UTS
UNIVERSITY OF TECHNOLOGY SYDNEY

Loose couplings and fast development: using xAPI to provide Leaning Analytics beyond the LMS

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UTS:CIC
CONNECTED INTELLIGENCE CENTRE

utscic.edu.au

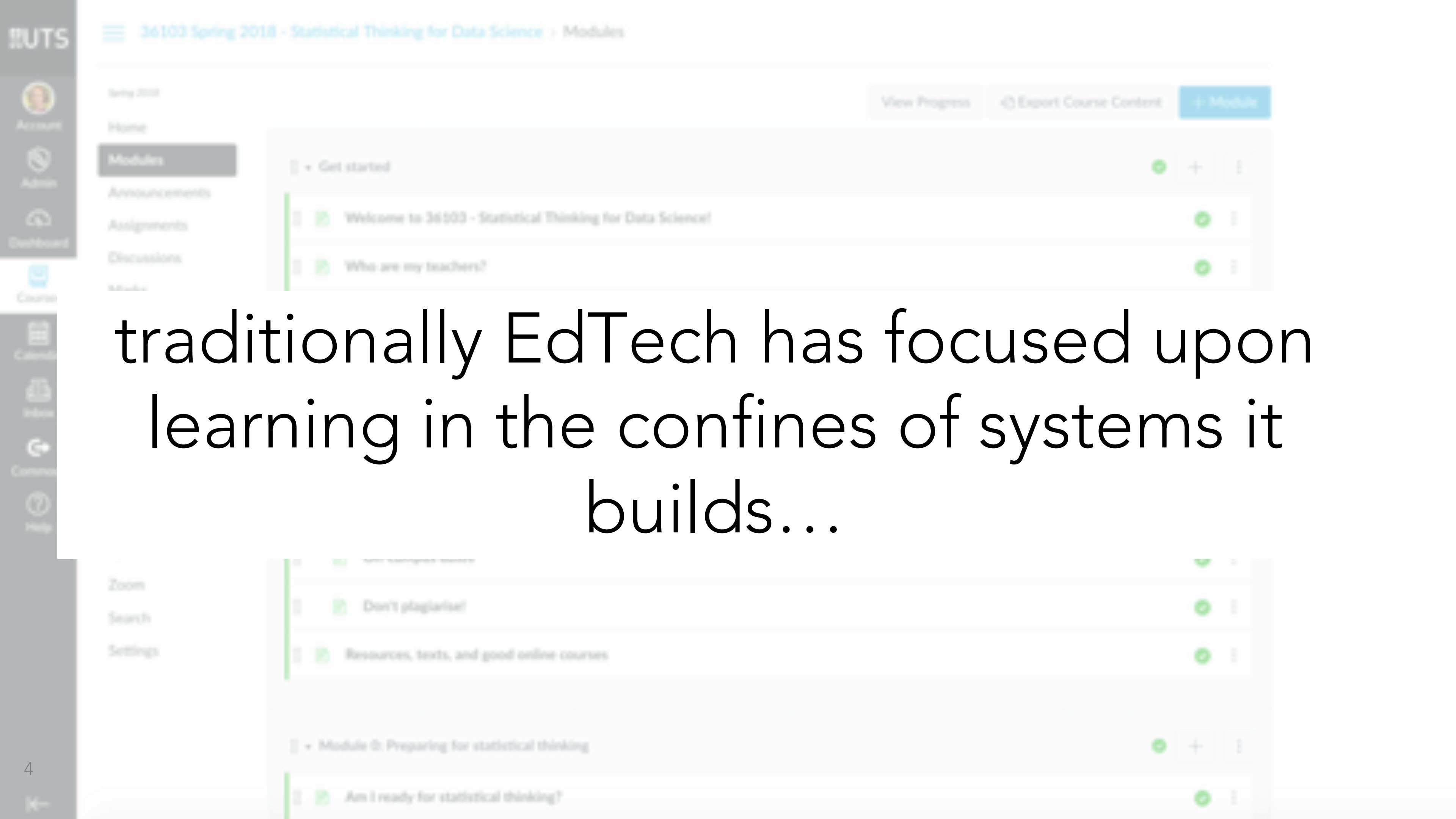
what is learning analytics? (LA)

Learning analytics is the measurement, collection, analysis and reporting of data about learners and their contexts, for purposes of understanding and optimising learning and the environments in which it occurs

SoLAR definition

SOLAR
SOCIETY for LEARNING
ANALYTICS RESEARCH

where does learning happen?



Get started

Welcome to 36103 - Statistical Thinking for Data Science!

Who are my teachers?

On campus dates

Don't plagiarise!

Resources, texts, and good online courses

Module 0: Preparing for statistical thinking

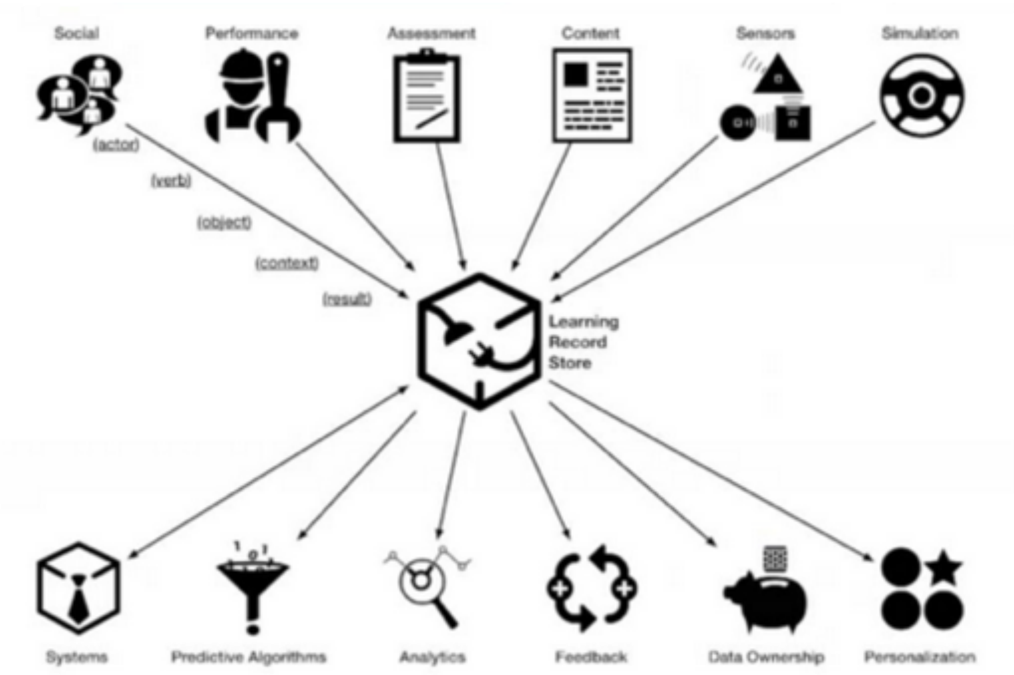
Am I ready for statistical thinking?

