

Experience Data Model.

The Rosetta Stone of the Experience Business.



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Executive summary.

Adobe Experience Platform helps customers to centralise and standardise their customer data and content across the enterprise – powering 360° customer profiles, enabling data science, and data governance to drive real-time personalised experiences.

Experience Platform provides services that includes capabilities for data ingestion, wrangling and analysing data and building predictive models and next best action. Experience Platform makes the data, content and insights available to experience-delivery systems to act upon in real time, yielding compelling experiences in the relevant moment. With Experience Platform, enterprises will be able to utilise completely coordinated marketing and analytics solutions for driving meaningful customer interactions, leading to positive business results.

An integral part of Experience Platform is sharing customer experience data to improve experiences for our customers as they work to deliver real-time experiences through our open and extensible platform.

Companies want to leverage their customer experience data and share data and insights across all their experience applications (both Adobe applications and third-party applications). Sharing customer experience data in multiple formats from multiple sources can require too much time and too many resources. Adobe's Experience Data Model (XDM) is a formal specification that you can integrate into your own data model to create a true 360-degree view of your customer, which saves you time and makes moving your data into Adobe Experience Cloud products a seamless process.



Background.

Company executives in a variety of industries have found themselves thinking about a single issue: how to create a better user experience by delivering the right offer (or right message) at the right time.

In order to find an answer to that issue, we need to understand the entire journey of a customer across multiple touchpoints both online and offline. It's not enough knowing how the customer interacts within a website. You also have to know how the customer responds to emails and how they respond to any offline touchpoints (such as customer support calls or marketing postcards). Knowing the details of the complete journey will give businesses information they need for better personalisation and that will allow them to use machine learning to analyse the journey and deliver an individualised experience.

Nine in ten marketers say data is their most underutilised asset. Why aren't they deriving more value from the terabytes of information they collect? Primarily, it's because that data isn't immediately usable. Information compiled from varied sources — like websites, emails, sales, third-party vendors and even offline channels — tends to be siloed and structured in different formats. Even when one department within a firm gets relevant data into a format it can understand, the resulting intel is still largely unintelligible to other teams and departments. If all that data were translated into a single language — one that is equally useful and informative to sales representatives, IT departments, social-media marketers and customer service reps — companies could offer customers more compelling, personalised experiences in real time.

Adobe's **Experience Data Model (XDM)** is a formal specification used to describe this journey of experiences, as well as the resulting actions and events. XDM describes not only the journey, but also the measurement, content offers and other details of the journey. XDM is more than just a "data dictionary" for companies working with data from customer experiences — it's a complete language for the experience business. XDM has been developed by Adobe as a way to make experience data easier to interpret and to share.



The data explosion.

Companies have been chasing the 360-degree customer view for years. The biggest problem is that every bit of data seems to be in a different format or on a different platform. You have your website, your email offers, your customer support system, your retail store and a rewards card, not to mention your search, display, social and video advertising across the web. Many of the systems you use to track those items don't talk to each other or even store the information in a format the other systems can use.

Since you want to use machine learning to derive insights and intelligence from the data, and then use those insights to drive company actions, those separate systems make getting a better view of your customer a difficult and time-consuming task. How can you talk about delivering a personalised experience for your customers if every system has a different definition of who the customer is?

To make all these disparate data sets work together and be understood, Data Engineers and Data Scientists are in a constant process of translating and re-translating the data at every step. A large amount of that time is spent understanding the structure of the data before they can turn the data into something meaningful that you can use to create a better experience for your customers.

