Taking the measure of your customer experience

Ending the tyranny of the session
In the mid-1990s, website server log file analysts (creating a practice later to be known as web analytics) created the concept of the session. The “session” was, philosophically, a measure reflecting the singular amount of attention that a visitor gave to a website, by landing on and loading pages, navigating links and reading content. Out of necessity, these analysts needed to define a time span around which to base good measurements and arbitrarily chose 30 minutes, and the session was born. For measurement purposes, the session might not last 30 full minutes or the session might last much longer, but if a visitor was inactive for 30 minutes, the session was over. This framing has dominated the field of web – now digital – analytics ever since, with Adobe, Google, Webtrends, Coremetrics and other tools currently defining a session (or “visit”) as the continuous, sequential behavior of a visitor on an online property until there has been no activity for 30 minutes.1

From a data scientist’s perspective, such a definition was necessary: the raw server-log data reflected a barrage of continuous clickstream data of a volume not seen previously and which has only grown. While the technologies used to store this data have evolved to include big data and Hadoop-based platforms, the business container has not, limiting the insights we can gain from the clickstream. The business container in use today is still the same one created over two decades ago – a timestamp is combined with a cookie or IP address combination, and sessions are cut off with 30 minutes of gap in the clickstream. Most standard digital analytics behavior is measured within this session framework: “conversion rate” is actually “conversions per session”; “landing pages” are the first page-load within a session; “campaign response” is the campaign that generated a session; “referrers” are the websites immediately before that session, and an “exit page” is the last thing a visitor did in that session before that 30-minute window expired. The session concept has become so ingrained in the way that we think about online behavior that no one questions the concept or why it was created in the first place.

It is time to end this tyranny. As the word “experience” has come to dominate the digital world, mature analytics teams have realized that the true measure of engagement is not what happens during an arbitrary length of time, but what happens with a visitor during the full digital experience, and whether the brand is able to fulfill the expectations of that visitor across their entire journey. This whitepaper presents this framework, introduces ways that it should be measured, discusses the concepts of “behavioral signatures” and “milestones,” and, in the end, calls on analysts and vendors to provide the flexibility needed to break apart that 30-minute defining barrier.

Sic semper tyrannis! –
Marcus Junius Brutus, 44 B.C.E.

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1 Over the years, slight nuances have been made to account for outlier traffic, with Adobe, for example, also cutting a visit off if there has been continuous activity for 24 hours.
1. Current pervasiveness of the session

In common digital reporting, it is difficult to escape the pervasiveness of the session, whether analysts are using the common web analytics tools (Adobe, Google, Webtrends, IBM Coremetrics) or are looking at data through clickstream feeds. Below is a sample of such metrics and the reasons why they have been questioned in recent years:

**Session-based metrics**

<table>
<thead>
<tr>
<th>Metric</th>
<th>Definition and calculation</th>
<th>Issues</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sessions (or “visits”)</td>
<td>Time-stamped hits from the same device/browser to the digital data collection server are grouped sequentially. When there is no activity for 30 minutes, the session is recorded as finished.</td>
<td>▶ 30 minutes is inherently arbitrary; visitors may need additional time (to seek additional information, compare prices or generally make up their minds). This often results in “re-entries” — new sessions that are qualitatively continuations but are recorded with their own starts, visits numbers and entry pages.</td>
</tr>
</tbody>
</table>
| Bounce rate | Sessions of a single page/sessions | ▶ Prone to inaccuracy for technical reasons (rich media or video on the landing page; drives to offsite)  
▶ Does not account for re-entries or interim exits |
| Conversion rate | The number of “Conversions” (purchases, signups, form completions)/sessions | ▶ Assumes that it usually takes a single session to convert  
▶ Does not account for multi-device conversion behavior  
▶ Many visitors do not come to the website to convert at all (careers, account management, contact us) |
| Campaign response | Campaign impressions or sends/sessions referred from the campaign | ▶ Effect of SEM can be inflated (navigational assist)  
▶ Campaigns often drive to app opens instead of site session starts  
▶ Social campaigns could lead to a “share,” not a “session”  
▶ Email or display content could be absorbed without generating a click to the website  
▶ Significantly weights marketing attribution to “last-touch” |
| Exit pages | The last page loaded in a session | ▶ Often used to identify unengaging site content, these reports do not account for session re-entries, app opens, or drives offsite  
▶ An exit page could itself be a sign of success – absorption of content (e.g., video) or a thank you page. |
| Landing pages or entry pages | The first page loaded in a session | ▶ Session re-entries, browser redirects or app drives can misidentify a landing page for continuous activity  
▶ Conversely, multi-sourced sessions (sessions where a visitor goes offsite for a brief time, only to return within 30 minutes) hide new landing pages from reporting  
▶ Campaign-specific landing pages have become increasingly dynamic, personalized, and the focus of A/B testing |
| Referrers | The domain visited before a session starts | ▶ Difficult to reconcile with campaign response data  
▶ Multi-sourced sessions tend to either inflate (Adobe) or hide (Google) referring instances  
▶ Internal microsites or other owned properties often appear in referrer reports |
| Time on site | The time stamp-based total time recorded for a session | ▶ Does not include the time spent on the exit page of a site, and is prone to understatement  
▶ Alternately, this may not account for videos or apps that are left open but continue to generate server calls, leading to overstatement |

