. However, such innovation requires robust data and effective management of those data through CRM systems.

WILL CUSTOMERS CO-CREATE VALUE?

Even when smart meter systems are deployed and the CRM word is spoken within utilities, the question still remains whether customers will perform in the role of co-creators of value. In this role,

customers use their knowledge and skill to more effectively and efficiently release the value embedded in the smart grid.¹¹ For example, will customers help reduce the need for peaker plants by shifting their energy usage to other times during a critical peak events?¹² Will they help reduce their utility's cost-to-serve by performing their own high-bill investigations online rather than calling the utility's call center? Will they enter in their personal information online to establish or transfer service rather than calling the call center?

The shuttering in fall, 2011 of Google's PowerMeter and Microsoft's Hohm services, which provided smart metering customers online information about their energy usage, illustrates the agony associated with customer engagement. Utilities and third-party providers are building services, but the question is whether or not customers will come. For example, in a smart metering pilot conducted by American Electric Power in Indiana, less than 2 per cent of the customers participating in the pilot viewed smart metering usage data online.¹³ In an industry where the majority of customers spend less than 30 min a month on utility business, opt-in services, such as PowerMeter and Hohm, compete for time that customers have allocated to other pursuits.

Research by the Brattle Group favorably indicates that dynamic energy prices encourage customers to shift their energy use.¹⁴ Yet, many studies that inform these kinds of results are, like PowerMeter and Hohm, opt-in, with a heavily incented response rates in the 7 per cent range, and less if there is no incentive.¹⁵ One conclusion is that if utilities pay highly engaged customers to adopt a dynamic rate, customers will perform as co-creators of value and reduce their energy usage at peak times. Another perspective, based upon the experiences of utilities in Arizona who have worked patiently for two decades on the dynamic rate issue, now can boast a 30–40

per cent opt-in participation rate with a time-of-use pricing plan.³ But what about opt-out schemes? The ComEd CAP, discussed earlier in this article, is the first study to investigate customer participation with opt-out dynamic pricing. Results that will shed light on this important question are scheduled to be released by the Electrical Power Research Institute (EPRI) in late 2011.

Utilities are now experiencing the agony of low customer engagement with energy usage information and dynamic pricing, as well as consumer confidence issues. Because of this, the utility industry now appears to have learned that customers need smart metering and CRM systems to deliver enhancements to basic services that enable co-creation of value to take seed. For example, our research suggests that customers want to avoid the worry and surprise associated with a high bill. Bill-to-date, bill threshold alerts and tools to view the 15-min smart meter usage data must be the first set of services customers receive, ideally within 30 days of smart meter installation. With these services, customers can do a better job with their first priority, managing their bill. After that, utilities will need to enhance the move in/move out process by effectively integrating remote connect and disconnect features with an enhanced self-service customer experience that makes customers feel that they are the utility. And then? Outage information services, alternative payment schemes such as prepayment, the inclusion of energy information and costs in mobile devices, dynamic prices, and ultimately support for electric vehicles. This focus on 'transactions first' is consistent with a consumer survey conducted by industry researcher EcoAlign.¹⁶

None of these core services enabled by smart metering can be effectively deployed without a robust CRM system. For those utilities that are fortunate enough to be making the shift from CIS to CRM, the

challenge will be prioritizing the new and enhanced services, and adopting customer-centered design methods that make customer experiences compelling and valuable.

SUMMARY

The purpose of this article was to examine the agony and the ecstasy of CRM systems in the smart grid world. The agony will involve shifting the perspective of regulators and executives, overcoming issues involving consumer confidence (specifically privacy), and delivering customer experiences that enable customers to be co-creators of value. The ecstasy will come in the form of being able to deliver innovative customer services that lead to favorable regulatory treatment, addressing competitive threats and opportunities, meeting energy efficiency and demand-side management goals, reducing cost-to-serve, and discovering new revenue opportunities.

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