AI-Driven Personalization at Scale

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1. Introduction

Rapid development in technology, data, and analytics presents an opportunity to build more human-like personal experiences across customers' end-to-end lifecycle. In simple terms, Personalization is about first understanding the customer, their needs and then using customer-specific insights to customize the timing, content, and design of their digital experience in real-time. Industry reports indicate that 75% of consumers prefer brands that offer a personalized experience, and Dell Technologies customers expect Dell to personalize their experience as well. The top five benefits of Personalization include increased visitor engagement (55%), improved customer experience (55%), improved brand perception (39%), increased conversion rates (51%), and increased lead generation, and customer acquisition (46%)[(1)].

Currently, very limited part of customer journeys on Dell Technologies are personalized. Mostly, customers need to self-navigate through static content using features, content, and props provided on our website. As such, it is hard for customers to find relevant products and content. Also, when customers navigate between different Dell properties (e.g., from dell.com to eSupport), all learnings/mental-models are lost and must be re-established. This is further exacerbated when they transition from online to offline channels and vice-versa. Clearly, there is a huge potential to improve our current digital experience to match customer expectations. And, it is great to see that our new Digital Experience roadmap acknowledges that Personalization is key to delight customers, and hence, Personalization is part of our team's vision.

Providing a personalized experience is not any one team's responsibility; it should be a combined effort across various groups. At Dell, different teams such as product, marketing, merchandizers, support, etc. are responsible for creating or influencing part of customer experience. This narrative will refer to these teams as the "producers" of the personalized experience. The major roadblock that hinders a collective strategy's effectiveness is that individually, these producer teams cannot deliver a personalized experience without Dell Digital's involvement, which results in an extended concept-to-production cycle. The producers do not have access to integrate and utilize the numerous datasets in a secure and self-service manner to deliver Personalization. Once deployed, they also do not have an easy way to measure how effective their solution is to drive iterative improvements. Additionally, Dell Digital's teams are resource-constrained and can focus on only a small subset of the personalization needs.

Starting in 2019, we started leveraging AI to recommend products across Dell.com and Premier, and ROI has been >10x. We strongly believe that we are well-positioned to build upon our strengths to take Dell's personalization offerings to new heights. This paper intends to share a high-level vision for how we can drive Personalization at scale. It covers the customers and their needs, the providers of those capabilities, why a platform approach to Personalization makes sense, the core capabilities of such a platform, and how external providers may extend the platform capabilities. Concepts and capabilities discussed in this narrative will extend to both online and offline experiences. However, for the sake of simplicity and relatability, this paper describes most of the capabilities from a digital experience point of view.

2. Personalization at Scale

Our vision is to delight all Dell Technologies customers with a personalized digital experience enabled by an AI-driven personalization platform.

Let's first examine the basics concepts of a platform approach. A Platform provides the core capabilities and rules for a marketplace that brings together the producers and consumers. The consumers are the recipients of the offerings created on the platform. The producers are the creators of those offerings. The platform owner is the controller of the intellectual property (IP) and an arbiter of the interactions – the exchange of offerings for currency - between the producers and the consumers. While the platform owner creates the core capabilities and rules, others (e.g., 3rd party developers) utilize the platform to build long-tail capabilities, thereby scaling out the platform. How can we leverage this approach to deliver personalization at scale at Dell?

A personalization platform is like a marketplace of relevant user experiences (or aspects of a personalized user experience e.g. product recommendation, pricing personalization, etc.) created by a variety of internal teams and served up to Dell Technologies customers. This platform's customers are Dell Technologies customers seeking a relevant experience based on their intent/need. The producers are the various product teams, marketing teams, merchandisers, sales, support, etc. that create these personalized offerings - aspects of that relevant experience. The core interaction is exchanging the most relevant user experience (aka the value) for revenue and customer satisfaction (aka the currency).

A high-level model of this personalization platform is illustrated in Figure. 1. Dell Digital will be responsible for creating the core capabilities and rules for this platform. To help create critical momentum, Dell Digital can also build a set of key personalized experiences and capabilities (e.g. product recommenders or intent recognizers). Beyond that, other teams can use the core-capabilties to extend the platform and create additional capabilities in a self-service manner.