The above table points out issues with individual session-based metrics. To mitigate these issues usually requires very careful reporting, additional rounds of technical implementation or tool configuration, spreadsheet-based heuristics or data manipulation or an understood “grain of salt” on the part of metric stakeholders. But the underlying assumption behind these metrics is also flawed: the session, as originally and currently defined, no longer represents the actionable unit at which a customer’s or prospect’s digital attention to the brand singularly operates.
2. Drivers of changes

The growing obsolescence of the session as a unit of measurement can be attributable broadly to several factors: the growth in the multi-device habit among visitors, the expansion of the digital experience beyond owned properties and the greater availability of experience data.

Growth in multi-device engagement

According to ComScore, 66% of the digital population is multiplatform.2 Nielsen reports an average of four digital devices owned by a typical American household, and Google reports that only 10% of consumers surf the internet from only one device.3 The same machine – particularly laptops and desktops – could have multiple browsers like Internet Explorer, Mozilla Firefox, Apple Safari and Google Chrome installed and used concurrently, and all major browsers allow users to browse on multiple tabs. Finally, ComScore reported that more than half of all internet behavior is done through apps, not browsers.4 The practical implication for these trends is that multi-session behavior by the same individual is the norm, not the exception, and that even though cookie-based measurement challenges have increased, the need to measure behavior across browsers and devices has become more acute.

Expansion of digital engagement beyond owned assets

Furthermore, digital customer engagement with the brand no longer takes place mostly on owned websites or apps, but also on social media, search engines, interactive emails and the wider display and video advertising universe. What this means is that a visitor’s engagement with a brand, their true “macro-session,” could really start on an email and end on Facebook. Because of the broad scale at which certain tags are deployed, cookie aggregators like Oracle BlueKai or Google DoubleClick can piece together these visitor macro-sessions and use this data for audience segmentation and targeting. The industry is increasingly moving in this direction and looking for additional solutions to solve ecosystem measurement and audience profiling challenges. Some practical analytics examples of how these unowned properties are beginning to be incorporated into the customer journey include the following:

- Segment targeting of display ads leading to personalization of website content through distinct landing pages and onsite experiences
- Email retargeting campaigns based on website interactions (owned websites and external)
- Social ads delivered based on display ad impressions
- Audience data collected from off-platform programming or native advertising (e.g., YouTube, Snap, Forbes BrandVoice)

In addition to making onsite behavioral measurement problematic, these trends are blurring the line between website optimization and marketing. Outbound marketing campaigns are now informed by website activity and vice versa. The segments being targeted for marketing and communications are the same segments that are activating onsite personalization.

