Google Analytics 4

vs

Universal Analytics

Collected by

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Google Analytics 4 vs. Universal Analytics, collected by Ameenah Al-Haidari

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Introduction

Google Analytics is a web analytics service offered by Google that tracks and reports website traffic and also the mobile app traffic & events, currently as a platform inside the Google Marketing Platform brand.

Starting on July 1, 2023, standard Google Universal Analytics properties stopped processing new data, and all customers will lose access to the Universal Analytics interface and API starting on July 1, 2024. To maintain your website measurement, you'll need a Google Analytics 4 property.

One of the primary questions on the minds of marketers, analysts, and developers is: What's the difference between Universal Analytics to Google Analytics 4?

We're going to break down the most differentiators between the two platforms with an aim to give you a clear understanding of the new platform for better migration preparedness.

- Ameenah Al-Haidari

Account Structure

The very first difference between GA4 vs Universal Analytics is the Account structure.

Universal Analytics

Account > Property > View

UA followed this traditional structure where a user could have up to 100 properties per account and create up to 25 views per property, which allowed users to create multiple properties and views to see data coming from various streams. UA collected data at the property level via a Tracking ID.

GA4

Account > Property

In GA4, you have a single, unified view per property. It has a completely different measurement model for data collection. GA4 has introduced a new concept of Data streams, which shows the data flow from your application or website to analytics. GA4 collects data at the stream level using a unique stream ID. Moreover, each property of GA4 supports up to 50 data streams.

Acquisition Reporting

Universal Analytics

UA gives you insights into the performance of different customer acquisition channels, such as organic or paid ads. It helps to find out how visitors arrive at your website, which traffic source is working for you, and which pages require optimization.

Traffic acquisition reports are especially helpful to understand how traffic sources perform in terms of total sessions on the site and driving conversions.

Let's consider the Source/Medium report. This report is the place to go if you want to understand the performance of various traffic sources and mediums. You can also find the referrals under Acquisition, in All Traffic and All Referrals reports and use the information on the 'start session' point (where the user found the website) to optimize the results of your referral marketing campaigns.

GA4

In GA4, there are only 3 acquisition reports initially available. Therefore, GA4 might not provide the same level of useful analytics insight as you can get from UA. There is simply not enough information to really grasp the full picture of what's happening on a site.

Active user calculation

Universal Analytics

UA relies on manual instrumentation (firing of an interactive event).

GA4

In contrast, a user activity is detected automatically in GA4. A user can launch an app and be considered an active user in GA4 but not in UA. This may lead to higher active user counts for GA4.

App Tracking

Universal Analytics

UA required marketers to create multiple views to access data from websites and applications separately.

GA4

GA4, marketers can track both website and mobile application data in one view, which is a highly anticipated feature. GA4 uses an event-based tracking model for websites, like Google Analytics

Firebase for mobile apps. This new capability allows for a unified view of the user's journey across the website and app, making it easier to integrate data from both sources

Average Session Duration

Universal Analytics

In UA the session duration is calculated by taking the sum of all the time difference between two page views or two actions (which could include page views and events). So if a user spends 2 mins on page one and 20 mins on page two and leaves then the session duration will be only 2 mins, the time difference between the two page views.

GA4

In GA4, every 10 seconds (when your website or app is in view) an event called "engagement" is sent to the backend. Hence when the user leaves after 20 mins, GA4 would have sent 12 engagement hits to the server and would count the last 20 mins as well, so the session duration will be 22 mins.

The difference in how these metrics are calculated in the two versions of Google Analytics will cause the difference in these metrics.

Bounce Rate

Universal Analytics

In UA Bounce Rate is calculated as the percentage of single-page sessions in which there was no interaction with the page. For example, if a user visits your website and reads the content, on the first-page user visits, for several minutes, but leaves without clicking on any links or triggering any events being recorded as interaction events, then the session will count as a bounce.

Bounce rate, as it's calculated in UA, is a reasonable measure of site engagement, but it has become less useful as websites and apps have changed. For example, it's possible for users to view a single-page application (SPA) and leave without triggering an event, which would be considered a bounce.

In UA, Bounce rate is the percentage of all sessions on your site in which users viewed only one page and triggered only one request to the Analytics server.

GA4

In GA4, the Bounce rate is the percentage of sessions that were not engaged sessions. In other words, the Bounce rate is the inverse of the Engagement rate.

An engaged session is a session that lasts 10 seconds or longer, has 1 or more conversion events, or has 2 or more page or screen views. If a user doesn't have an engaged session (that is, they don't meet any of the criteria for an engaged session), then Google Analytics counts the session as a bounce.

Since the way bounce rate is calculated in UA and GA4, this metric is going to be very different and likely lower in GA4 than UA.

In GA4, Bounce rate is the percentage of sessions that were not engaged sessions. In other words, Bounce rate is the inverse of Engagement rate.

Additionally, Bounce rate, as it's calculated in GA4, provides a more useful way of measuring the level at which customers engage with your site or app. For example, if you operate a blog, you might not mind if customers visit your site to read an article and then leave. You probably care more about the number of customers who visit your site, don't find what they were looking for, and then quickly leave.

Metric	UA	GA4
Bounce rate	Percentage of single page sessions in which there was no interaction with the page. A bounced session has a duration of 0 seconds. For example, if a user visits your website and reviews content on your homepage for several minutes, but leaves without clicking on any links or triggering any events being recorded as interaction events, then the session will count as a bounce.	Percentage of sessions that were not engaged sessions. For example, if a user visits your website, reviews content on your homepage for less than 10 seconds, and then leaves without triggering any events or visiting any other pages or screens, then the session will count as a bounce. An engaged session is a session that lasts 10 seconds or longer, has 1 or more conversion events, or has 2 or more page or screen views. If a user doesn't have an engaged session (that is, they don't meet any of the criteria for an engaged session), then Google Analytics counts the session as a bounce.