traditionally EdTech has focused upon learning in the confines of systems it builds…

but learning happens anywhere!

https://commons.wikimedia.org/wiki/File:Andrea_Leslie_helps_students_search_(8696541130).jpg

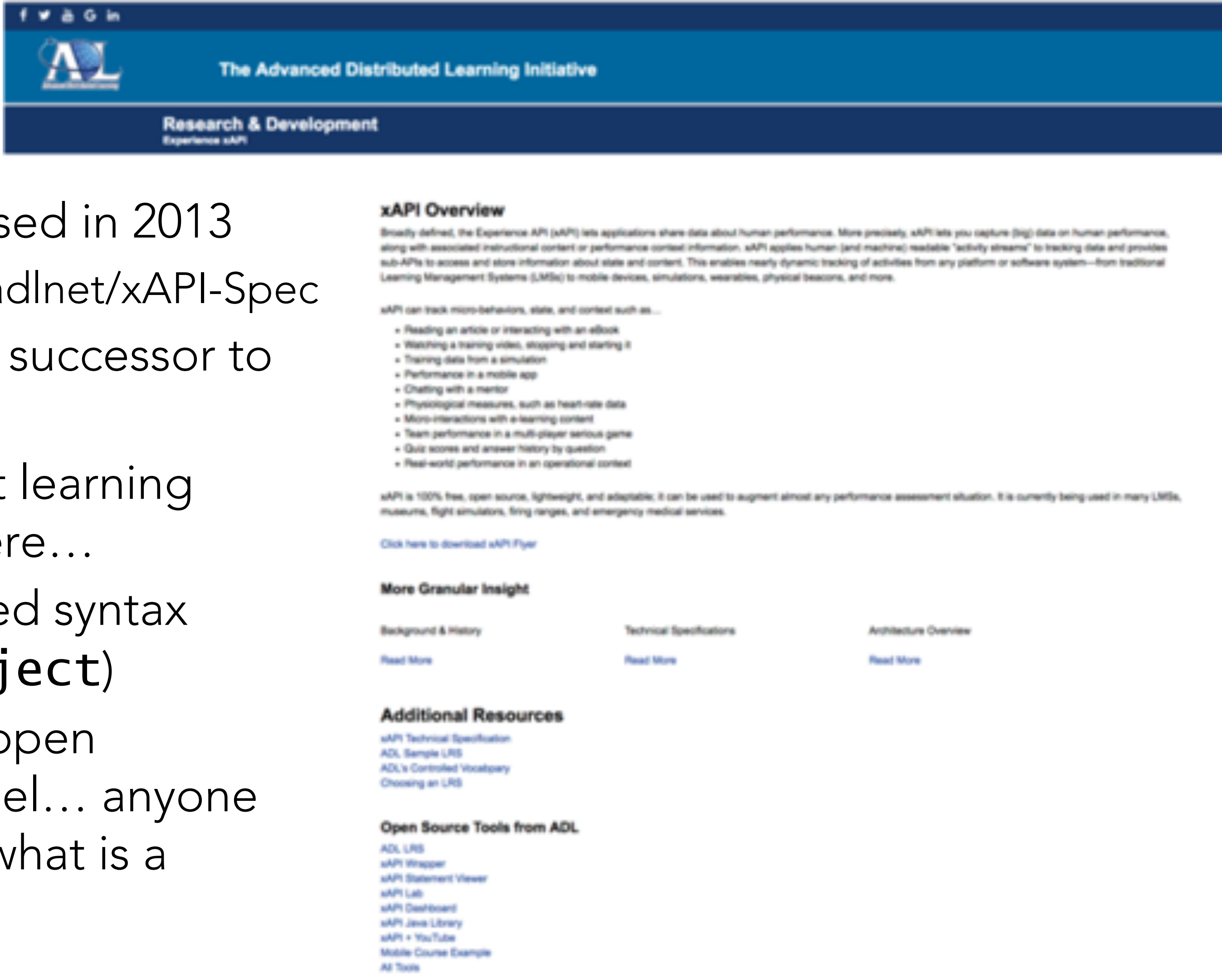
finally new data standards have emerged…
…new possibilities for capturing and using data!



https://www.apereo.org/communities/learning-analytics-initiative/learning-analytics-webinar-state-xapi-and-imsglobal

xAPI

- specification released in 2013 https://github.com/adlnet/xAPI-Spec
- initially meant as a successor to SCORM
- acknowledges that learning happens everywhere…
- very simple required syntax (`actor`, `verb`, `object`)
- open source with open development model… anyone can contribute to what is a community effort



The Advanced Distributed Learning Initiative

Research & Development

Experience xAPI

xAPI Overview

Broadly defined, the Experience API (xAPI) lets applications share data about human performance. More precisely, xAPI lets you capture (big) data on human performance, along with associated instructional content or performance context information. xAPI applies human (and machine) readable "activity streams" to tracking data and provides sub-APIs to access and store information about state and content. This enables nearly dynamic tracking of activities from any platform or software system—from traditional Learning Management Systems (LMSs) to mobile devices, simulations, wearables, physical beacons, and more.

xAPI can track micro-behaviors, state, and context such as…

- Reading an article or interacting with an eBook
- Watching a training video, stopping and starting it
- Training data from a simulation
- Performance in a mobile app
- Chatting with a mentor
- Physiological measures, such as heart-rate data
- Micro-interactions with e-learning content
- Team performance in a multi-player serious game
- Quiz scores and answer history by question
- Real-world performance in an operational context

xAPI is 100% free, open source, lightweight, and adaptable. It can be used to augment almost any performance assessment situation. It is currently being used in many LMSs, museums, flight simulators, firing ranges, and emergency medical services.

