xAPI:
An Introductory Guide

by Margaret Roth
Chief Revenue Officer at Yet Analytics

Introduction

Consider this introductory e-book a crash course – everything you'll need to know to have a basic understanding of the Experience API™, otherwise known as xAPI.

xAPI is an open data interoperability specification originally developed to get a better picture of how, when, and why learning and performance happen both on and offline.

As technologies have developed, instructional designers have had access to more dynamic, immersive, and engaging ways of delivering content to create authentic learning experiences. Because of these advancements, learners and employees at any level are developing skills, building knowledge, and connecting the dots in new environments, in ways that we've never been able to capture before.

However, xAPI is much more than just a way to understand how learning progresses in a course. It's a way to understand how people engage and perform in the connected world.

In this introductory guide, you'll learn what xAPI is, what a Learning Record Store does, and why it matters to the future of your organization.

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The Experience API™ (xAPI)

is an open data interoperability specification for collecting the experiences people have across, with, and through technologies in the connected world.

How xAPI Works

When a technology, whether it be a mobile app, a computer program, a training simulation, a Learning Management System (LMS), or an Internet of Things (IoT) device, is integrated with xAPI it is able to capture data about what is happening as it happens in a standardized format. Through this integration, data created about what is happening in the technology is now able to be translated outside of the technology in xAPI format.

Once data is captured in xAPI format, it can be stored in a Learning Record Store (LRS). An LRS is a specialized database designed specifically to store data structured in xAPI format.

Because all the data within an LRS is structured in the same common format, it is a rich pool of information designed for advanced analytics.

Statement Structure

Readable by both humans and machines, data statements in xAPI format are structured as Actor-Verb-Object. Each individual piece of data structured in this way is called an xAPI statement.

The structure of an xAPI statement is very important because it makes it possible for data to be captured about any type of actor, whether that be a person, a group, a system, a network, a machine, or a device, in a language that is definite and understandable. You can think of an xAPI statement as a "sentence" of data.

In an xAPI statement your actor is a noun, the simple subject of your sentence. The actor identifies who or what the sentence is about. Your verb is the simple predicate of your sentence, it describes what the actor did. Your object reveals the context of what and how the actor did what they did; it is the direct object of your verb.

Why xAPI? Flexibility.

- Unify input from many diverse sources through xAPI integration
- Connect data from web-based formal learning, informal learning, social learning, real-world experiences
- Track experiences like reading an article, watching a training video, or playing an augmented reality mobile game

xAPI statements are also described as activity statements or activities, because they tell what activity occurred.

For example:

- Carrie(actor) satisfied(verb) the Requirements(object).

Activity Context

Additional information that describes the context of an activity can be stored in the xAPI statement's JSON representation file, the data encoding for each individual xAPI statement. In the case of our previous example that would be the rest of the predicate of our sentence, including but not limited to indirect objects, complements, and adjectives.

For example:

- Carrie(actor) satisfied(verb) the HR Management (context) Course Requirements(object) on 2015-04-09T11:08:00Z (context).

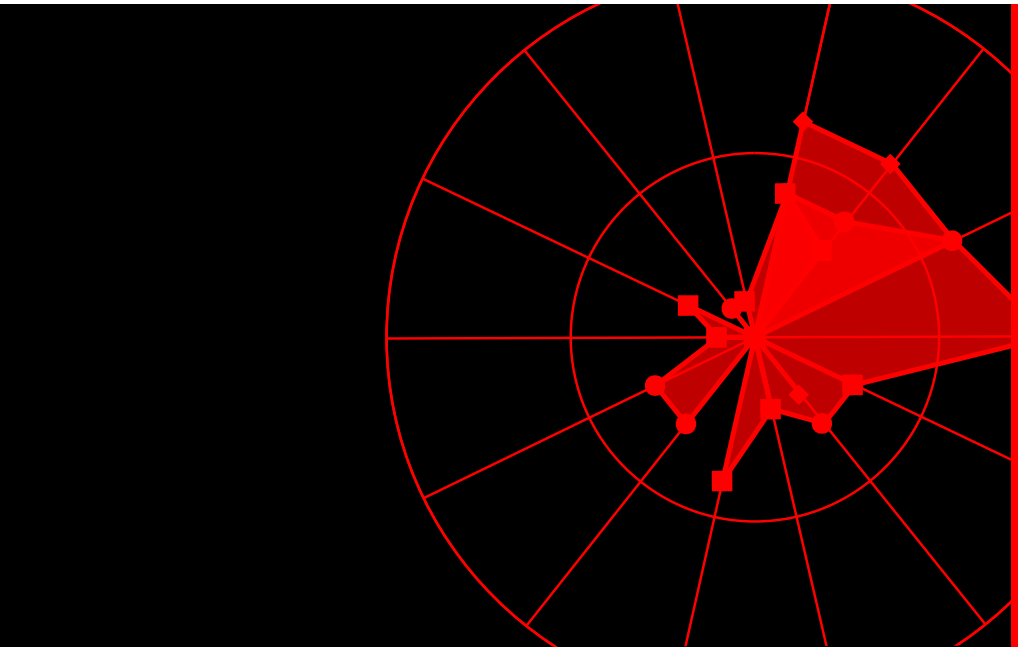
The Story of Experience

When xAPI statements are collected about actors over time, we are able to have a better understanding of when and how learning, training, and accomplishment occur. As we collect xAPI statements they begin to tell a story. The more data sources you have telling the story, the better and more detail-rich the story becomes. xAPI makes it possible for many different data sources to be interoperable, so that they can communicate with each other through an LRS.