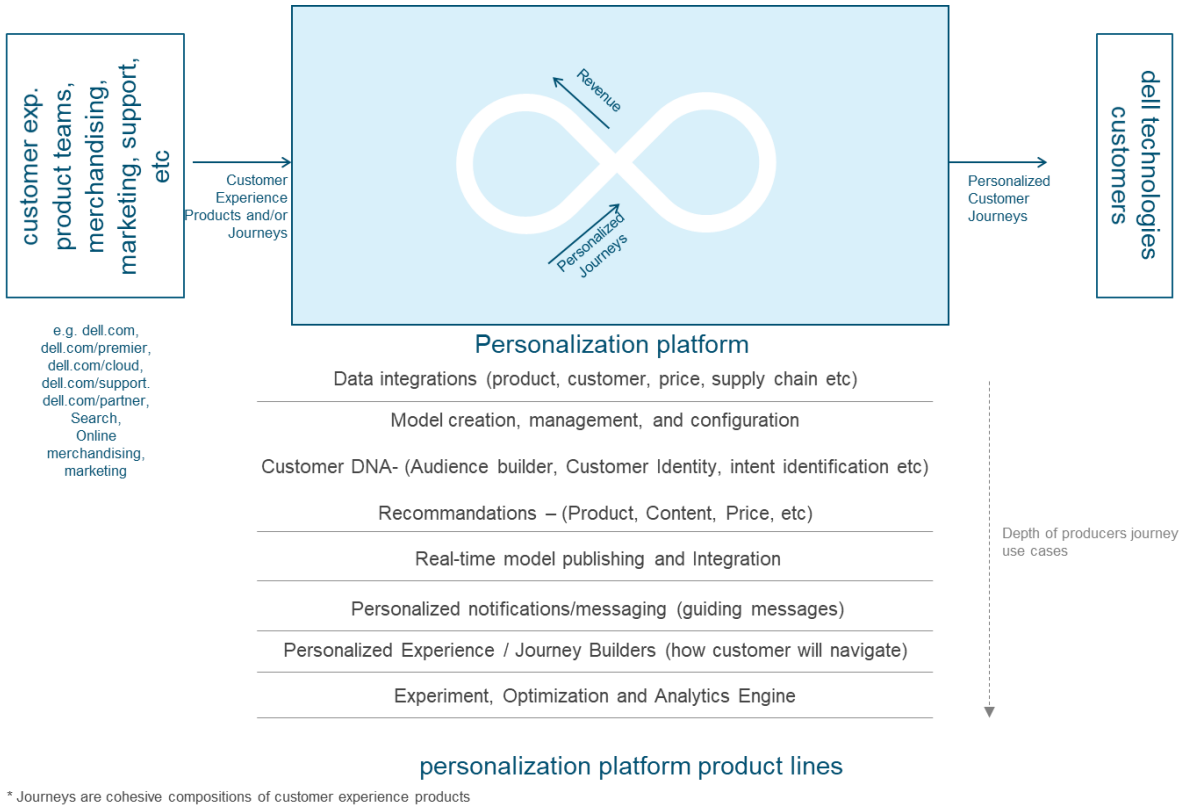

Figure 1. A Dell Personalization Platform “Sarvagya”

Let's examine the core capabilities and rules that this platform would offer. As we do that, we need to evaluate use cases that this platform serves – across consumers and producers – from simple to complex. In section 3, we will focus on capabilities, and in section 4, we will focus on how producers can use these capabilities.

3. Core Capabilities of Personalization Platform "Sarvagya"

The platform should build/provide a set of core capabilities and services that would address the challenges faced by both producers and customers currently. On one side, the platform should enable producers to (a) access multidimensional data with ease to create/use models for personalization, (b) seamlessly publish models into production as part of personalized experience, (c) test and evaluate different hypotheses, and (d) easily assemble an entire journey dynamically using journey builder. On the other side, consumers expect Dell to (a) recognize their intent, (b) serve them with the most relevant results, content, product and pricing recommendations, and (c) finally, to deliver the most pertinent end-to-end journey and make it easy for customers to fulfill their intent. Let's discuss the platform capabilities that the producers will leverage to create a personalized experience for customers.