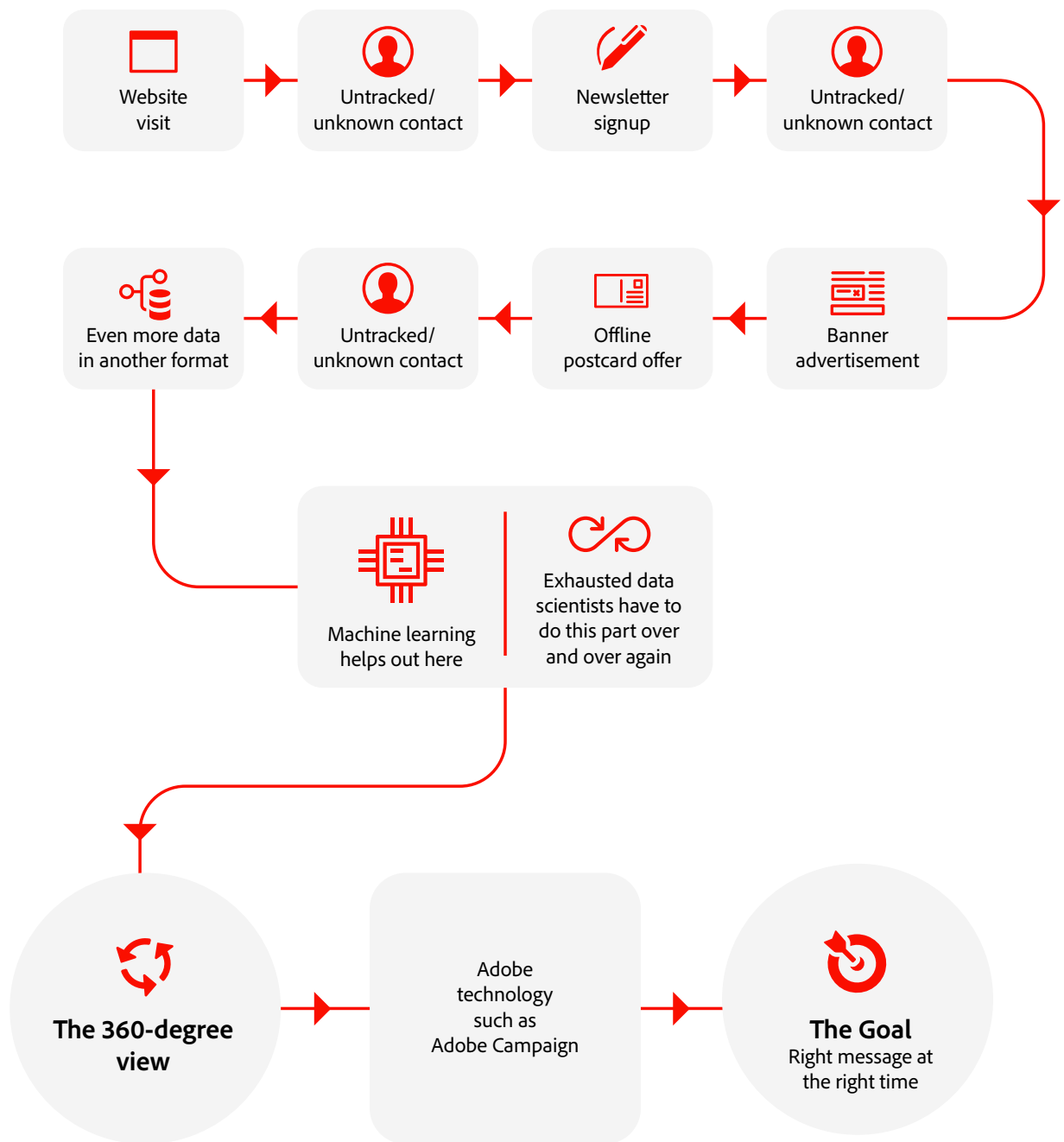
But streamlining that data is easier said than done. Almost 40 percent of advertisers employ three or more data management platforms and 44 percent use three or more analytics platforms. By juggling multiple different data platforms, companies are more likely drop sales leads.

Data flowing in from a company's smartphone app, for instance, might be in a completely different language than the data acquired from an email marketing campaign, a third-party vendor or from the point of sale. The average data scientist spends about 80 percent of their day preparing raw data for analysis, according to a recent poll from data mining company CrowdFlower.

Every hour spent cleaning and structuring data is time that could be better spent drawing useful insights from that data, so companies can devise engaging customer experiences.

Imagine if sales and marketing data existed in a single, standardised language from the moment it's compiled — the same way Adobe standardised PDF for documents.

The Customer Journey.



XDM has been developed to help companies avoid much of the constant translation and re-translation process. By using a standard that is designed to improve interoperability, you can focus on creating a better experience for your users.

The bottom line for businesses is that personalisation gets attention, and XDM helps businesses personalise customer experiences.



Introducing XDM and the Adobe Experience Platform.

Every business is an Experience Business. Whether you're selling a product, a service or even an event, as long as another person is expected to interact with your company or product or service, then you are creating an experience. This is especially true for any business (or department) that deals with a customer's ongoing interaction, such as customer support or loyalty clubs.