Digitization of the real world

Online interactions have, from the beginning, been highly measurable and analyzable, and now offline interactions are becoming digitized and quantified to a degree that enables the full customer journey to be measured and optimized. Commonly referred to as a “360-View,” joinable data is becoming available, underscoring the smallness of the individual website session. Such data includes:

- Call center data, with voice transcripts often digitized and classified
- In-store analytics: the ability to track shoppers’ behavior in and around a physical store through mobile and video technology, digital kiosks and POS data collection
- Internet-of-Things, including onboard devices (OBD), usage meters or supply chain data
- Customer satisfaction, or net promoter score (NPS) data collected through surveys on either a transactional or overall customer relationship basis

Measuring digital performance across this proliferation of devices, experiences and platforms presents a very different set of challenges than the ones addressed 20+ years ago when a website was simply trying to measure basic traffic and impact across a relatively small number of web pages with limited multimedia, e-commerce or social networking capabilities.

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3. Breaking through the single-session barrier

Earlier in this decade, the vision of creating an end-to-end picture of a single customer journey, including advertising impressions, email communications, social media activities, searches, call center calls and in-store experiences was unachievable. This was due to the data collection being fragmented by cookie silos; data ownership and privacy restrictions; and technology limitations in consuming, storing and aggregating all this data. As a result, a single customer was often duplicated across many platforms and even within a single measurement platform.

Today, three main methodologies have tackled the deduplication problem that, in parallel with better data management platforms (DMPs) and analytics middleware, have opened up visibility into the complete customer life cycle. These three methodologies deduplicate and identify visitors across multiple devices and over time, without relying on visitor cookies. They are:

User authentication

The creation and consolidation of a single customer key, tied to a customer login that provides a bridge between devices, browsers and in-store experiences. This key can be an alphanumeric ID; a login username; an email address; or more specific PII, such as a SS#, name, address or phone number, and is usually user-generated or read from a cookie.

Industry example (ecommerce and retail stores): What used to be up to a dozen different customer IDs, GUIDs and logins have been consolidated into a single customer identifier that is collected at multiple points in the experience:

- On owned websites (shopping cart, shipping address, e-receipts)
- On apps (joining device IDs with authentication data)

Device fingerprinting

Device fingerprinting is actually older than cookie-based tracking, dating to the days of server-log file web analytics in the 1990s. It uses a combination of IP address, browser configuration, user agent, Wi-Fi information — pretty much anything available in the document object model (DOM) or within the server “handshake” — to uniquely identify a single device. The principal advantage to device fingerprinting is that it does not rely on cookies, so private browsing, cookie-deletion or the rejection of third-party cookies do not prohibit continuous behavior tracking. Device fingerprinting is used as a more accurate replacement for cookie-based IDs, particularly for organizations without user authentications, email capture or logins. This method is becoming more important and sophisticated as cookie-blocking software becomes more widespread; Apple’s recent announcement of additional restrictions on first-party cookie functionality is an example of where the cookie industry is heading.5

Industry example (media and entertainment): A video-on-demand service knows that members of a single household use the same login to access their services. In order to personalize the recommendations available to the user, device fingerprinting is used in conjunction with look-alike segmentation to identify which devices should be targeted with “kids,” “family,” “drama,” or “action” recommendations, even though only the aggregate mix of content is associated with a single authentication ID.

Walled gardens

Cookie-aggregators emerged during the last decade as part of marketing targeting and audience aggregation, working with online properties to deploy a simple third-party JavaScript tag on their websites in return for better data visibility, competitive reporting and advertising targeting. Today, they have expanded to include a wide range of analytics, personalization and data-joining capabilities and, as a consequence, are often branded as Data Management Platforms or “DMPs.” Many of these have been acquired by traditional database technology companies. About a dozen major vendors account for the major market-share in this space and include Adobe Audience Manager (originally Demdex), Oracle® DMP (originally BlueKai), Salesforce DMP (originally Krux), MediaMath, Neustar®, Nielsen, Acciom® and Google (through DoubleClick, Google Analytics, AdWords and YouTube). To this list should be added the social media platforms (Facebook, Twitter, Snapchat, LinkedIn) that have scaled user data-capture not only on their own sites but very widely on the internet; online retail behemoths (principally Amazon and Walmart); and media conglomerates (e.g., Comcast/NBCU, Disney/ABC/ESPN, Time Warner, Turner, Hearst and Cox).