- **Data Integration**

  As discussed, producers usually don't have a good handle on data (be it customer data, product data, content, or pricing), which limits their ability to create effective personalized content. Therefore, the platform will provide a core set of data and integration services to make various contextualized/annotated data available for our producers to consume. The platform will have the capability to bring together relevant omnichannel data related to customer profiles, historical sales, customer interactions, product, price, etc, and build a unified/holistic customer journey database. The platform also needs to provide the capability to fetch batch and real-time data from different sources using low latency and high-speed data services.

- **Model creation, configuration and management**

  Once we have a handle on data, the next capability is to extract insights using Artificial Intelligence (AI) or advanced rule-based models. Currently, the producers may not have data science skills to develop and manage complex models to drive effective personalization. Hence, the platform needs to provide capabilities or services to make it easier for producers to leverage different models. Broadly speaking, the platform will provide three type of services – (a) Develop out-of-the-box cognitive services/models spanning across customer identification, personas building, intent recognition, product/content/price/message recommendations, etc. (b) Provide easy functionality to configure these models based on specific use cases, (c) Enable producers to add models to expand the platform's capabilities/offerings, and (d) Provide production-grade services/APIs for smooth integrations.

  Let's discuss these core cognitive services in detail.

  a. Customer DNA: Producers can create personalized experiences if they know the customer and their purpose. As part of customer DNA, the platform will build a set of core differentiating services. First, we need to develop the capability to identify the customer (anonymous and logged-in) by leveraging customer data across all digital and offline interactions. Second, it is not easy for experience creating teams to drive actions at an individual level, so we will also develop the capability to create personas or segments either based on AI or advanced rules set by producers. To kick-start adoption, we will provide some out-of-the-box personas. Finally, the platform will develop AI-powered intent recognizers to identify the customer need.

b. Recommendation Engines: Now that we know our customers better, how can we use this information to create curated experiences? This is where the platform's in-built recommendation engines would come into play. The platform will provide following core out-of-the-box recommendation services.

- **Product Recommender:** The product recommender engine can identify relevant products for customers/personas using predictive modeling. The platform will create the capability for these recommendations to adapt and learn in real-time based on customer behavior. Examples of such out-of-the-box services are upsell, cross-sell, alternate product, attach, etc. Additionally, any producer can build upon these AI services to create/modify product recommendations. Producers can use the built-in product recommender engines to optimize business outcomes. For example, suppose the shop experience team wants to show the top five attach recommendations on gaming pages. In that case, they can use AI engine to get product recommendations for "gaming persona" and/or they can accept/change the platform recommendations.

- **Content Recommender:** Currently, producers don't have any capability to dynamically select the content relevant for customer needs. To drive content recommendations at scale, we need to have two key capabilities – Context-content mapping and a scoring mechanism to keep personalized content relevant to customers. AI/machine learning can help create a context-content mapping at scale. We need some AI-services/capabilities for producers to consume and make a context-content mapping. For example, suppose the customer's context is to learn about the graphics on the XPS l5 laptop. In that case, AI services will dynamically pick the relevant part of a specific page that contains relevant information. The idea is to provide focused content recommendations across different pages such as homepage, category page, site overlays, site notifications, learn content, etc. The platform will also build a scoring mechanism to understand how customers interact with content. This scoring mechanism will help refine the quality of content recommendations as customers engage with recommendations.

- **Others:** Everyway we interact with our customers can be personalized including web, email, chats, or phone. Producers can augment different recommendation engines for specific use cases e.g. create targeted emails using the product and content recommender, personalize discounting to drive conversion, improve search relevancy, etc. A lot of extensions can be built using core services to serve specific segments or customers. I am leaving this as a thought to explore further.

c. Real-time model publishing & monitoring

Once producers have quality data and intelligence, producers need to deploy solutions for the end customer's consumption effortlessly. To enable fast and seamless deployment of new solutions, the platform team will build low latency and high-speed data solutions/pipelines to easily productionalize new models in real-time. The models will dynamically personalize journeys as customers interact with Dell properties. The ability to monitor each model's performance in real-time will accelerate the journey to build and manage personalization using AI.

d. Personalized messaging/notifications

Our site is currently static and doesn't interact dynamically with customers based on their real-time interactions. Producers can help customers navigate through their journey using persuasive messaging with a personal touch. The dynamic, personalized messages and relevant product and content can make each customer experience unique, relevant, and engaging. Currently, producers don't have any capability to create these personalized messages. Personalization platform can build machine learning algorithms to dynamically curate engaging content across customer journeys from the time customers enter our site to the time they leave our site and even beyond. These ML algorithms will learn how

customers navigate the site and curate the messages based on individual needs vs. static content. This capability intends to guide customers throughout their journey to take the next best action to fulfill the visit's purpose based on the real-time behavioral context.