XDM is a specification that describes the elements of those interactions. XDM can describe a consumer's preferences and qualify what audiences they are part of and then categorise information about their online journey (such as what buttons they click on or what they add to a shopping cart). XDM can also define offline interactions such as loyalty-club memberships.

XDM is a core part of the Adobe Experience Platform, built with partners and global brands that are strategically investing in this shared vision of omnipresent and consistent first-class customer experience. Modern customer interactions are unique because they go beyond what historically common data modelling can support. Interacting with digital audiences requires capabilities such as engaging content, insights from data at scale, complete data awareness, identity management, unified profiles, omni-channel and experience-centric metadata, and the blending of real-time with historical behavioural data. Often, this data comes from multiple different vendors representing online behaviour across web and mobile and offline behavior for in-store purchases, demographic information and user preferences. It is a labour-intensive process to combine all of these disparate data sources to get a 360-degree view of a consumer and speak to them with one voice across the various channels. XDM is the language to express these experiences.



Adobe's Experience Data Model (XDM) represents all Customer Experience Data in a single standard data model to enable next generation customer-centric Experience Applications to activate customer insights faster, with less cost and in more ways.

Adobe has a long and proud history of defining important technology standards that move the industry forward and, more importantly, expand what our customers can achieve (TIFF, PDF, XMP, etc). By defining a new standard for customer experiences, Adobe is formalising a new way of building applications that are experience oriented first.

XDM is a data dictionary, but it goes beyond that. Standardising the data format means it can be more easily shared between applications, departments and organisations. XDM is channel agnostic, which means it can be used on data from multiple channels or touchpoints.

Most importantly, when you use XDM on your own in-house data and then bring that data into the Adobe Experience Platform you will create a seamless process for describing your customers interactions consistently across your various touchpoints.

XDM allows data for the Experience Business to flow freely through the Adobe Experience Platform.



XDM is the fuel that allows Adobe Experience Cloud, powered by Adobe Experience Platform, to deliver the right message to anyone, at the right moment, using the right channel.



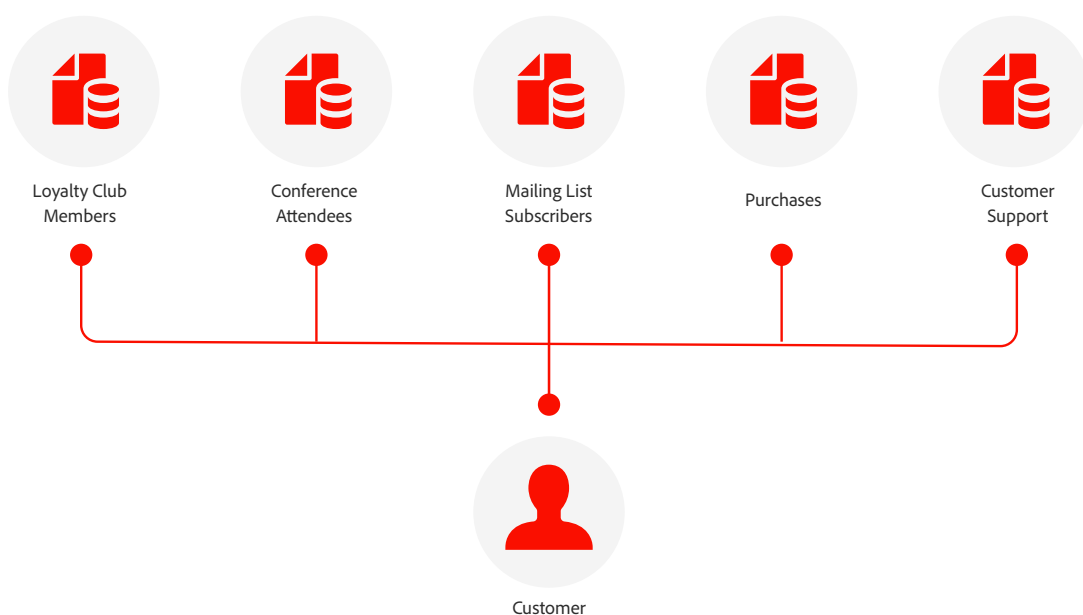
Why Move to XDM?

Every Experience Business wants to reach customers with higher-quality messages. XDM can help you research options and deliver those messages.