As soon as a visitor enters any website included in any of these networks (and a single website can belong within more than one), they can be deduplicated down to a single ID, and all their sessions on multiple websites can be joined. These data environments are often referred to as “walled gardens” or “closed platforms” because this deduplicated ID is only natively available to the parent network/DMP, within which visitor-level segmentation can occur for website and marketing personalization purposes. A company wishing to take advantage of this rich segmentation and targeting data-pool must subscribe to the DMP provider, be included in the network, or otherwise pay for these marketing services or visitor-level data.

Industry example (media/entertainment): A studio selling movie tickets wants to target individuals who have watched movie trailers on YouTube. But since YouTube is part of the Google “walled garden,” that organization must subscribe to Google Analytics 360 Suite in order to reach these individuals, or pay for a back-end Google data-integration with their current DMP. At no point does Google provide individual-level data to the organization in such a way that it can be analyzed internally.

All three methodologies above complement each other and can be used together, making it possible today to map the complete customer journey to a degree of accuracy unavailable in the past. In doing so, organizations are now able to break through the single-session focus of traditional web analytics and optimize the customer experience holistically.

6 Forrester Wave™ “Data Management Platforms, Q2 2017” (June 1, 2017) lists eleven platforms, but did not evaluate Google, which released its Audience Center as part of its Analytics 360 Suite as a beta in 2016.
4. A customer-journey framework for digital analytics

As the digital world moves inexorably towards omnichannel experiences, session-based metrics must be supplanted by measures of the efficiency that brands move visitors and customers along their experience. This will deliver a seamless cross-session and cross-device framework for digital analytics reporting, analysis and optimization.

To achieve this measurement, digital analytics teams should adopt the following road map:

**Customer journey mapping**

Customer journey maps exist as routine work products among CX (Customer Experience) teams in most organizations. But what many analytics teams have failed to do is translate these diagrams, descriptions and PDFs into quantitatively measurable metrics. For the digital analyst, this requires the creation of *behavioral signatures and journey micro-conversion metrics*.

Behavioral signatures are sets of distinct actions that define a customer’s life cycle stage and their intent or reason for engaging in a particular digital experience. An organization must understand how to measure what these customer intents are and quantify their ability to successfully meet the expectation of the customer vs. that intent. The true measure of engagement then is not necessarily based on what happens in a session, but on what happens relative to one or many behavioral signatures.

In digital analytics, the behavioral signatures are imprints within the clickstream data collected from web behavior. Below is an example of a typical journey map on an acquisition website:

**Figure 1: Example digital customer journey for an eCommerce website**
“Spurious” visitors are “one-and-done” – they come to the website, don’t do anything indicating intent and never return. If they come to the site intentionally, they are considered as “Land.” From there, the journey may take them through a “Learn” or “Customize” phase, finally and presumably “Decide” and “Buy.” Behavioral signatures encompass those actions that define a visitor in each phase and can be defined in real time through JavaScript logic within web analytics tagging. The customer’s existing life cycle stage is set within a cookie and modified according to each action taken. Note that this process can take place in the absence of any personal identifiers outside of the standard, anonymous cookie-based tracking, but if authentication is present, then customer data can be made available in real time and pushed into the web analytics solution.

Non-digital data related to customer experience (e.g., call center interactions, transactional history or voice-of-customer), when combined with the behavioral signature, can provide additional refinement and color to the above website journey map, signaling churn, identifying acute issues and encouraging upsell.

As a final example, content-oriented websites (for example, publishing or video-on-demand) have an engagement journey lifespan that is very long (similar to existing customer, self-service journeys), but often lack customer data-enrichment opportunities created by account ID’s. Such a journey might look like this:

Figure 3: Example visitor journey for a content-oriented, non-conversion website
In cases such as these, web analytics-based journey measurement can be used, but data quality tends to deteriorate over time. Instead, behavioral signatures are best defined through a clickstream data-lake or DMP that is integrated with external segmentation or targeting feeds in order to assist with visitor deduplication. Such a data-lake can also be used for onsite personalization, advertising placement and marketing segmentation.