Bounce Rate and Engagement Rate

Engagement rate is a ratio metric presented as a percentage, and the formula is engaged sessions/sessions. What are engaged sessions you ask? These are sessions that lasted at least 10 seconds, had at least 1 conversion event, or had at least 2 page / screen views.

Google suggests GA4 is more customer-centric because it no longer only measures customers' actions by individual devices or platforms. Instead, it assesses that behavior by measuring how the customer interacts with your business. So, some once-familiar metrics are now gone. Universal Analytics' bounce rate has been changed.

Universal Analytics

In UA, bounce rate was calculated as the percentage of website users that didn't view more than page on your website.

It's worth noting that, in UA, bounce rate doesn't have a time threshold. UA will record the session as a zero-second session if a site visitor bounces from a web page. Unlike the bounce rate metric, the engagement rate metric has a time threshold associated with it. Because of that, it might be more useful in measuring user engagement on a single-page web/app.

*This parameter is configurable. It makes the analysis more flexible, but also harder, since you have to know the default setting for that.

GA4

In GA4, bounce rate is the percentage of sessions that were not engaged sessions. In other words, bounce rate is the inverse of engagement rate, which is the number of engaged sessions divided by the total number of sessions in a specified time period.

In GA4, there is an engagement rate and bounce rate. Both metrics are defined in terms of engaged sessions:

- A session is a period during which a user is engaged with your website or app.
- An engaged session is a session that lasts longer than 10 seconds*, has a conversion event, or has at least two pageviews or screenviews.

The engagement rate is the percentage of engaged sessions on your website or mobile app. The bounce rate is the percentage of sessions that were not engaged.

It's a helpful metric, but it's less specific than bounce rate. Engagement rate is helpful but less specific than bounce rate. Hence, GA4 gives you less control, as the time for an engaged session is up to 55 seconds, and you have no way to stop conversion events from impacting the bounce

rate. Being able to view landing pages based on lowest and highest bounce rates is a great way for digital marketers to understand which pages perform best and which need optimization. If bounce rate is one of the key metrics for your business, you'll need to find a new way to identify your best and worst performing pages.

Content Groupings

Universal Analytics

In UA, content grouping lets you group content into a logical structure, and then view and compare metrics by group name. For example, you can see the aggregated number of pageviews for all pages in a group such as 'Men/Shirts,' and then drill in to see each URL or page title within that group. Additional UA content group dimensions may be implemented and operate separately.

GA4

Content groupings reporting is not available in GA4.

In GA4 you can take advantage of event parameters and custom dimensions to basically replicate the content groupings that we know from GA Universal.

GA4 properties have one predefined event parameter for content group ("content_group" in gtag.js or "Content Group" in GTM) that populates data into the "Content Group" dimension. In GA4 content group dimensions as event-scoped custom dimensions.

Conversions

Universal Analytics

UA counts only one conversion per session for each goal. So, if a user submits the form twice during the same session, only one conversion will be counted for the "Form Submit" goal.

UA supports five goal types: destination, duration, pages/session, smart goals, and event goals.
UA counts only one conversion per session, for the same goal.

GA4

GA4 counts every instance of the conversion event, even if the same conversion event is recorded multiple times during the same session. So, if a user submits the same form twice during the same session, two conversions will be counted.

GA4, only supports conversion events. It may not always be possible to use GA4 conversion events to precisely duplicate some UA goal types. For example, it's not possible to duplicate a smart or duration goal using GA4 conversion events.

GA4 usually counts multiple conversions per session, for the same conversion event. To reduce conversion count differences between your UA property and corresponding GA4 property, update your GA4 conversion counting method setting to Once per session.

Your UA reports may be excluding data based on view filters.

If you are comparing recent reports, you might see differences because GA4 is still processing data. For example, GA4 can update attributed conversions for up to 7 days after the conversion is recorded. More reasons for differences in conversion counts

Metric	**UA**	**GA4**
Conversions	You define a ***goal*** to indicate that a particular user action is to be considered a conversion. For example, if you define a "Form Submit" goal, a conversion will be registered each time a user submits the form. UA counts **only one** conversion per session for each goal. So, if a user submits the form twice during the same session,	You specify a ***conversion event*** for each action that you want to count as a conversion. For example, if you specify that the "Form Submit" event is a conversion event, a conversion will be registered each time a user submits the form. GA4 *usually* counts **every instance** of the conversion event, even if the same

	only one conversion will be counted for the “Form Submit” goal.	conversion event is recorded multiple times during the same session. So, if a user submits the form twice during the same session, two conversions will be counted. To reduce conversion count differences between your UA property and corresponding GA4 property, update your GA4 conversion counting method setting to *Once per session*.

Conversion Attribution

Universal Analytics

UA has robust attribution modeling features with multi-channel funnels and extensive attribution reports. It is essential in assessing conversion. What’s more, UA allows you to segment your attribution reports. Also, it provides you with data-driven attribution reports that work based on algorithms and let you assess converting and non-converting paths.

GA4

Attribution modeling in GA4 is data-driven and uses advanced AI to understand each touchpoint’s impact on conversion.

Cookies and Consent Requirements

Universal Analytics

In UA, data gets into the analytics platform from cookie-based tracking. The website sends cookies (or similar identifiers) to a user's web browser, allowing for monitoring web activity during that user's session on the site.

If your company manages personal data from EU residents, the EU's General Data Protection Regulation (GDPR) applies to your organization. GDPR requires website owners to disclose details such as the type, source and purpose of data collection, and with whom this data is shared. According to GDPR, you have to get explicit consent from EU residents to collect and process their personal information. If the user refuses to consent, you can't collect their personal data.

Using a tool like UA to track users, you'll need to ask for consent via a cookie consent banner. That's because cookies used by platforms such as GA can contain a great deal of personal data about a visitor's identity, location, and online activities.