Here are the main reasons to implement XDM in your company:

- It makes it easy to reuse data and easier to bring third-party data into Adobe Experience Cloud.
- By incorporating the XDM schemas into your own data models, you'll get a seamless flow into Adobe Experience Cloud. And by leveraging Adobe's work you'll have a shorter time to delivery.
- It will increase consistency. There are a wide variety of ways to store the same information (such as lastname versus last_name), but XDM can unify the way data is named and categorised.

You can use XDM to describe a consumer and their preferences, and then use machine learning-derived attributes (like propensity scoring) to dive even deeper into figuring out what the right message is for each consumer. This helps you speak to the customer with one voice, since XDM defines a standard way to express how customers are consuming digital experiences and how they're engaging with you both online and offline. Say the sales team's software logs a site visit from a potential customer. With XDM, that consumer data "event" is now automatically detected across business departments in a format that every department can digest. The marketing and customer service teams waste no time in capitalising on the sales team's intel. Customer data from a firm's loyalty programme could even talk directly to the firm's content management application in order to target customers most likely to make a repeat purchase.



With greater communication between sales and marketing teams, firms can ensure customers receive up-to-date advertisements and promotions. An online outdoor gear retailer could ensure that a customer who just bought a bike receives an ad for a matching helmet — not another bike.

Using a standard that is both open and extensible will mean you can add your own fields and attributes. This adds to the ease of adoption within your organisation. For example, a company with a line of toys might have fields for favourite characters, while an outdoor retailer might focus on climate or adventure preferences.

XDM also provides a modern approach to understanding your assets. Digital assets are at the heart of digital experiences and the Adobe Experience Platform. Working with assets more consistently is another good reason to move to XDM. Starting from a foundation of existing standards for digital asset metadata (such as XMP and EXIF), XDM builds on those standards and helps you get more mileage from your assets by making sure they are part of your message at the right time.

Ease of reuse is another reason for switching to XDM. By having standard definitions for core concepts, you can simplify new deployments, new channels and new sources. Any application that reads XDM will understand the new data automatically.

Another reason to consider XDM is that XDM is integrated with Microsoft's Common Data Model (CDM). This makes for easier integrations between systems of engagement (like Adobe Experience Cloud) and systems of record (like CRMs), giving companies a powerful, comprehensive marketing-to-sales service.



Building an open experience ecosystem.

XDM is an open specification used to describe digital experiences in detail. The goal is to create an open and extensible standard to allow customers, vendors and other companies to contribute to XDM. This specification can be extended and customised with your own fields and attributes, which can then be used across Adobe Experience Platform.

Adobe is using GitHub as the repository for the specification: <https://github.com/adobe/xdm>.

At GitHub repository you'll find reference materials and documentation, XDM extensions and the full collection of schema. You can clone or download the entire repository.


XDM is published under a Creative Commons Attribution 4.0 International (CC BY 4.0) licence. It is driven by Adobe, but it is not specific to Adobe products. This means that schemas should capture the universal concepts of digital experiences, not specific implementations, no matter if they are part of an Adobe product or not.



Adobe core schemas.

XDM schemas enable data to be described in a consistent way no matter where it is coming from (Adobe, partners or customers). This creates a more uniform technology infrastructure rather than the great diversity that exists today. Building on top of the standard notation is a set of XDM standard schemas that define customer engagement concepts (such as profile, channel, product, etc.) in a uniform way no matter which application or platform is using the data.

The core elements of the set of standard schemas are available at [GitHub](#) and the list of available items is growing.

Assets 	Channels 	Content 	Context 	Data 
Assets	Channel	Content	Device	Abandons
Font	Email	Component	Environment	Check Out
Artboard	Social	Page	Experience	Clicks
Layer	Direct Mail	Product	Location	Orders
Video	Mobile App	Product	Profile	Purchases



Case study.

Adobe Experience Platform applications speak XDM natively. One such application is Data Science Workspace, Adobe's framework and tooling for enabling customers and partners to create custom machine-learning applications on the platform. Let's take a look at how XDM enables a Data Scientist using Data Science Workspace to understand their customers, build a machine learning model and then operationalise that model in Adobe Experience Platform.

Data Science Workspace in action.




Predictions and insights provide the information you need to deliver a highly personalised experience to each customer who visits your website, contacts your call centre or engages in other digital experiences. Here's how your day-to-day work happens with Data Science Workspace.