Click here to download xAPI Flyer

More Granular Insight

Background & History	Technical Specifications	Architecture Overview
Read More	Read More	Read More

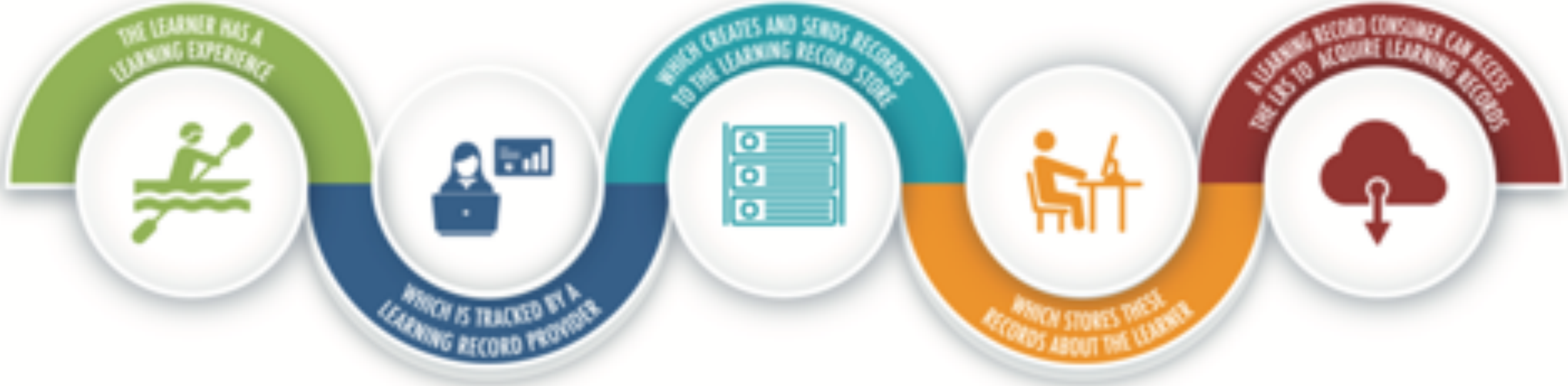
Additional Resources

xAPI Technical Specification
ADL Sample LRS
ADL's Controlled Vocabpery
Choosing an LRS

Open Source Tools from ADL

ADL LRS
xAPI Wrapper
xAPI Statement Viewer
xAPI Lab
xAPI Dashboard
xAPI Java Library
xAPI + YouTube
Mobile Course Example
All Tools

xAPI data flow



THE LEARNER HAS A LEARNING EXPERIENCE

WHICH IS TRACKED BY A LEARNING RECORD PROVIDER

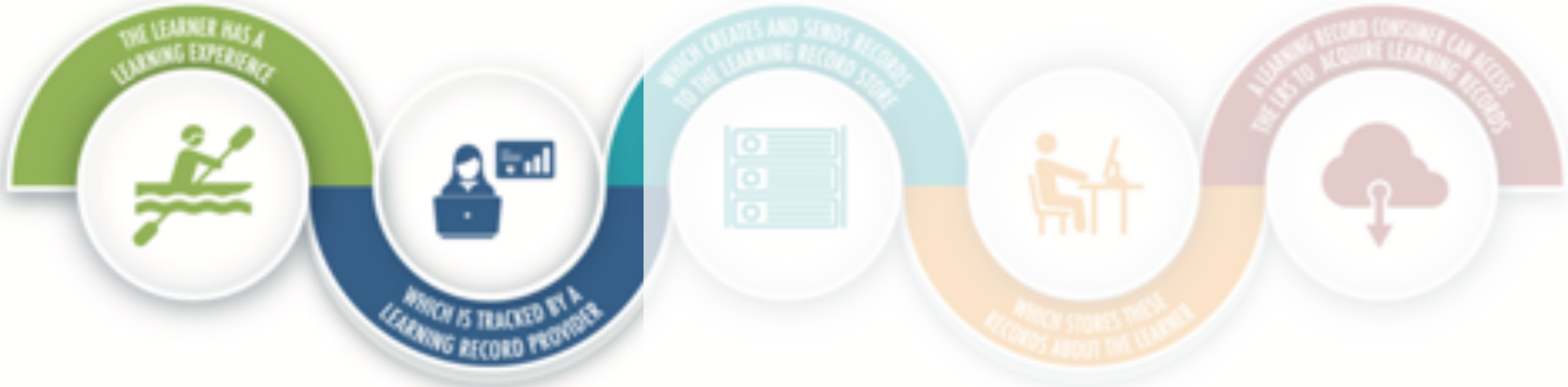
WHICH CREATES AND SENDS RECORDS TO THE LEARNING RECORD STORE

WHICH STORES THESE RECORDS ABOUT THE LEARNER

A LEARNING RECORD CONSUMER CAN ACCESS THE LRS TO ACQUIRE LEARNING RECORDS

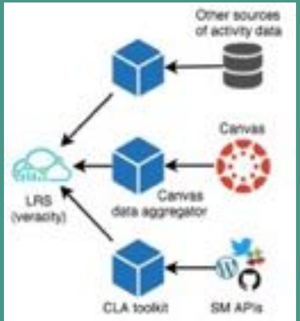
we are going to cover this whole flow today!

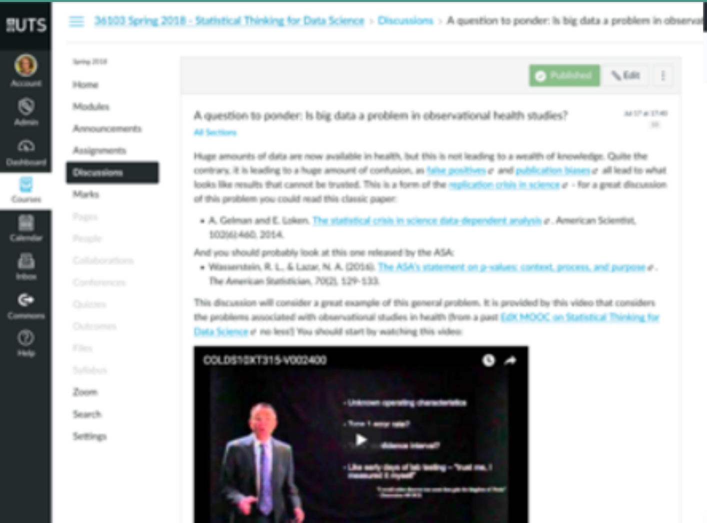
Learning Record Providers (LRPs)


THE LEARNER HAS A LEARNING EXPERIENCE
WHICH IS TRACKED BY A LEARNING RECORD PROVIDER
WHICH CREATES AND SENDS RECORDS TO THE LEARNING RECORD STORE
WHICH STORES THESE RECORDS ABOUT THE LEARNER
A LEARNING RECORD CONSUMER CAN ACCESS THE LRS TO ACQUIRE LEARNING RECORDS

what is a learning record provider? (LRP)

- something that monitors a learner
- extracts data about what they are doing
- creates an xAPI statement
- and sends it to a Learning Record Store (LRS)





36103 Spring 2018 - Statistical Thinking for Data Science › Discussions › A question to ponder: Is big data a problem in observa

A question to ponder: Is big data a problem in observational health studies?