Depending on how many users choose to opt-in, this could cause a decrease in measurable website traffic.

GA4

GA4, rather than relying on cookies and JavaScript variables to track every pageview, tracks data based on specific events. But Google Analytics 4 also uses cookies where they are available for tracking.

You still need to display a cookie consent banner on your website to trigger GA4 tags and capture user data. If consent isn't granted, the data is captured, but without identifiers. The collected data will only consist of events with limited user information, which makes it difficult to analyze the customer journey, run conversion attribution, or analyze funnels. The events won't be tied to a session.

Google applies behavioral modeling – machine learning is used to model the behavior of users who decline analytics cookies based on the behavior of similar users who accept analytics cookies. It means that the reports you analyze in GA4 display data that is modeled, and not the

real behavior of your website's visitors. Because of that, GA4's 'privacy by design' might not be a solution to capturing 100% of reliable data when users don't want to be tracked.

Cross-Domain Tracking

Universal Analytics

Cross-domain tracking has proven to be a bit challenging to set up in Google UA, in part because it required changes at both the tracking and admin levels.

GA4

Cross-domain tracking in GA4 promises to be a much simpler proposition. It is configured through admin settings only and without changes to the on-page tracking.

In GA4, you set up cross-domain tracking through an admin setting only rather than through tagging and admin modifications.

As an important note, the alert on the page informs us that if we are maintaining dual tagging for GA Universal and GA4, we must specify the same domains for cross-domain tracking.

Also note that since GA4 cross-domain tracking is still in beta, and will likely benefit from future refinements to the feature.

Custom Dimensions/Metrics

Universal Analytics

Custom dimensions and custom metrics in UA are used to add information to collected data.

GA4

In GA4, event parameters serve this purpose. Map your custom dimensions and metrics as follows, according to their scope.

Scope in your Universal Analytics property	maps to the following in your Google Analytics 4 property
Hit-scoped	Event scoped custom dimension
User-scoped	User scoped custom dimension
Session-scoped	No Google Analytics 4 property equivalent
Product-scoped	E-commerce parameters

Customer Journey Analytics: funnels, user flows and more

Universal Analytics

With UA's session-based model, user flows and funnels are based on events that happened within one visit (session). It can be less accurate when the steps in a conversion funnel were completed during separate visits.

In UA, using funnels requires defining a goal. The report will only show data collected going forward from that point. In UA step customization is based on Page dimension.

UA offers many types of flow reporting. The list includes:

- Behavior flow
- Goal flow
- Users flow
- Events flow
- Funnel visualization
- Google Play referral flow

GA4

GA4 gives you customer-centric measurement from multiple touchpoints, instead of measurement fragmented by device or by platform. Customer-centric insights might give you a fuller picture of the buyer funnel, especially if your conversion funnel involves many steps that can be completed during separate visits.

GA4 users have access to funnel exploration features. In GA4, funnel exploration utilizes data that's already been collected. In GA4 step customization is based on events, with filtering by other dimensions.

In GA4, you can choose how to count conversions with the new counting method setting for conversion events. "Once per event" is recommended, but if you need it to match Universal Analytics, choose "Once per session."

GA4 doesn't have a behavior flow report. Instead, you can use your exploration templates to follow your user's journey. Use your funnel exploration report to track a predetermined path or your path exploration for free-form tracking.

Custom Metrics

Universal Analytics

In Google UA, you can capture custom metrics directly, meaning that you send numeric data with an event or pageview hit explicitly as a custom metric.

GA4

Similar to GA4 custom dimensions, it's the mapping of an event parameter that determines if it will be treated as a custom metric. For instance, in the example below, we're tracking the 25% milestone on a video as a numeric event parameter.

From within the All Events report, you can map this event parameter as a custom metric to be incremented each time a user generates a GA4 event containing this parameter: Mapping the milestone_25 event parameter as a custom metric.

Data Limits

Universal Analytics

In UA, each tracking event is sent as an individual image beacon to Google servers. An Ecommerce website that sends data on all pageviews, interactions, product impressions can be a significant load on Google servers so Google has historically imposed hit limits on the free version of Google Analytics.

Example limits for the free tier UA include:

- 10 million hits per property
- 200,000 per users per day
- 500 hits per session
- There are also limits to how many hits you can send within a one second.

The enterprise level of Google Analytics Universal (GA360) offers higher data collection limits than the free version.

GA4

These limits do not apply to GA4 properties.

GA4 utilizes a queuing system that Google developed so multiple events can be bundled together in the same network request which means less of a load on Google servers.

However, there are other limitations to be aware of in GA4. Google has imposed various limits on the number of distinct events you can track and the number of parameters per event, and the length of characters on those parameters. A full list of limits are documented here.

Configuration Limits

GA4 lets you track an endless number of parameters with events but you will not be able to access each one from the interface. You will need to cherry-pick your top 50 text parameters to map as custom dimensions persisted in the reporting UI.

You can also map 50 numeric parameters as custom metrics, but most implementations need a far greater number of text parameters than numeric parameters, so you're probably more likely to reach the limit of custom dimension slots than custom metric slots.

In any case, all event parameters, even beyond the limit of 50 text and 50 numeric persisted in the reporting UI, are passed through to BigQuery, where you can take full advantage of them for analysis, modeling, audience building, and more.

Data Model

Universal Analytics

UA has a session-based data model; within these sessions are various hit types. Most Google Analytics data is sent in the form of pageview hits and event hits, with some basic ecommerce data sent as transaction hits.

GA4

In GA4 data model is event-based. All data sent to GA4 has adopted the Firebase data model in the form of events. Each event is distinguished with the event_name parameter, with additional parameters to describe the event.