Define the problem.

It all starts with a business problem. For example, an online call centre needs context to help them turn a negative customer sentiment positive.

There's plenty of data about the customer. They've browsed the site, put items in their cart and even placed orders. They might have received emails, used coupons or contacted the call centre previously. The recipe, then, needs to use the data available about the customer and their activities to determine propensity to buy and recommend an offer that the customer is likely to appreciate and use.

For example, a customer's recent activities might look like this:

Action	Item 	Date 	Time 
Entered Site		7 January	10:10 a.m.
Search	Men's shoes	7 January	10:13 a.m.
Page View	ABC black men's loafers, size 10	7 January	10:15 a.m.
Cart Addition	ABC black men's loafers, size 10	7 January	10:18 a.m.
Link	Men's dress shirts	7 January	10:19 a.m.
Page View	ABC navy blue men's dress shirt, size 40	7 January	10:19 a.m.
Cart Addition	ABC navy blue men's dress shirt, size 40	7 January	10:20 a.m.
Search	Men's sandals		
Page View	ABC men's waterproof sandals, size 10	7 January	10:25 a.m.
Cart Addition	ABC men's waterproof sandals, size 10	7 January	10:28 a.m.
Cart Deletion	ABC navy blue men's T-shirt, size M	7 January	10:29 a.m.
Exit Site		7 January	10:30 a.m.
Call Centre Contact		8 January	5:15 p.m.

At the time of the call centre contact, the customer still has two pairs of shoes in the cart, but removed a shirt. With this information, the intelligent service might recommend that the call centre agent offer a coupon for 20% off on shoes during the call. If the customer uses the coupon, that information is added to the dataset and the predictions become even better the next time the customer calls.

Explore and prepare the data.

Based on the business problem defined, you know the recipe should look at all the customer's web transactions, including site visits, searches, page views, links clicked, cart actions, offers received, emails received, call centre interactions and so on.

A data scientist typically spends up to 75 percent of the time required to create a recipe exploring and transforming the data. Data often comes from multiple repositories and is saved in different schemas — it must be combined and mapped before it can be used to create a recipe.

Your first step is to check the recipe gallery to see if an existing recipe meets your needs or comes close. Or, you might import a recipe you created outside of Adobe Experience Platform. Starting with an existing recipe often streamlines the data exploration phase.

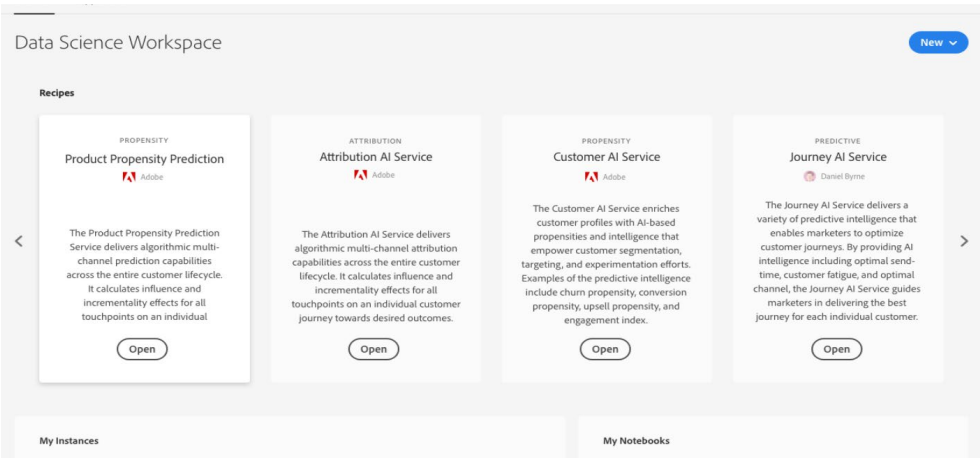


Figure 1. Prebuilt recipes in Data Science Workspace.

If you're starting from scratch or configuring an existing recipe, you begin your data search in a centralised and standardised data catalogue for your organisation, which simplifies the hunt considerably. You might even find that another data scientist in your organisation has already identified a similar dataset and you could choose to fine-tune that dataset rather than start from scratch.

All the data in Adobe Experience Platform complies with a standardised XDM schema, eliminating the need to create a complex model for joining data or obtain help from a data engineer.