All Sections

Huge amounts of data are now available in health, but this is not leading to a wealth of knowledge. Quite the contrary, it is leading to a huge amount of confusion, as false positives and publication biases all lead to what looks like results that cannot be trusted. This is a form of the replication crisis in science - for a great discussion of this problem you could read this classic paper:

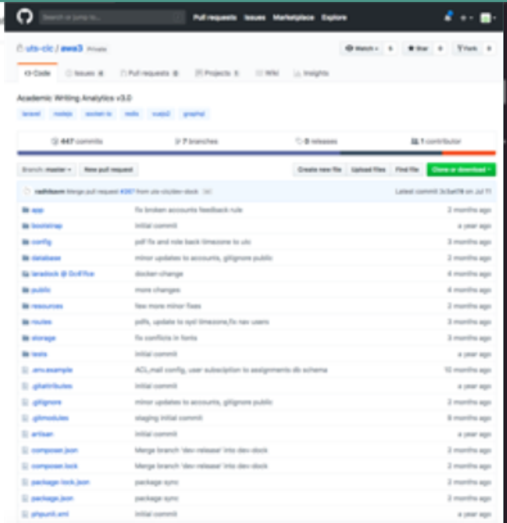
- A. Gelman and E. Loken. The statistical crisis in science data-dependent analysis. American Scientist, 102(6):460, 2014.

And you should probably look at this one released by the ASA:

- Wasserstein, R. L., & Lazar, N. A. (2016). The ASA's statement on p-values: context, process, and purpose. The American Statistician, 70(2), 129-133.

This discussion will consider a great example of this general problem. It is provided by this video that considers the problems associated with observational studies in health (from a past EdX MOOC on Statistical Thinking for Data Science no less!) You should start by watching this video:

COLDS10XT315-V002400



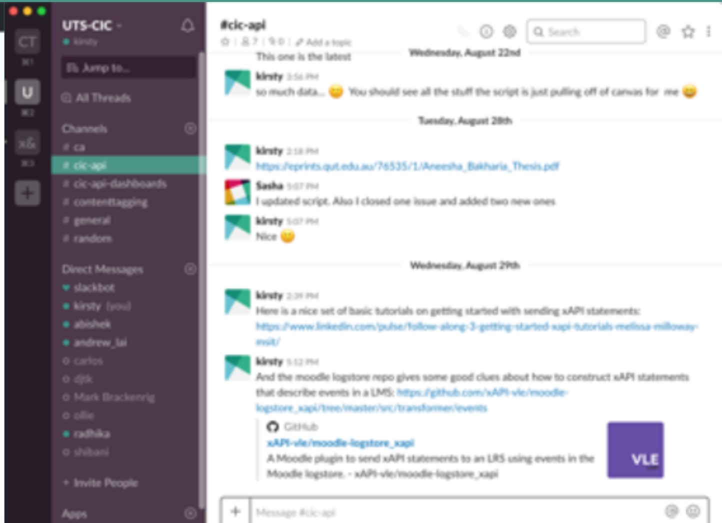
uts-cic / awa3 Private

Academic Writing Analytics v3.0

447 commits · 7 branches · 0 releases · 1 contributor

radhikam Merge pull request #267 from uts-cic/dev-dock · Latest commit 3c3a478 on Jul 11

app	fix broken accounts feedback rule	2 months ago
bootstrap	initial commit	a year ago
config	pdf fix and role back timezone to utc	3 months ago
database	minor updates to accounts, gitignore public	2 months ago
laradock @ 0c4f1ce	docker change	4 months ago
public	more changes	4 months ago
resources	few more minor fixes	2 months ago
routes	pdfs, update to syd timezone,fix nav users	3 months ago
storage	fix conflicts in fonts	3 months ago
tests	initial commit	a year ago
.env.example	ACL,mail config, user subscription to assignments db schema	10 months ago
.gitattributes	initial commit	a year ago
.gitignore	minor updates to accounts, gitignore public	2 months ago
.gitmodules	staging initial commit	8 months ago
artisan	initial commit	a year ago
composer.json	Merge branch 'dev-release' into dev-dock	2 months ago
composer.lock	Merge branch 'dev-release' into dev-dock	2 months ago
package-lock.json	package sync	3 months ago
package.json	package sync	3 months ago
phpunit.xml	initial commit	a year ago



#cic-api

This one is the latest

Wednesday, August 22nd

kirsty 3:56 PM
so much data... 😄 You should see all the stuff the script is just pulling off of canvas for me 😄

Tuesday, August 28th

kirsty 2:18 PM
https://eprints.qut.edu.au/76535/1/Aneesha_Bakharia_Thesis.pdf

Sasha 5:07 PM
I updated script. Also I closed one issue and added two new ones

kirsty 5:07 PM
Nice 😀

Wednesday, August 29th

kirsty 2:39 PM
Here is a nice set of basic tutorials on getting started with sending xAPI statements:
https://www.linkedin.com/pulse/follow-along-3-getting-started-xapi-tutorials-melissa-milloway-msit/

kirsty 5:12 PM
And the moodle logstore repo gives some good clues about how to construct xAPI statements that describe events in a LMS: https://github.com/xAPI-vle/moodle-logstore_xapi/tree/master/src/transformer/events

GitHub
xAPI-vle/moodle-logstore_xapi
A Moodle plugin to send xAPI statements to an LRS using events in the Moodle logstore. - xAPI-vle/moodle-logstore_xapi

an example?

ID14-3821: ENABLING CONNECTED LEARNING VIA OPEN SOURCE ANALYTICS IN THE WILD: LEARNING ANALYTICS BEYOND THE LMS

This project was supported by the Australian Government's office for learning and teaching

QUEENSLAND UNIVERSITY OF TECHNOLOGY:
Kirsty Kitto (Lead Investigator), Mandy Lupton, John Banks, Dann Mallet, Peter Bruza

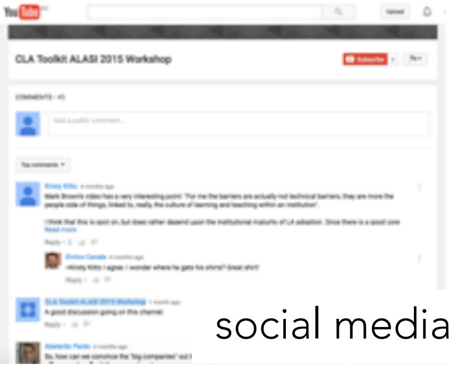
UNIVERSITY OF SOUTH AUSTRALIA
Shane Dawson, Dragan Gašević (Uni of Edinburgh)

UNIVERSITY OF TECHNOLOGY SYDNEY
Simon Buckingham Shum (and now Kirsty Kitto!)