In GA4 you're no longer looking for the built-in Event Category/Action/Label taxonomy. Instead, the parameter will start with event_name, and you'll add other parameters to describe the

interaction. The following table illustrates how you might capture a newsletter signup in GA4 vs. GA Universal:

Google Analytics Universal	**Google Analytics 4**
Event Category: form *Event Action:* submit *Event Label:* newsletter-signup	*event_name:* generate_lead *lead_type:* newsletter-signup

Data Setup Organization

Universal Analytics

In UA, you need to create separate properties for your website and app. In addition, each property is recommended to include 3 distinct views. The first view is unfiltered, where you store all of the raw data. The second is a test view, in which you add filters and conduct experiments. And the last is a master view that gathers all the goals, filters, and other customizations you've tested in the test view.

GA4

In GA4, a website or an app will be considered a 'data stream', and they can fall under one single property. A data stream is a data funnel starting from a customer's touch point to GA4. Each GA4 property can have a maximum of 50 data streams.

Events

An event allows you to measure a distinct user interaction on your site or app.

Events represent a fundamental data model difference between UA and GA4 properties.

Universal Analytics

In UA, events are created with the help of Google Tag Manger (GTM). When we create a UA event with GTM, we set up new tracking for something new that Universal Analytics won't track out of the box. There are 4 specific "parameters" that we can send along with every event in Universal Analytics. A parameter is additional information that we can use to better understand and analyze the event in question. Here are those parameters:

- Event Category (category is required)
- Event Action (action is required)
- Event Label (label is optional)
- Event Value (value is optional)

You will see these 4 parameters when you create a new event Tag in Google Tag Manager, and these are the same parameters that you see in your UA property. The names you give your parameters in GTM are the same names that flow into your Universal Analytics reports.

GA4

In GA4, some examples are page loads, downloads, link clicks, add-to-cart actions, form submissions and time spent on a page are all events that we can measure to better understand user behavior. In GA4 all of these distinct user interactions are measured as events.

In GA4 properties, every "hit" is an event; there is no distinction between hit types. For example, when someone views one of your website pages, a page_view event is triggered.

GA4 events have no notion of Category, Action, and Label and, unlike Universal Analytics reports, Google Analytics 4 reports do not display Category, Action, and Label. Therefore, it's better to

rethink your data collection in terms of the GA4 model rather than port your existing event structure to GA4.

Hit Type in Universal Analytics property	Measurement in GA4 property
Page View	Event
Event.	Event
Social	Event
Transaction/e-commerce	Event
User timing	Event
Exception	Event
App/screen view	Event

Event Count

This metric will be very different in the two versions and can't be compared.

Universal Analytics

In UA, certain actions can be tracked as Events.

GA4

While in GA4 every action and interaction is tracked as an event. This is a fundamental difference between the two versions of Google Analytics.

In GA4, the sign_up event may or may not mean the same thing as in UA. If your website only has one signup form and only one button where the sign up event would fire, then these event counts may be quite close. However, if your website has multiple sign_up events, then comparing the event count between GA4 and UA may not be as straightforward and the numbers may not be close.

GA4 reports do not display Category, Action, and Label. It's better to rethink your data collection in terms of the GA4 model rather than port your existing event structure to GA4.

Metric	UA	GA4
Total Events	A Universal Analytics event has a Category, Action, and Label and is its own hit type. For example, an event can be set up to register that a sign-up button has been clicked. The event might have a Category of "CTA", an Action of "Sign Up", and a Label that is the destination URL. *Total Events* increments each time a Category/Action/Label event is triggered.	N/A

Enhanced Measurement

Universal Analytics

In UA, enhanced measurement tracking typically required custom GTM configuration.

GA4

GA4 has made the most common tracking available out-of-the-box with little to no configuration required. It is now standard for all GA4 properties. While this should be plug-in-play for most websites, you do have the option to disable.

Exports to BigQuery are free with GA4

Universal Analytics

For UA, this was limited to Analytics 360 properties.

GA4

With GA4, BigQuery exports are made available to all properties. This means that you are able to send raw events to BigQuery, which can then be queried using SQL. The function itself does not cost anything as long as usage is within the sandbox limits for BigQuery. It's worth noting that the sandbox environment does not support streaming data.

Goal Conversions

Universal Analytics

In UA, you can report and analyze the conversion rate of each traffic source for each goal. You may use the 'end session' point to analyze and optimize the conversion rate. For example, the Goal URLs report shows you the URLs where most goals are completed.

In many cases, this report will show the URL which you have assigned as the goal completion point (for example, a sign-up form the "thank you" page). And if you're using events to assign goals, this report becomes even more useful, as it shows which elements of the website help convert the best. With the code implemented on every page of your website you may collect data on clicks on buttons, links, social media profiles and more.

GA4

In GA4, goals as conversions are not URL-based. For example, you can't use the 'end session' point as in GA3, so it's hard to locate actual drop-offs without sessions. You can only see conversions based on events, requiring you to use Google Tag Manager for most conversion items. To set the events as a conversion, you will have to mark it as a conversion in existing events.

On the one hand, such a conversion tracking setup gives you more flexibility and lets you track even very complex sequences of events. But the need to use GTM even for simple conversions makes the setup difficult. Moreover, in GA4, specific events marked as conversions can't be isolated as separate metrics in reporting.

Hit

A hit is simply an interaction that a visitor has on your site that is recorded and results in data being sent to Google Analytics.

Universal Analytics

In UA, there are multiple hit types for visitor interactions. The UA property automatically collects data each time a new page loads up (the "pageview" hit type). With UA, it is possible to track things like file downloads, button clicks and scroll depth tracking, but it requires using Google Tag Manager to set up event tracking. In UA, all of the user interactions that occur during a single visit (page views, tracked clicks, downloads and more) are bundled together and sent as a distinct "session" so there is a record of everything that took place during that visit.