The design and implementation of behavioral signatures sets the stage for micro-conversion metrics whose purpose is to visualize the success of the digital experience in moving visitors and customers through their journey. These can be straightforward percentages as follows:

These micro-conversion metrics are only the framework for experience optimization: their tactical and operational use lies in understanding what led a customer through an experience conversion (or conversely, why they failed to do so).
Milestones and KPIs

So far we have avoided the term “KPI,” because a metric by itself – while useful tactically – isn’t a key performance indicator. What makes it “key” is whether a particular behavior can be analytically shown to improve customer satisfaction, increase sales or otherwise get customers or visitors to do what they want they want to do online, significantly, statistically and demonstrably. Actions and metrics must be analyzed to identify those that stand out as significantly driving customers along their life cycle journey; these actions and metrics then become milestones and KPIs.

For example, suppose I have an ecommerce website with a journey as described in Figure X above. My behavioral signature for the “Learn” phase might consist of the following elements:

- A customer is in “Learn” phase in any of the following situations:
  - They click a homepage banner
  - They use internal search directly
  - They click through from an offer email
  - They browse by category using filters
  - They use a “Compare Products” tool
- Pulling micro-conversion metrics for each use case might show the following results:

<table>
<thead>
<tr>
<th>Use case</th>
<th>“Learn” to “Decide” conversion %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Homepage banner</td>
<td>14%</td>
</tr>
<tr>
<td>Internal search</td>
<td>13%</td>
</tr>
<tr>
<td>Offer email click-through</td>
<td>15%</td>
</tr>
<tr>
<td>Browse by category</td>
<td>10%</td>
</tr>
<tr>
<td>Compare products tool</td>
<td>35%</td>
</tr>
</tbody>
</table>

Statistical methods – either built into the web analytics tool or done in-house – can reveal whether these percentages are significantly different (simple T-tests to more sophisticated GLM, decision tree or binary logistic models to control for covariate effects). In this case, the compare products tool can be considered a “milestone” for customers in the “Learn” phase, and use of that tool could become a KPI. Experience improvements can, thus, be focused on getting potential customers to that section of the experience.

The above example also illustrates that the customer journey mapping and behavioral signatures are best deployed in an iterative manner, much like customer behavioral segmentation. As improvements are made to online assets, or marketing channels become optimized, customer journeys and behavioral segments can change. Cluster or principal components analysis could show that the “compare products” behavior displays a degree of independence from other website use cases and could constitute its own step in the customer journey.
**Milestone-based data architecture**

Once milestones have been identified within the digital customer life cycle journey, the use of sessions as the basis for digital behavioral measurement and optimization can disappear. Instead, variables and data can be reorganized around milestones that are agnostic of calendar time or device. Traditionally, web data has been organized like this:

### Illustrative session-based data architecture

<table>
<thead>
<tr>
<th>Customer</th>
<th>Session ID</th>
<th>Date</th>
<th>Performed search</th>
<th>Viewed product detail page</th>
<th>Item viewed</th>
<th>Added item to cart</th>
<th>Item added</th>
<th>Purchase</th>
<th>Item purchased</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mary Smith</td>
<td>12345</td>
<td>9/13/2017</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mary Smith</td>
<td>23456</td>
<td>9/14/2017</td>
<td>1</td>
<td>1</td>
<td>SKU 123</td>
<td>0</td>
<td>0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mary Smith</td>
<td>34567</td>
<td>9/14/2017</td>
<td>0</td>
<td>1</td>
<td>SKU 123</td>
<td>1</td>
<td>SKU 123</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Mary Smith</td>
<td>45678</td>
<td>9/15/2017</td>
<td>0</td>
<td>1</td>
<td>SKU 123</td>
<td>1</td>
<td>SKU 123</td>
<td>1</td>
<td>SKU 123</td>
</tr>
</tbody>
</table>

**Operational Metrics:** Searches/session; sessions/customer; purchases/session

This data architecture places undue emphasis on the session and obscures the journey-to-purchase undertaken by the customer.