UNIVERSITY OF SYDNEY
Abelardo Pardo

UNIVERSITY OF TEXAS (ARLINGTON)
George Siemens

the connected learning analytics toolkit



CLA Toolkit ALASI 2015 Workshop

COMMENTS • 45

Add a public comment...

Top comments ▾

Kirsty Kitto 4 months ago
Mark Brown's video has a very interesting point: "For me the barriers are actually not technical barriers, they are more the people side of things, linked to, really, the culture of learning and teaching within an institution".

I think that this is spot on, but does rather depend upon the institutional maturity of LA adoption. Once there is a good core
Read more

Reply • 2

Enrico Canale 4 months ago
+Kirsty Kitto I agree. I wonder where he gets his shirts? Great shirt!

Reply •

CLA Toolkit ALASI 2015 Workshop 1 month ago
A good discussion going on this channel.

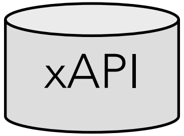
Reply •

Abelardo Pardo 4 months ago
So, how can we convince the "big companies" out

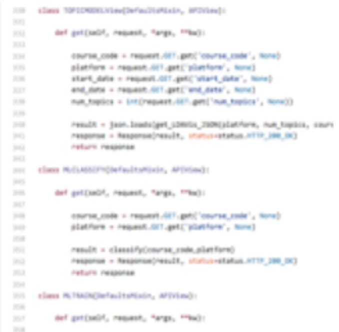
social media

scraping

Learning
Record Store



analysis



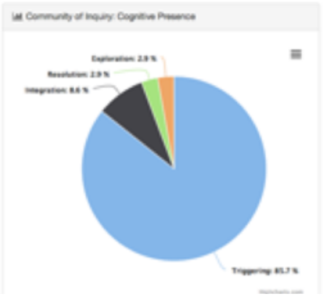
```
class TOPICMODELView(DefaultsMixin, APIView):

    def get(self, request, *args, **kw):

        course_code = request.GET.get('course_code', None)
        platform = request.GET.get('platform', None)
        start_date = request.GET.get('start_date', None)
        end_date = request.GET.get('end_date', None)
        num_topics = int(request.GET.get('num_topics', None))

        result = json.loads(get_LDAVis_JSON(platform, num_topics, cours
        response = Response(result, status=status.HTTP_200_OK)
        return response

class MLCLASSIFY(DefaultsMixin, APIView):

    def get(self, request, *args, **kw):

        course_code = request.GET.get('course_code', None)
        platform = request.GET.get('platform', None)

        result = classify(course_code,platform)
        response = Response(result, status=status.HTTP_200_OK)
        return response

class MLTRAIN(DefaultsMixin, APIView):

    def get(self, request, *args, **kw):
```

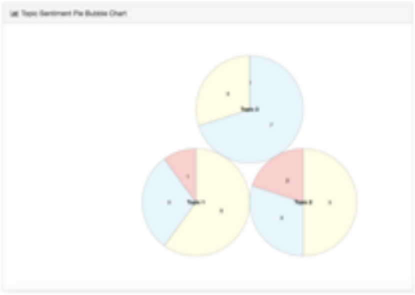
learning analytics

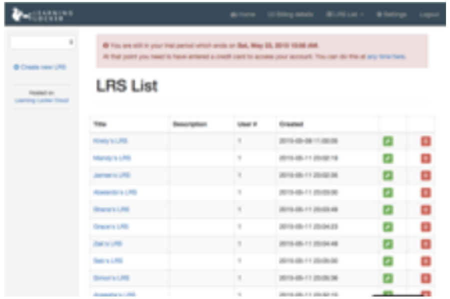
students

academics

admin & developers







You are still in your trial period which ends on Sat, May 23, 2015 10:08 AM.
At that point you need to have entered a credit card to access your account. You can do this at any time here.

LRS List

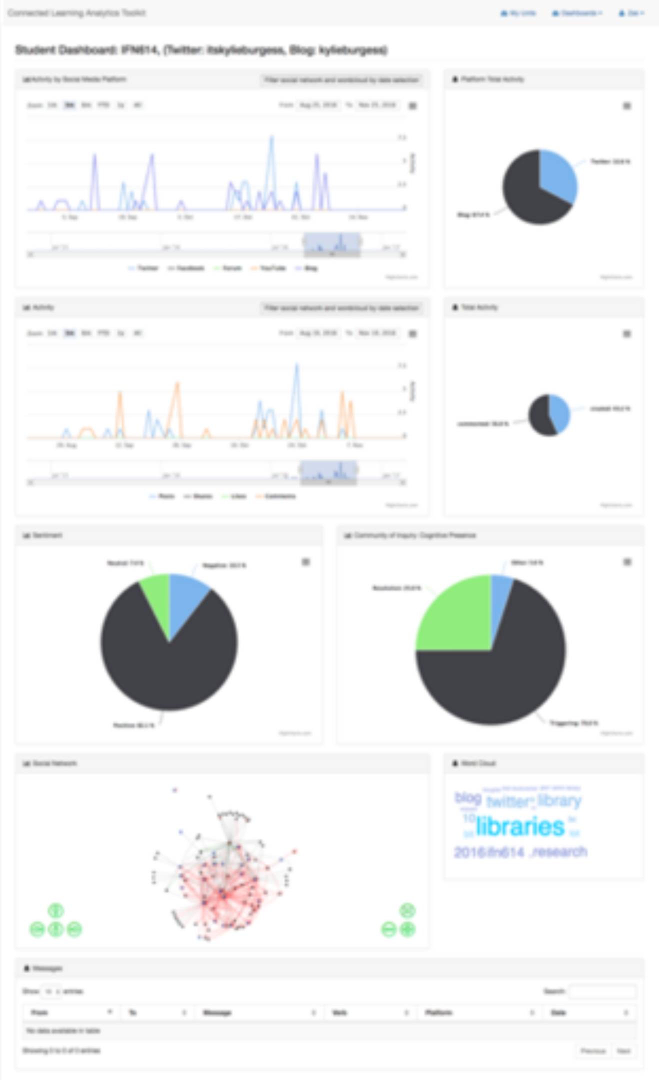
Title	Description	User #	Created		
Kirsty's LRS		1	[illegible]	✓	✕
Mandy's LRS		1	[illegible]	✓	✕
James's LRS		1	[illegible]	✓	✕
Abelardo's LRS		1	[illegible]	✓	✕
Shane's LRS		1	[illegible]	✓	✕
Grace's LRS		1	[illegible]	✓	✕
Zak's LRS		1	[illegible]	✓	✕
Seb's LRS		1	[illegible]	✓	✕
Simon's LRS		1	[illegible]	✓	✕
Anastasia's LRS		1	[illegible]	✓	✕