In UA, interactions were captured in many different hit types such as page views, transactions, and social interactions.

GA4

In GA4 are event hit types. Every interaction is captured as an event. Events existed in UA as well; with an associated category, action, and label; but these classifications do not exist in GA4. Instead, GA4 works with event parameters that are additional pieces of information about the action (event) a user took. Some event parameters are sent automatically, such as page_title, and additional ones can be added (you can log up to 25 event parameters with each event).

Since the data models are fundamentally different, Google recommends that you do not simply copy over existing event logic from UA to GA4, but instead implement new logic that makes sense in this new context.

Hit types

UA	GA4
Page View	Event
Event	Event
Social	Event
Transaction/e-commerce	Event
User timing	Event
Exception	Event
App/screen view	Event

Pageviews

In general, Pageviews should be fairly close between UA and GA4, generally within a few percentage points, since the Google tag fires on each page and generates a pageview. However, the differences can vary based on any filters you may have set up in UA or GA4.

Universal Analytics

UA measures screenviews in separate mobile-specific properties.

UA allows for additional filtering options which may impact the data contained in the view you are comparing to. For example, if you use a filter to exclude certain geographic regions, then your pageview counts between UA and GA4 may differ more.

UA properties, it's common practice to set up a manual pageview for single-page applications (SPAs). That's because the automatic pageview couldn’t measure pageviews for SPAs out of the box.

GA4

GA4 combines both web and app data in the same property.

GA4 properties currently do not support filters, while data in Universal Analytics reporting may be subject to view filters that exclude data.

In Google Analytics 4, you don't need to implement custom tagging. Instead, you can turn on enhanced measurement to measure these automatically.

Metric	**UA**	**GA4**
Pageview	Total number of pages viewed. Repeated views of a single page are counted.	aka *Views*: Total number of app screens and/or web pages your users saw. (The *Views* metric found in the reporting interface is the combination of pageviews and screenviews.) Repeated views of a single screen or page are counted.
Unique Pageview	Total number of pages viewed but duplicates are not counted	N/A

Pageviews and Screenviews

Universal Analytics

Page views in UA is Pageviews.

A screenview is the app analog to a pageview.

GA4

Page views in UA translate to the page_view event in GA4 properties.

A page_view event is automatically triggered by the config gtag command or by the GA4 Configuration tag in Google Tag Manager.

In GA4 properties, a screen_view event is triggered each time a user views a screen. The Pageviews total should be fairly close between UA and GA4, usually within a few percentage points, since the Google tag functions identically when recording pageview hits. The range of variation between the totals is usually due to different filters applied in UA and GA4.

Some Universal Analytics pageview attributes have GA4 equivalents, as shown below:

Pageview attribute in Universal Analytics	**Pageview attribute in Google Analytics 4**
page_title	page_title
page_location	page_location
page_path	page_path
None	page_referrer

Page View Per Session

Universal Analytics

In UA, Pages per session. Page views per session can be different if the session count is different

GA4

In GA4, Views Per Session.

In addition to session-based metrics, there is also a metric called Views Per User in GA4.

Purchases

Web purchase counts should match closely. We never expect all events to be collected perfectly, and purchase events are no exception to that rule, however these events are atomic and critical so event counts should match closely across UA/GA4.

Metric	UA	GA4
Purchases	• purchase events are fired within the Enhanced Ecommerce model • Data is pulled from a products array via Google Analytics-provided JavaScript and collected in a purchase event when you choose to send that event	• purchase events are recommended and collect data in a similar fashion to UA, but there are differences • Does not provide additional JavaScript for array collection and expects you to provide the items array when collecting a purchase event on your own (though the same advice is given with regard to populating a data layer object)

Reports

You may also find that some Universal reports have no direct equivalent in GA4.

Universal Analytics

UA emphasizes built-in reports.

GA4

GA4 is more oriented towards custom reporting templates and analyzing and activating the datasets on other platforms (particularly BigQuery).

GA4 is somewhat more oriented towards custom report templates than built-in reports. The Path Analysis template allows you to map user interactions starting from or leading to a specific event.

Report Data in your Universal Analytics and Google Analytics 4 Properties

When comparing your GA4 property data to your UA data, ensure that:

- Your Tracking ID (from your UA property) and tag ID (from your GA4 property) are both collecting data from the same web pages.
- Both properties have equivalent tag implementations.
- All tags are firing successfully. Google Tag Assistant can help you verify that your tags are working correctly.
- Your UA property and GA4 property use the same time zones (Property settings > Reporting time zone).
- You compare an unfiltered view in your UA property to a single web data stream in your GA4 property.
- Both the UA property and the GA4 property have been collecting data for at least 30 minutes, so that you can compare data in the Realtime reports.

With all of the conditions above in place, you can compare the following data in the Realtime reports between your UA property and GA4 property:

UA property metric / report	Google Analytics 4 property metric / report
Pageviews Realtime > Content > Pageviews tab	Event count (for page_view event) Realtime > *Event count by Event name* card
Goal completions Realtime > Conversions	Conversions *Conversions by Event name* card (If you enabled an event as a conversion that maps to one of your goal completions, e.g., you created and enabled as a conversion an event for opening a specific page that maps to one of your destination goals.)

Rich Ecommerce Tracking Capabilities

Universal Analytics

UA offers a wealth of data related to ecommerce. You can use it to track and analyze transactions, revenue, or products you've sold.

Ecommerce data in UA gives you insights into products with a high (or low) number of sales, the average revenue, the number of products per transaction, your online store's conversion rate or changes, and trends in transactions and revenue over time.

GA4

GA4 lacks the enhanced ecommerce module available in UA. Ecommerce reports in GA4 seem to provide much less information than what Universal Analytics offered. For example, the lack of product-level custom dimensions in GA4 can surprise you if you depend heavily on ecommerce.