Once we can have personalized messages, producers can use various strategies to share these personalized messages with customers e.g., popups, overlays, push notifications, gamification, survey, incentivized coupons, etc. Many everyday use cases include creating a sense of urgency, social proofing, cart abandonment, and order status, which are commonly known, and these use cases are easy to address. Using ML or advanced rule-driven messaging, producers will utilize these services to serve customers personalized messages at the right time to drive customers towards the right action.

e. Personalized Experience / Journey Builder

As the customer starts to interact with Dell property, their Dell journey begins. Every customer's journey is unique, and customers expect us to personalize their journey based on their needs. A simple example of a journey builder is to land "customers interested in Alienware accessories, on a homepage that shows gaming banners>>deals>>product recommendation based on their preference (i.e., Alienware related)". Another example, "smart shopper journey can be curated to show the best deals, highlight product reviews and personalized messages to show the value of their investment". Currently, this capability doesn't exist. This is where the personalized journey builder comes into the picture. It leverages the customer DNA service, product/content/messaging recommenders, etc. to create customized journeys. The built-in machine learning algorithms can further enhance the customer experience by dynamically selecting the most appropriate content (banner, promotions, recommendations) and picking the best-suited design libraries or MFE (layouts, call to action buttons) to arrange content. The platform needs to provide producers with the capability to select a subset of all possible options to define unique journeys.

f. Experiment, Optimization and Analytics Engine

Another critical question in front of producers is to find the optimal journey for a specific customer or persona? To address the same, the platform needs to provide producers with the capability to analyze different journeys based on outcome-driven success metrics. Experimentation is vital for any machine learning to succeed! Creating multiple personalized journeys for each customer or persona and testing how customers interact with different personalized journeys is essential to optimize the site's experience or conversion. Optimizing the journey is different from A/B testing. The idea is to make the whole site a functional testing and optimization platform to actively select the right experience either based on success metric or advanced rules/strategies set by producers. Another capability that the platform needs to provide is a statistical toolkit to help run either the bayesian engine or some simple analytical engine to help understand effectiveness of different experiments. Many personalized decisions are dynamic and made in real-time, so analytics engines need to capture data, define, calculate, and analyze metrics in real-time and not real-time capability. Initially, we will build a core set of pre-defined metrics, dashboard views, and analyses. However, later, producers will have the ability to create their additional analysis and add to the platform.

4. Consumption model

So far, we have discussed the different capabilities provided by the platform. Now, let's review a use case for illustrative purposes to understand how producers can use the platform to create an end-to-end personalized experience for Dell consumers-

Example:1 – Producer X wants to create a personalized journey for customers who recently purchased XPS.

Let's see how X can leverage the platform's core capabilities in an iterative way to create value. X can use the data integration module to analyze what customers buy post an XPS purchase. This will help producers curate recommendations for customers who buy XPS and return to the site (with a cookie). This is the first level of personalization. To move to the next level (Level -2), X can use the Customer DNA services to define this behavior as a persona (XPS buyers = persona Y). X can use recommendation engines to get the product and content recommendations. To move towards a more personalized state (level-3), X can design journeys customized to Y's needs using personal messaging and selecting a subset of content/design and products. An example of this journey can be when this person lands on the website, show them these 'N' curated products, greet them with a personal message like "Hello, we see that you recently purchased XPS, and would you like to……". To move to a highly experimental stage (level-4), X can set objectives for persona Y and design multiple journeys. Then, platform experimentation ML will actively measure and optimize the journey based on how Y interacts with various recommendations. The site will convert into functional testing. The maturity of personalization moves as we build more capabilities on the platform.