Kitto, K., Cross, S., Waters, Z., Lupton, M. (2015). Learning Analytics beyond the LMS: the Connected Learning Analytics Toolkit. In Proceedings of the Fifth International Conference on Learning Analytics and Knowledge (LAK15). ACM, New York, NY, USA, 11-15.

some details (CLA toolkit V1)

1. Has a philosophy of going to the students where they are actually learning (rather than expecting them to come to us)
2. V1 could access data from: wordpress blogs, twitter, youtube, facebook, trello, github, slack
3. Stores data in xAPI format (to ensure future interoperability)
4. Only retrieves data for specific learning activities and only if students sign up
5. And gives students access to their own analytics

Bakharia, A., Kitto, K., Pardo, A., Gašević, D., & Dawson, S. (2016). Recipe for success: lessons learnt from using xAPI within the connected learning analytics toolkit. In Proceedings of the sixth international conference on learning analytics & knowledge (pp. 378-382). ACM.



Connected Learning Analytics Toolkit

Student Dashboard: IFN614, (Twitter: itskylieburgess, Blog: kylieburgess)

Activity by Social Media Platform

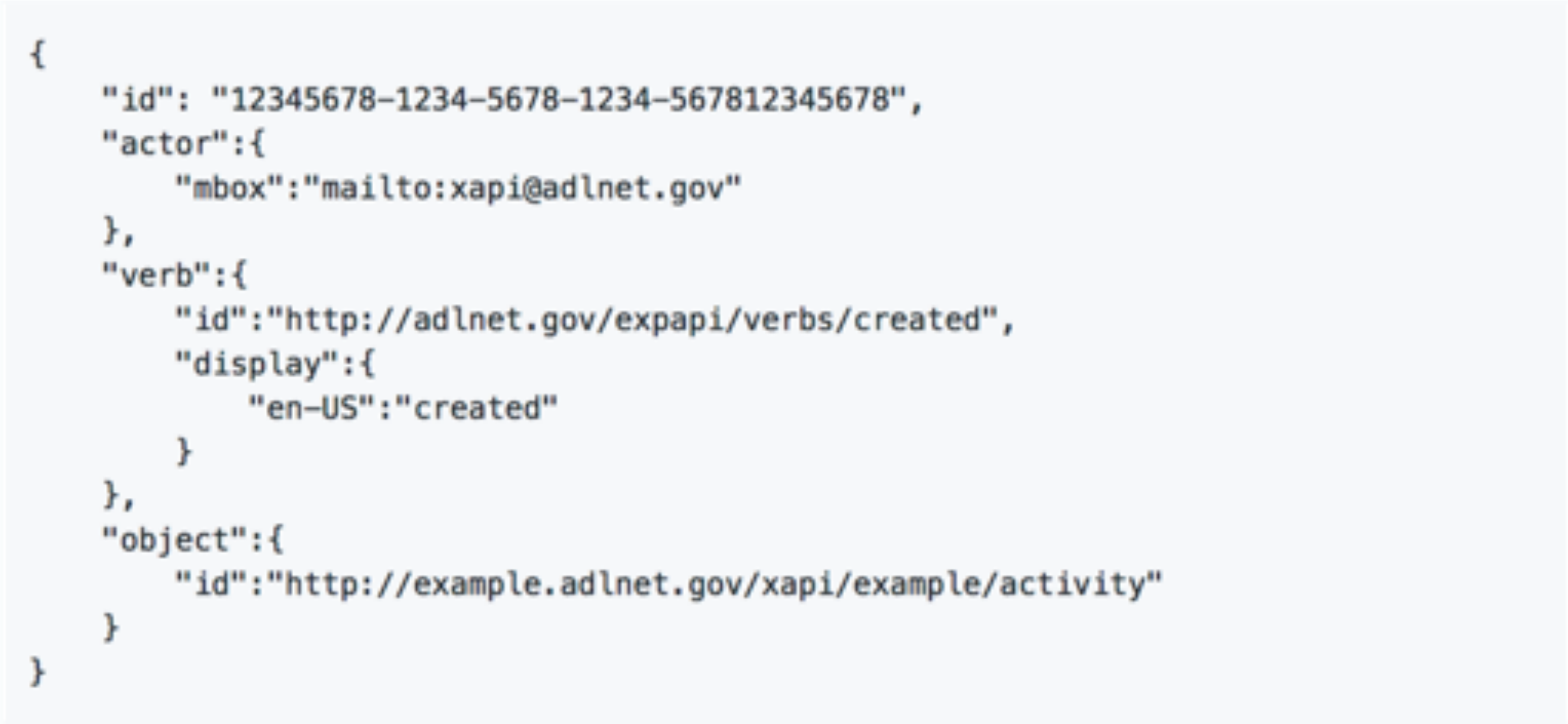
Filter social network and wordcloud by date selection

Platform Total Activity

https://www.cmswire.com/cms/customer-experience/the-iot-will-drive-the-future-of-digital-experience-027937.php