Additionally, GA4 lacks some important metrics for measuring item-level performance that were previously available – Add-to-detail and Buy-to-detail rate.

Due to the different conversion model, you will need to head to Google Tag Manager (GTM) if you want to track more complex conversions like click-to-call or purchases. It requires technical knowledge to go in and set them up. This can be especially tricky for ecommerce site owners who may need to track multiple complex conversions.

So, if your business relies on detailed ecommerce reports, you shouldn't rely solely on GA4. At least not yet.

Sampling

Universal Analytics

UA, particularly the standard/unpaid version, is susceptible to heavy sampling.

Sites that have a high volume of traffic and high cardinality will eventually trigger "sampling" when you make a request that combines dimensions and metrics in a way that cannot be pulled from pre-aggregated tables. Sampling serves to balance Google's ability to calculate complex reports while preventing excess use of computation resources.

The sacrifice that sampling entails is the size of the sample itself. UA sometimes bases its on-the-fly calculations on as little as 1% of your actual data. If this 1% of data is not really representative of the full data capture, your reporting the data will present a highly skewed view of reality.

GA4

With GA4's event-based data model and UI restrictions, sampling should be less of an issue.

Sessions

A session is a group of user interactions with your website that take place within a given time frame.

Universal Analytics

In UA, a session can comprise multiple page views, events, social interactions, and ecommerce transactions. Sessions are typically defined as having ended once there has been a 30 minute period of inactivity or another qualifying reset event has occurred.

UA will increment a session with any of these scenarios:

- Time based expiration:
- 30 minutes of inactivity (as the default setting)
- At midnight
- Change in medium, source, or campaign dimensions

GA4

GA4 session metrics are derived from the session_start event, an automatically collected event. The duration of a session is based on the time span between the first and last event in the session. This and other nuances can lead to sessionization differences between your UA and GA4 properties.

In GA4, a session_start will trigger on each new session. If 30 minutes have elapsed without the user generating any events, the next event that the user does generate will automatically generate a new session_start event.

This approach for calculating sessions in GA4 is comparable to the basic session calculation logic in Universal, but the other factors in Universal that also trigger a new session – namely, change

in day or traffic acquisition dimensions – no longer apply. For this reason, GA4 may display fewer sessions than GA Universal for the same user interactions.

Metric	UA	GA4
Session	• Period of time a user is actively engaged with your website or app • Has defined parameters for what may cause it to end e.g. a session will end when there has been more than a 30-minute period of inactivity (depending on the session timeout settings), the timestamp has been cut off at midnight (according to the timezone the view is set up in), or new campaign parameters are encountered. • If a user comes back after a session timeout, it will start a new session • If the user is on the website when midnight arrives, a new session will be started • If a user picks up new campaign parameters while on the website, a new session will be started	aka Session Start • To determine the session that each event comes from, the session_start event generates a session ID and Analytics associates the session ID with each subsequent event in the session • A session will end when there has been more than a 30-minute period of inactivity (depending on the session timeout settings) • Sessions are not restarted at midnight or when new campaign parameters are encountered • If a user comes back after a session timeout, it will start a new session

Keep in mind:

The difference in session count between UA and GA4 can vary from business to business depending on several factors, including:

- Geography - consider the timezones of your users and how likely they are to cross the midnight threshold to restart a session. This is especially relevant if you have a global customer base.
- Use of UTMs on owned websites or apps - Using UTM tagging on your own website is not recommended since it will reset the session in Universal Analytics. If you do use UTMs on your own website, you may see a much higher count of sessions in UA than in GA4.
- Filters - The data in UA reporting may be subject to view filters that exclude data. The data in GA4 reporting for Google Analytics 360 customers may be subject to filters that define which data from a source property appears in a subproperty. However, Google Analytics still generates a session ID when you filter out the session_start event from a subproperty.
- Estimation - Google Analytics 4 properties use a statistical estimate of the number of sessions that occurred on your website or app by estimating the number of unique session IDs, while Universal Analytics properties don't estimate the number of sessions. The estimates used by Google Analytics 4 properties more efficiently count sessions with high accuracy and low error rate.

Session Calculations

Universal Analytics

In UA, a session represents the period of time that a user is actively engaged with your site. After landing on your site, these are the things that ends a session in UA:

- 30 minutes of inactivity (or your session timeout settings)
- The clock passing midnight (resulting in a new session)
- New campaign parameters are encountered (i.e. if you use UTM parameters for internal links on your website -- therefore, this is not recommended by Google).

GA4

In GA4 by contrast, the session_start event generates a session ID with which all subsequent events during the session are associated. Similar to UA, a session ends after 30 minutes of inactivity (or your session timeout settings), but sessions can now carry over across midnight and are not affected by encountering new campaign parameters. If your site has a global audience, this can cause discrepancies in the Session figures you see for UA and GA4 respectively.

Session Counting

Universal Analytics

In UA, a new campaign will start a new session regardless of activity.

Late hits may also be a factor.

Late hits are hits that aren't sent immediately. In UA, hits are processed if they arrive within 4 hours of the close of the preceding day.

GA4

In GA4, a new campaign does not begin a new session. This may lead to lower session counts in your GA4 property.

Late hits may also be a factor.

In GA4, events are processed if they arrive up to 72 hours late. Because GA4 events are processed across a wider time range, you may see higher session counts in your GA4 property, as well as variations in reported figures within these 72 hours. For example, a user loses service while browsing your website on their mobile device and then regains service 48 hours later. GA4 processes the late hit, while UA doesn't, leading GA4 to produce a higher session count.

Logged GA4 events are uploaded automatically when iOS apps are backgrounded. This is not the case in UA. As a result, iOS-related metrics may be significantly higher in your GA4 reports.

Session/Traffic-based Acquisition Metrics

Many acquisition reports will show you users and sessions. These might have slight differences in Users or Sessions.