For example:

- Carrie attended HR Management Workshop on 2015-04-08T16:00:00Z.
- Carrie attempted HR Management Module on 2015-04-09T10:49:00Z.
- Carrie completed HR Management Module assessment on 2015-04-09T10:52:00Z.
- Carrie passed HR Management Module Assessment on 2015-04-09T11:07:00Z.
- Carrie satisfied the HR Management Course Requirements on 2015-04-09T11:08:00Z.

Why xAPI? Readablity.



- xAPI's Actor-Verb-Object data syntax is readable by humans and machines
- Format makes data more understandable, accessible, and useful
- Machine-readable for future machine learning applications

Immutable Records

When xAPI statements enter the LRS database, they are stored in an immutable format, meaning that you have a completely accurate, unchangeable, auditable record of exactly what happened as it happened. Additionally, because of the human and machine readable format of xAPI statements, you have a common controlled vocabulary that all statement data refers to, in a structure that is as easy to understand as it is to read a story.

Why xAPI? Interoperability.

- xAPI's open data specification allows compatibility with a wide variety of data analysis and visualization tools
- Uniform data structure allows cross-source queries
- Exportable data ensures portability and allows for analysis with external tools, reducing vendor lock-in

The Bottom Line

Whether you want to know what makes your employees most productive or how to improve processes within your facility, the flexibility, readability, and interoperability of the Experience API can help you make it happen.

Many companies and organizations are already using xAPI to better understand how the resources that matter most — time, money, and people — are being utilized. Organizations that act on this knowledge and combine it with the power of advanced data analytics are improving their operations, powering up their workforce, and making better decisions.

xAPI Glossary

Actor - An actor is a noun, the simple subject of your sentence. The actor identifies who or what the sentence or xAPI statement is about. An actor is part of the xAPI format that makes up an xAPI statement.

Advanced Distributed Learning Initiative - The Advanced Distributed Learning (ADL) Initiative is the Department of Defense research and development epicenter for learning technologies.

API - An API, or Application Programming Interface, is a software interface that makes it possible for application programs to communicate with each other and share data.

Controlled Vocabulary - The controlled vocabulary, facilitated by the Advanced Distributed Learning Initiative (ADL), creators of xAPI, standardizes the definitions of verbs and activities so that all xAPI technologies reference a specific definite language. This vocabulary will continue to grow as xAPI and LRS adoption increases.

E-Learning - E-Learning stands for electronic learning, learning that is delivered through an electronic media, generally online.

Experience API - The Experience API™ (xAPI) is an open data interoperability specification for collecting the experiences people have across, with, and through technologies in the connected world.

Experiential Data - Experiential data is any kind of data that is embedded in the moment of an experience. Experiential data can be captured and collected through interactions with content, context, technologies, and the environment, both internal and external.

Integration - A software integration is the process of connecting different technologies, softwares, or systems functionally or physically so that they can communicate with each other and work together.

Internet of Things - The Internet of Things (IoT) is the technological networked infrastructure created by the connectedness of our world. IoT technologies include devices, vehicles, buildings, sensors, electronics, computers, and anything else that is or can be connected to the web, and can exchange and collect data.

Interoperability - Interoperability is the ability for the parts of a technology or system to be able to interact with and use the parts of another. In terms of xAPI, interoperability refers to the ability of technologies and systems to use the xAPI specification as the means of data exchange and communication.

JSON - JSON, which stands for JavaScript Object Notation, is a lightweight data-interchange format. It is easy for humans to read and write and it is easy for machines to parse and generate.

Learning Management System - A Learning Management System (LMS) is a software application that allows for the management, administration, documentation, tracking, reporting, and delivery of e-learning courses or training programs in mobile and online formats.

Learning Record Store - A Learning Record Store (LRS) is a specialized database designed specifically to store data structured in xAPI format.

Object - An object reveals the context of what and how the actor did what they did, it is the direct object of the verb. An object is part of the xAPI format that makes up an xAPI statement.

Verb - A verb is the simple predicate of your sentence, it describes what the actor did. A verb is part of the xAPI format that makes up an xAPI statement.

xAPI Format - A human and machine readable format structured as Actor-Verb-Object.

xAPI Statement - An individual piece of data structured in xAPI format. xAPI statements are also described as activity statements or activities, because they tell what activity occurred.

About the Author

Margaret Roth is the Chief Revenue Officer and Co-Founder of Yet Analytics, a Baltimore-based software company that builds an analytics platform and scalable xAPI LRS database that puts the power of connected data into the hands of decision makers.

Margaret works to develop and design connected learning environments and real-world applications of the Experience API. She has presented nationally on data interoperability and experiential learning and training at conferences including iNACOL, xAPI Camp, ISTE, the NIST Global Cities Teams Challenge, SXSWedu, and SXSW Interactive.

Connect with Margaret on Twitter @teachingdaisy.

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yetanalytics.com • hello@yetanalytics.com • 410.256.3673