5. Extension of the platform - Who will build long tail with illustrative example

Platform evolves as producers use the platform and add capabilities to the platform. Many capabilities are not core capabilities and need to be built by other teams or producers. Let's review a few illustrative examples to analyze how extended capabilities will be orchestrated -

Example 1 - Customer DNA will provide some out-of-the-box customer segments or personas. However, producers can leverage the core AI-services to run, analyze, and create new personas, which will then be available for everyone to use.

Example 2 – Product recommendation services will be provided by the platform team, leveraging the AI-recommender services. The merchandising team can configure product recommendations for personas or customers to test. New product recommendations for that specific persona will be made available for everyone. For example, product recommender gives product A, B, C and D as top products for persona Y, but the merchandiser can change the product recommendations and include A, B, C, New1, New2 for persona Y. Everyone can see the performance of the new recommendations for this persona and compare against other alternatives so that other Producer teams can re-use this if they want to target a similar audience.

Conclusion

Industry trends indicate that personalization is critical for any retail business to create a differentiating experience. More than 90% of the industry has personalization as one of their top priorities, but only 15% admit that they are doing it right based on a recent survey(source3). To scale the personalization across the whole commerce experience is hard to solve for just one team. Adopting a platform strategy towards personalization will increase Dell's chances to drive personalization at scale, and this personalization platform has the potential to change the way our customers shop with us truly.

This paper is meant to be a starting point to introduce the concept and high-level details of the personalization platform strategy. I hope this narrative pushes us to think more about adopting a platform strategy towards personalization.

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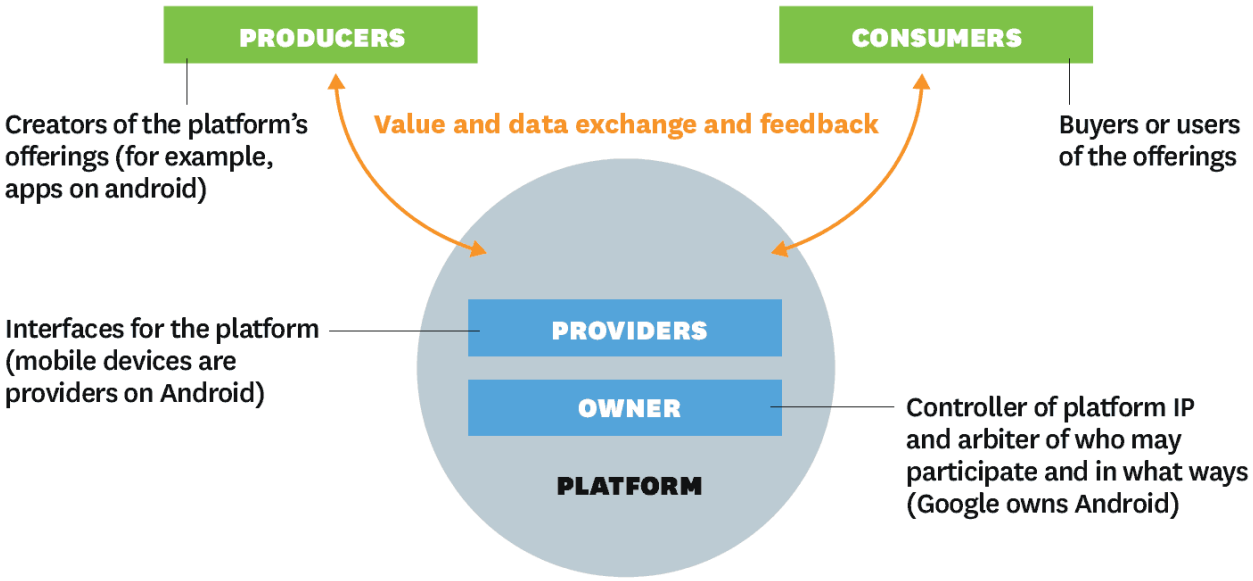
Appendix

Platform Strategy

The Players in a Platform Ecosystem

A platform provides the infrastructure and rules for a marketplace that brings together producers and consumers. The players in the ecosystem fill four main roles but may shift rapidly from one role to another. Understanding the relationships both within and outside the ecosystem is central to platform strategy.



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