If you don't immediately find the data you need, but it exists outside Adobe Experience Platform, it's a relatively simple task to ingest additional datasets, which will also transform into the standardised XDM schema.

You can use Jupyter Notebook to simplify data pre-processing — possibly starting with a notebook template or a notebook you've used previously for propensity to buy.

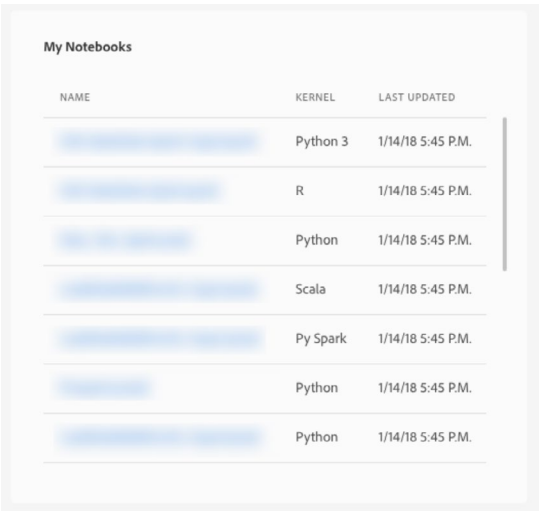


Figure 2. List of existing notebooks shown in Data Science Workspace.

Author the recipe

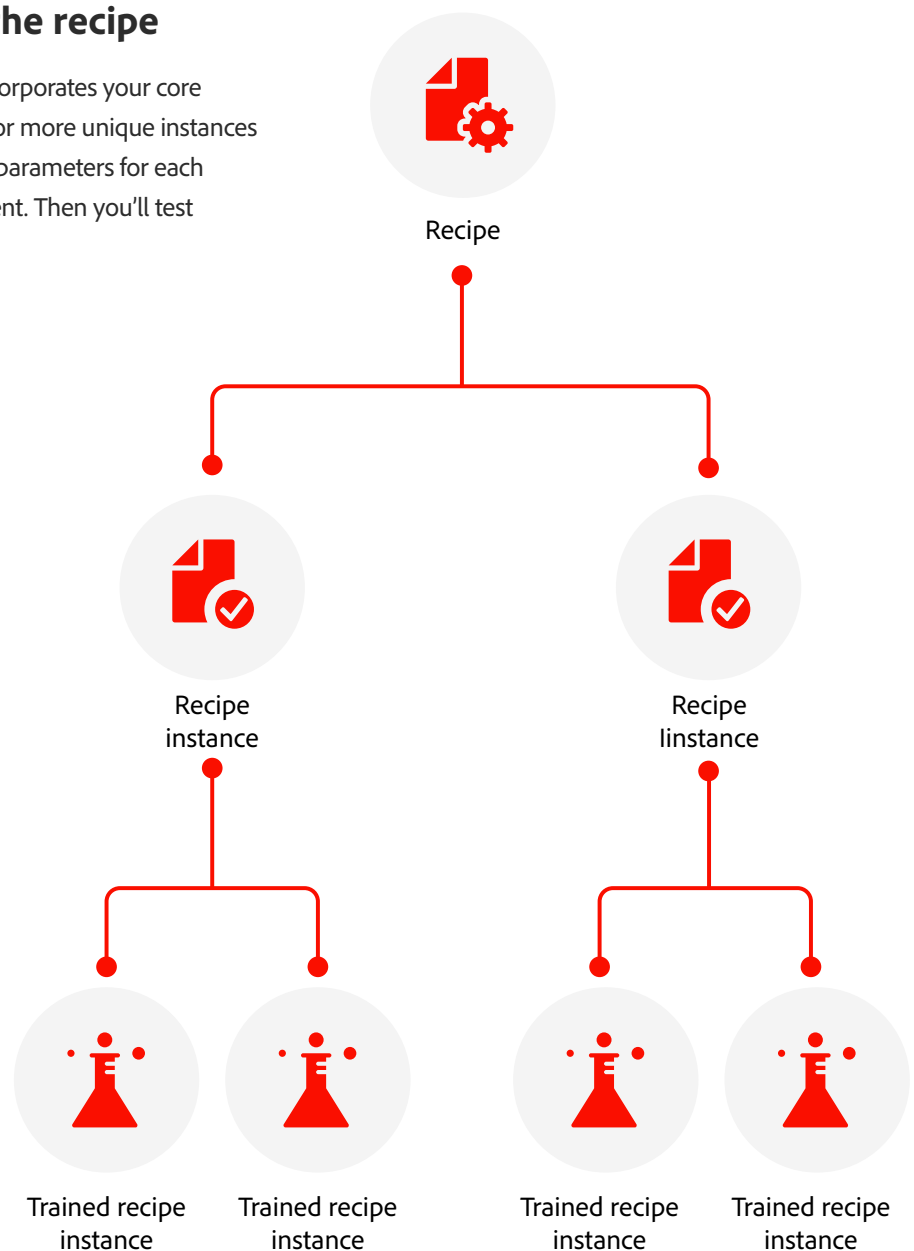
If you already found a recipe that meets all your needs, you can move on to experimentation.