Note: GA4 can update attributed conversions for up to 7 days after the conversion is recorded, which can result in different numbers in attribution reports.

Metric	UA	GA4
Session/Traffic based Acquisition metrics	Found in the Acquisition section in a number of different reports, such as the Channels report or the Source/Medium report Channel or Source/Medium is the dimension being analyzed against metrics such as *Users* and *Sessions*	Traffic acquisition metrics can be found in the Traffic Acquisition report The dimensions of Channel or Source/Medium are measured against metrics such as *Users* and *Sessions* Note that the main differences you may see between UA and GA4 for acquisition metrics are aligned with the differences you will see for the metrics of *Users* or *Sessions*

Spam / Fake Data Prevention

Universal Analytics

A common problem in data accuracy in UA has been spam referrals. With just the Google UA property ID, it's easy for bad actors to populate someone's Google Analytics property with spam data using the Measurement Protocol.

GA4

Google has now made this virtually impossible with GA4 by forcing Measurement Protocol hits to include a secret key that is visible in the GA4 web data stream settings but is not available publicly. Only hits with a valid key can send data to a GA4 property.

Tag Manager

Universal Analytics

If you were using the more basic functionality of GA Universal, you could use it without Google Tag Manager. For instance, you could create destination page conversions in Google Analytics itself.

GA4

With GA4, this is no longer possible. All goals are event-based, so it is more important than ever to know your way around Google Tag Manager. Especially if you are working in digital marketing or e-commerce.

Understanding Tag Manager (or GTM) and being able to work with it, is also helpful for advanced data collection. For instance, you will need it to create custom events and custom dimensions.

Tracking Model

Universal Analytics

UA uses a session-based data collection method, where each interaction in a session is recorded as a separate hit type (e.g., page views, social interactions, events, transactions). Although events also exist in UA, the method of creating events is different. In UA, creating an event requires an associated category, action, and label.

GA4

GA4 uses an event-based method, where all activities and interactions are collected and stored as an event.

In GA4, creating an event involves providing additional information about the action (event), called parameters. Moreover, GA4 comes with pre-built events for monitoring user journeys and interactions.

Tracking Paradigm

Universal Analytics

UA uses a tracking paradigm based on sessions and pageviews. UA collects and measures different user interactions with your website within a given period as sessions or 'hits'. Primarily, Universal Analytics tracks only page views across your properties. While a session in UA can also include multiple additional events, it requires some technical skills in event tracking and Google Tag Manager to make that happen.

GA4

GA4 measures event-based data. GA4 is built to capture what's happening on your website and app as 'events' instead. This new data measurement model gives a full overview of your user engagement on and off the web, regardless of your technical capabilities.

There are 4 event types in GA4:

- Automatically collected events are triggered by basic interactions when you install the GA4 code base. Some examples of this type of event are page_view, first_visit, and session_start.
- Enhanced measurement events are also automatically collected and allow you to track engagement with your content. For example, with enhanced measurement events, you can see data related to scrolls, outbound clicks, site search, video engagement, and file downloads. Some specific measurements in this event type can be manually disabled in settings.

- Recommended events are not automatically collected but can help you measure additional data and thus create more useful reports.
- Custom events consist of names and sets of parameters defined and unique to your business. Before setting up a custom event, review the list of automatically collected, enhanced measurement, and recommended events first to avoid duplicates.

Universal Analytics and Google Analytics 4 Measurement Models

Since UA is a session-based analytics platform, it uses sessions as the foundation of all reporting. A session refers to various interactions that take place within a given timeframe. You can think of a session as a container for all user actions on your site.

What is crucial in session-based analytics is how the session started (for example, which channel the user came from) and how it ended (for example, where the user dropped off), average session times, and pages per visit, just to give a few examples.

The GA4 event-based data changes how data is measured. GA4 relies on user-based tracking, focusing on user interactions and events across various digital platforms. While things like page views, user timing, and app/screen views are classified as hit types in session-based analytics, here they're all counted as events.

Let's explain it a bit further. In UA, events track information about specific user actions within your page, such as button clicks or scrolls. You also need to set them up to make them work. In GA4, the event-based data measurement model provides a more user-centric view of data beyond tracking sessions and page views. All data that comes into your reports is events, including information about users, actions, and information from your website and/or mobile apps.

In UA, events are managed with Google Tag Manager or by including code on the site. With GA4, some events can be edited directly in the Google Analytics user interface.

Users

Universal Analytics

In UA, there are two User metrics: Total Users, and New Users.

UA highlights Total Users (shown as Users) in most reports.

The calculation for this metric is using Total Users.

GA4

In GA4, there are three User metrics: Total Users, Active Users, and New Users.

Active Users, a new metric in GA4, is the total number of users who have engaged session or are new users.

GA4 focuses on Active Users (also shown as Users).

The calculation for this metric is using Active Users.

Generally,

the numbers in both UA and GA should be very close.

However, the following two reasons can lead to bigger differences in the two metrics.

1. The method used to track users. For example, if Google Analytics 4 property might be using User-ID while the Universal Analytics property is using Client ID.
2. Filters: UA also can exclude certain users based on view filter settings. In GA4 there are limited settings to exclude users, which could result in different numbers.

Metric	UA	GA4
Total Users	Primary user metric in UA: Total number of users	Total number of unique users who logged an event
New Users	Number of users who interacted with your site for the first time	Number of users who interacted with your site or launched your app for the first time

		The metric is measured by the number of new unique user IDs that logged the first_open or first_visit event.
Active Users	N/A	Primary user metric in GA4: Number of distinct users who visited your website or application. An active user is any user who has an engaged session or when Analytics collects: • the first_visit event or engagement_time_msec parameter from a website • the first_open event or engagement_time_msec parameter from an Android app • the first_open or user_engagement event from an iOS app
User-Identity	Client ID	User-ID

User Entity Modeling

Universal Analytics

Whenever you visit a website, you'll most likely be asked to give consent to the cookies settings. Once you've accepted the terms, the website that integrates with UA sends the cookies into your web browser, and they'll be able to record and monitor your actions online during a specific session. Unfortunately, nowadays, websites aren't the only channels through which customers interact with businesses. More and more people engage in-app and find information from multiple platforms where cookies aren't available. Relying only on cookies makes combining user behavior data from various touchpoints difficult to get a big picture of their interactions.