### Illustrative example based on customer journey

<table>
<thead>
<tr>
<th>Customer</th>
<th>Item</th>
<th>Viewed product detail page</th>
<th>Time stamp of view</th>
<th>Added item to cart</th>
<th>Time to cart add</th>
<th>Purchase</th>
<th>Time to purchase</th>
<th>Number of touchpoints</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mary Smith</td>
<td>SKU 123</td>
<td>1</td>
<td>9/13/2017:14:24:13</td>
<td>2</td>
<td>1:24:18</td>
<td>1</td>
<td>2:17:36</td>
<td>4</td>
</tr>
</tbody>
</table>

**Operational Metrics:** Time-to-Purchase; Cart Adds/Purchases; Touchpoints/Purchases

Organizing data in this manner also allows for the inclusion of additional touchpoints (social, email, display ad impressions, etc.), or even to offline data (call center, point-of-sale). Other table designs could be used towards different data activation use-cases: marketing campaign codes, product category, individual transaction ID. The point is that the framework for digital measurement represented in the first table is traditional, session-based. In the second table, the framework is based on customer journey.
5. The future of digital analytics

With increased customer omnichannel engagement and the real improvements in technology to link data, the session is no longer the optimal organizing principle for the collection, storage and activation of digital behavioral data. Rather, mature organizations are moving toward the customer journey as this organizing principle, replacing the session with an over-time, multiple touchpoint view organized by life cycle stages and milestones, and collected through behavioral signatures. What are the longer-term implications of this trend for digital analytics? We predict the following:

- Customer journey and experience mapping will increasingly become a data-led exercise informed as much by data scientists and analytics professionals as experience strategists.
  
  The best target state experience designs will be informed by deep insights derived from measuring behavioral signatures, and the best analytics implementations will be designed from understanding a journey map — with a sound test strategy built in to make sure both the analytics and experience people have it right.

- Just as web analytics expanded to become digital analytics, digital analytics teams will blend with customer analytics, customer insights, or customer experience teams.

Between 2008 and 2011, different emerging specializations such as social analytics, mobile analytics, web analytics and – to some degree – marketing analytics became blurred under the heading of “digital analytics.” Today, we have customer analytics, digital analytics, finance analytics, supply chain analytics and text analytics – as databases become more comprehensive, it is likely that the line between some of these specializations will become blurred.

- Web analytics implementations will become more focused on those behavioral dimensions that indicate key segments and steps in the customer journey.
  
  Implementations of web analytics tools consisting of hundreds of custom variables will become outdated. Rather, web-specific behavioral dimensions will become standardized in a CMS-fed data layer to become one of many customer dimensions of equal usefulness for segmentation and targeting.

- Web analytics tools will need to adapt to compete, either by expanding to become audience DMPs or by focusing as single-channel, granular data collection platforms that can be integrated with existing DMP solutions.

- Web analytics tools that do not enable integration and view of the full customer life cycle do not capture the insights these integrations enable. As the industry evolves away from session-based customer views, tools will need to follow suit to stay competitive.

- Cloud-based data repositories will slowly be brought in-house in order to integrate PII (Personally Identifiable Information), PHI (Protected Health Information), financial, legal, or transactional data.

  As powerful as they are and will become in the next year or two, third-party cloud-based DMPs are stymied because they cannot store private information. Secure as they may be (or may become), most large organizations with large repositories of customer information will be legally (or socially) prevented from sending this to third-party DMPs. As the analytics power of full customer journey analytics becomes widely exploited, the most mature organizations will need to bring as much data as possible in-house in order to differentiate themselves analytically.

  This means that organizations will demand full feeds – including visitor IDs – from their third-party DMPs. Walled gardens could open their doors, even if they charge a hefty price at their gates.

- IoT (Internet of Things), in-store analytics, OBD, voice and mobile geolocational data will be the new frontiers in customer analytics, eventually to be integrated with the above.

  Each new device, sensor and interaction point becomes another data source to better understand behavioral signatures and the context that best drives outcomes along the experience map. Session data is clearly not relevant to the connected home, car or quantified self, so it is time to remove it from our other digital experience data sources.

  Forward-thinking organizations have begun to invest valuable time and resources in journey mapping and planning the customer experience across omnichannel interactions. Many also have mature digital analytics implementations that are divorced from this journey construct. The time has come to bring these worlds together and retire the session in favor of the customer experience. 

  *Vivat Experientia!*

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7 As an example, the Web Analytics Association officially changed its name to the Digital Analytics Association in 2011.

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