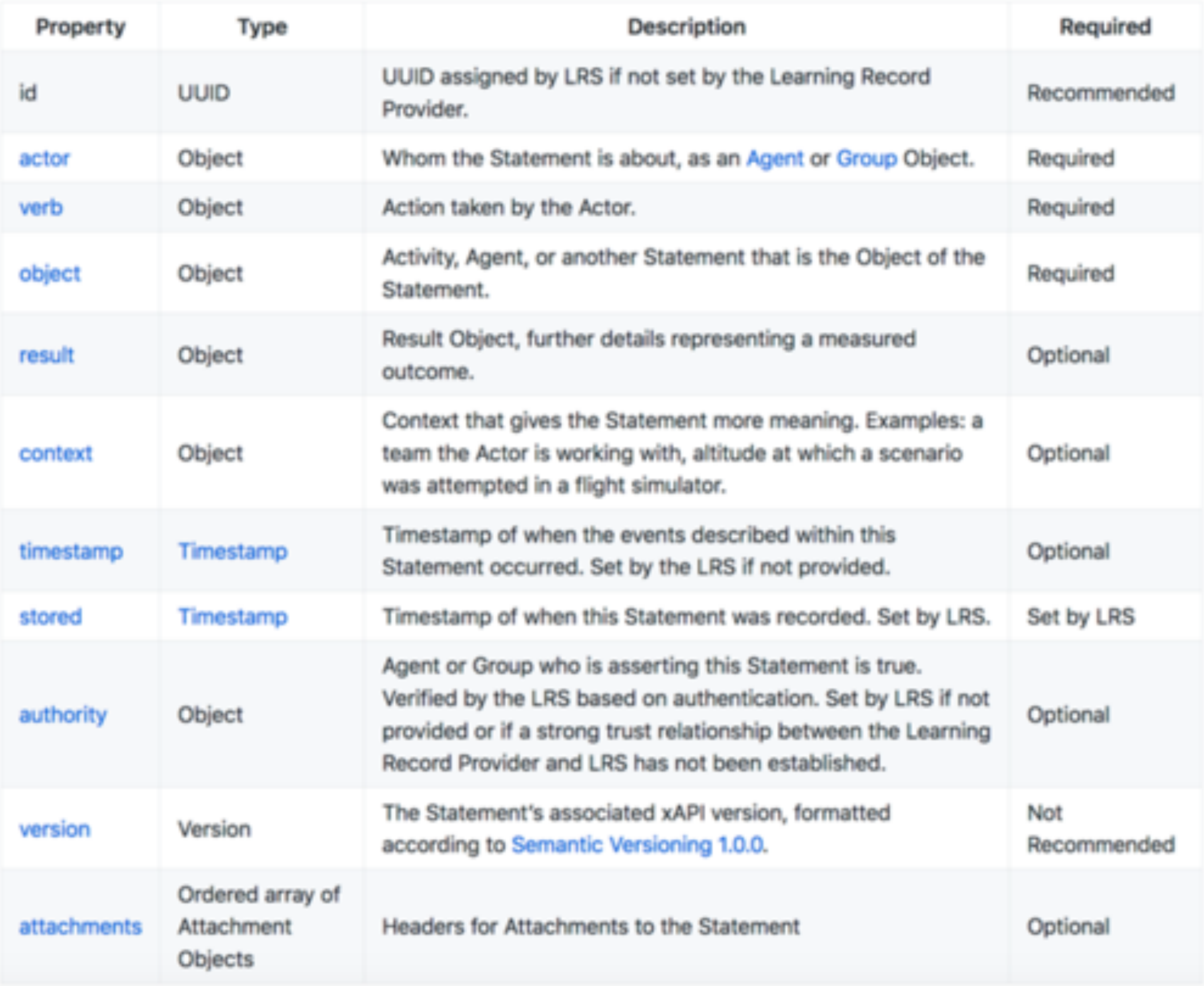
using xAPI to build LRPs

a simplest possible legal xAPI statement



```
{
    "id": "12345678-1234-5678-1234-567812345678",
    "actor":{
        "mbox":"mailto:xapi@adlnet.gov"
    },
    "verb":{
        "id":"http://adlnet.gov/expapi/verbs/created",
        "display":{
            "en-US":"created"
        }
    },
    "object":{
        "id":"http://example.adlnet.gov/xapi/example/activity"
    }
}
```

statement properties



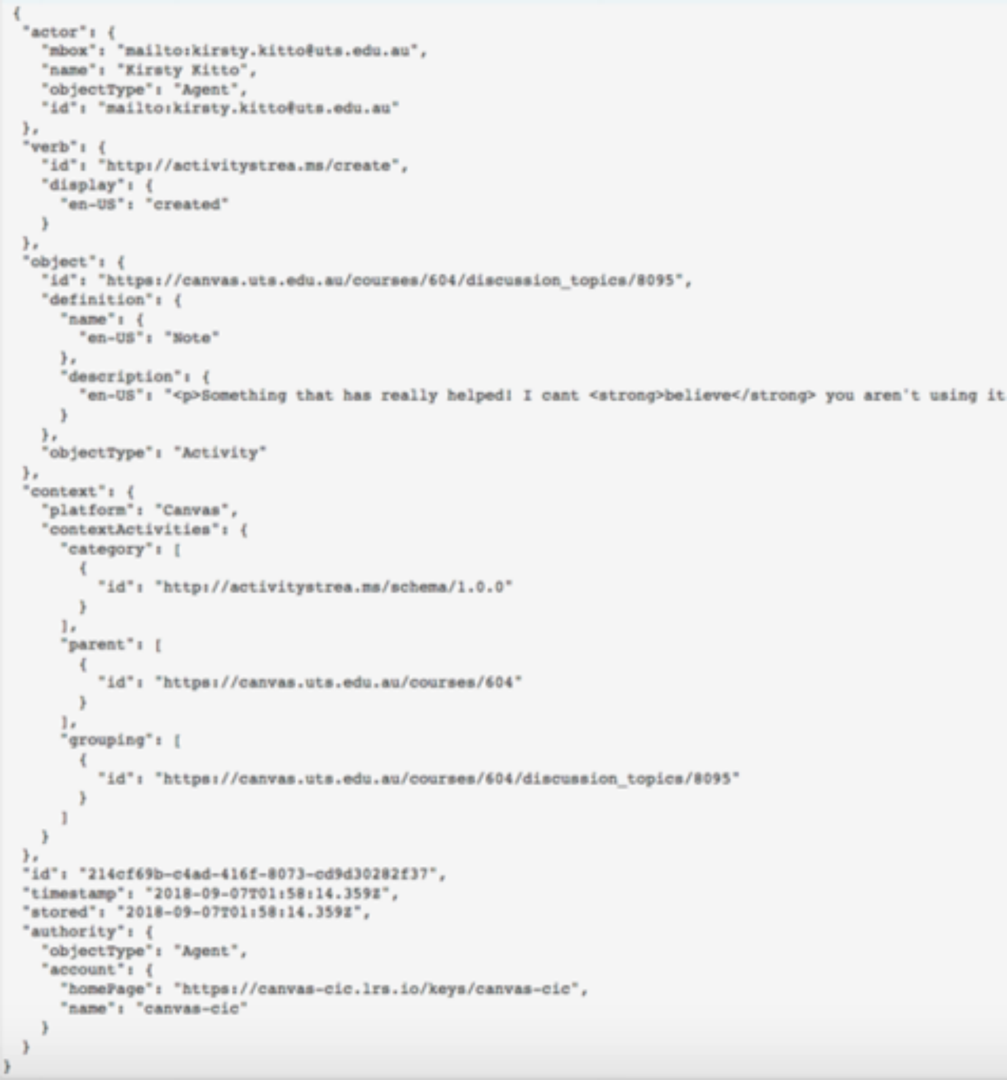
Property	Type	Description	Required
id	UUID	UUID assigned by LRS if not set by the Learning Record Provider.	Recommended
actor	Object	Whom the Statement is about, as an Agent or Group Object.	Required
verb	Object	Action taken by the Actor.	Required
object	Object	Activity, Agent, or another Statement that is the Object of the Statement.	Required
result	Object	Result Object, further details representing a measured outcome.	Optional
context	Object	Context that gives the Statement more meaning. Examples: a team the Actor is working with, altitude at which a scenario was attempted in a flight simulator.	Optional
timestamp	Timestamp	Timestamp of when the events described within this Statement occurred. Set by the LRS if not provided.	Optional
stored	Timestamp	Timestamp of when this Statement was recorded. Set by LRS.	Set by LRS
authority	Object	Agent or Group who is asserting this Statement is true. Verified by the LRS based on authentication. Set by LRS if not provided or if a strong trust relationship between the Learning Record Provider and LRS has not been established.	Optional
version	Version	The Statement's associated xAPI version, formatted according to Semantic Versioning 1.0.0.	Not Recommended
attachments	Ordered array of Attachment Objects	Headers for Attachments to the Statement	Optional