Or, you can modify the recipe a bit — or create one from scratch — taking advantage of the Data Science Workspace authoring runtime in Jupyter Notebook. Using the authoring runtime ensures that you can both use the Data Science Workspace training and scoring workflow and convert the recipe later so it can be stored in the recipe gallery and reused by others in your organisation.

If you're importing a recipe, you can also use the Data Science Workspace authoring runtime, so you can take advantage of the experimentation workflows as you create your intelligent service.

Experiment with the recipe

With a recipe in hand that incorporates your core algorithms, you'll create one or more unique instances of the recipe and change the parameters for each instance so you can experiment. Then you'll test each unique recipe instance.



As you test, Data Science Workspace keeps track of evaluation metrics for each unique recipe instance and each trained instance. You'll check Data Science Workspace's evaluation metrics as you experiment to find the instance that performs best.



Operationalise the model

When you've selected the best-trained recipe to address your business need, you can create an intelligent service in Data Science Workspace without developer assistance. It's just a couple of clicks — no coding required. Then publish the intelligence service to Adobe I/O for deployment in digital experiences.

As your intelligent service is deployed, you can continue to track where it's used and how it's doing, retraining it to improve performance as more data becomes available.

The screenshot shows the 'My Instances' section of the Data Science Workspace interface. It contains a table with three columns: 'RECIPE INSTANCES', 'LAST UPDATED', and 'DEPLOYED'. The 'RECIPE INSTANCES' column contains blurred text representing instance names. The 'LAST UPDATED' column shows the date and time '1/14/18 5:45 P.M.' for each instance. The 'DEPLOYED' column shows a blue dot for the first, third, and fifth instances, and a grey dot for the second, fourth, sixth, and seventh instances. A vertical scrollbar is visible on the right side of the table.

RECIPE INSTANCES	LAST UPDATED	DEPLOYED ↓
[blurred]	1/14/18 5:45 P.M.	●
[blurred]	1/14/18 5:45 P.M.	●
[blurred]	1/14/18 5:45 P.M.	●
[blurred]	1/14/18 5:45 P.M.	●
[blurred]	1/14/18 5:45 P.M.	●
[blurred]	1/14/18 5:45 P.M.	●
[blurred]	1/14/18 5:45 P.M.	●
[blurred]	1/14/18 5:45 P.M.	●

Figure 4. List of recipe instances shown in Data Science Workspace.

Next steps.

If you want to find out more about the technical details of XDM, you should go to [GitHub](#). For more information on what you'll find there, please see our sidebar earlier in this paper.

Adobe Experience Platform is where you can really put XDM into use in your organisation. Talk to your Adobe representative to see which Adobe Experience Platform capabilities are right for you.

References and links

Check out our current open source schemas on Github:

github.com/adobe/xdm.

Read more about the Adobe Experience Cloud at:

www.adobe.com/uk/experience-cloud/overview.html.

You can follow the Adobe Experience Cloud Twitter feed at:

twitter.com/AdobeExpCloud.

¹ Giselle Abramovich, "[15 Mind-Blowing Stats about Data-Driven Marketing](#)," CMO.com, 3 June 2016.

² Jeff Wright, "[A big data problem or a big problem with data? Part I: the issues](#)," Market One.

³ "[Advertising Report, Adobe Digital Insights](#)," slide 16, Adobe, 13 March 2017.

⁴ Gil Press, "[Cleaning Big Data: Most Time-Consuming, Least Enjoyable Data Science Task, Survey Says](#)," Forbes, 23 March 2016.