GA4

With GA4's new user entity modeling—offering both cookies and Google signals, you can now stitch the data together in a single unified cross-device user journey. Google signals are data from users who are signed in to Google. They can help fill the gap of data that the lack of cookies leaves behind.

User Identification

Universal Analytics

In the current UA property, a default view reports on anonymous/unknown traffic which was identified with the anonymous Client ID, which is read automatically from the _ga cookie.

If your website includes a logged-in state, you could then create a separate view that reconciles users based on the User ID value exposed in your data layer and populated into Google Analytics for authenticated users.

This somewhat either/or approach is not ideal in that it does not provide a single view of your data to take advantage of the multiple identifiers that can be used to unify separate sessions across individual users. The views based on User ID don't recognize Client ID and sometimes don't yield a lot of data.

GA4

GA4 instead takes advantage of a "fallback" approach with multiple methods to identify or dedupe unique users.

1. User ID: GA4 will first check if you have passed a User ID value that represents authentication to your own back end and that you typically exposed on your website data layer.
2. Google Signals: If User ID is available, GA uses Google Signals which is tied to a Google login. (You need to activate Google Signals in your GA4 property.)
3. Client ID: If nothing is detected so far, GA4 will default to the Client ID (the _ga cookie).

Note: Don't be alarmed if your GA4 is reporting fewer Users than Universal: it's doing a better job at deduping users across multiple devices – and across multiple data streams.

User-ID vs. Client ID

The following table summarizes the differences between Client ID and User-ID:

	Client ID	User-ID
What does the ID Represent?	An pseudonymous device or browser instance.	A single user, like a signed-in user account, that may interact with content across one or more devices and / or browser instances.
How is the ID Set?	Randomly generated and automatically sent with all hits by Analytics libraries.	You must set and send your own userIds with your Analytics hits.
How is ID Used to Calculate Unique Users?	In a non-User-ID-enabled view, Client ID is used to calculate unique users.	In a User-ID-enabled view, the user ID is used to calculate unique users

User Interface

GA4

The reporting interface in GA4 has been updated and is noticeably different from UA. Many reports and metrics have been removed or replaced in GA4, resulting in a smaller number of standard reports that are easier to manage and navigate.

GA4 also has a modern and user-friendly interface with simplified navigation. The five main collections are reorganized into four collections—Acquisition, Engagement, Monetization, and Retention—that represent a user's lifecycle on the website

A quick recap of the platform's capabilities

Advantages and disadvantages of GA3 (Universal Analytics)

Rich attribution modeling features

You get a bird's eye view of each customer journey — from the starting point to the moment of conversion.

Privacy compliance

According to several EU data protection authorities, the use of Universal Analytics is illegal under GDPR.

Robust standard acquisition reporting

It gives you insights into how visitors arrive at your website, which traffic source is working for you, and pages that require optimization.

Customer journey limitation

User flows and funnels are based on events that happened within one visit. It is less accurate when the steps in a conversion funnel are completed during separate visits.

Rich ecommerce tracking capabilities

UA offers a long list of tracking details. You can use it to track and analyze transaction data, revenue, or products you've sold.

Data sampling

Automatic sampling for more than 500K sessions per month.

Quick goal conversions

You can report and analyze the conversion rate of each traffic source for each goal.

Separate tracking for web and mobile apps

If you want to track a mobile app's data in your Google Analytics account, you need to rely upon a Firebase integration to do it.

Advantages and disadvantages of GA4

One platform for both website and mobile app data

GA4's event-based data model allows for a unified tracking system for web and app.

Steep learning curve (not an out-of-the box solution)

The data model is completely different, new UI, very few standard features, missing key metrics.

Better user insights

GA4 gives you customer-centric measurement from multiple touchpoints, which gives you a fuller picture of the buyer funnel.

Limited acquisition reporting

Only 3 default acquisition reports that don't provide the same level of useful analytics insight that we can get from Universal Analytics.

Greater customization options

You can customize your events, so they can be used to report on various actions your users take and any user traits you would like to see in your reports.

All conversions are events/Different conversions

If you're used to using URL destination goals in UA, you'll need to set up events in GA4 with the same goal values. This is way more complicated than simply creating a goal in UA.

Data sampling

It occurs only in advanced reporting when the data exceeds 10 million in counts.

Privacy

Despite some privacy changes introduced in GA4, the new version of the product is considered illegal by some European DPAs.

Lack of historical data

When you switch to GA4, you're starting from scratch. All of your historical data from UA will not be transferred over.

Resources:

[UA→GA4] Comparing metrics: Google Analytics 4 vs. Universal Analytics - Analytics Help

GA4 vs Universal Analytics (GA3): Difference in Metrics - Optizent

GA4 vs Universal Analytics - 7 key differences | Funnel

GA4 vs Universal Analytics: Why Moving to GA4 is Important (astera.com)

Google Analytics 4 vs. Universal Analytics: what's the difference - Supermetrics

Universal Analytics vs. Google Analytics 4: Data models and other key differences explained - (piwik.pro)

Universal Analytics (UA) vs Google Analytics 4 (GA4): 15 Key Differences | Cardinal Path

[UA→GA4] Universal Analytics versus Google Analytics 4 data - Analytics Help

How Sessions are Different in GA4 vs. Universal Analytics | Ontario SEO