https://github.com/adlnet/xAPI-Spec/blob/master/xAPI-Data.md#statement-properties

a more realistic example xAPI statement

(but its still very simple!)

https://github.com/adlnet/xAPI-Spec/blob/master/xAPI-Data.md#Appendix2A

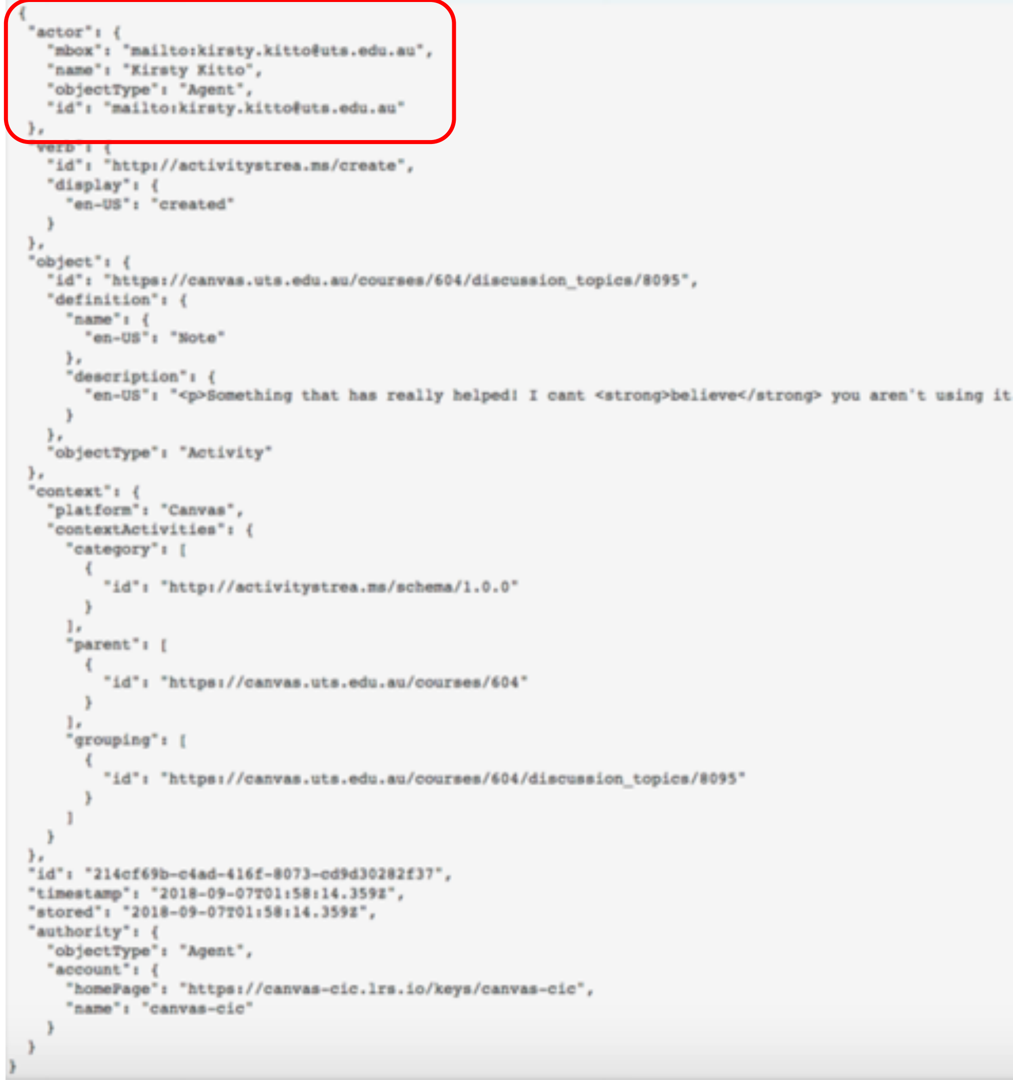


```
{
  "actor": {
    "mbox": "mailto:kirsty.kitto@uts.edu.au",
    "name": "Kirsty Kitto",
    "objectType": "Agent",
    "id": "mailto:kirsty.kitto@uts.edu.au"
  },
  "verb": {
    "id": "http://activitystrea.ms/create",
    "display": {
      "en-US": "created"
    }
  },
  "object": {
    "id": "https://canvas.uts.edu.au/courses/604/discussion_topics/8095",
    "definition": {
      "name": {
        "en-US": "Note"
      },
      "description": {
        "en-US": "<p>Something that has really helped! I cant <strong>believe</strong> you aren't using it
      }
    },
    "objectType": "Activity"
  },
  "context": {
    "platform": "Canvas",
    "contextActivities": {
      "category": [
        {
          "id": "http://activitystrea.ms/schema/1.0.0"
        }
      ],
      "parent": [
        {
          "id": "https://canvas.uts.edu.au/courses/604"
        }
      ],
      "grouping": [
        {
          "id": "https://canvas.uts.edu.au/courses/604/discussion_topics/8095"
        }
      ]
    }
  },
  "id": "214cf69b-c4ad-416f-8073-cd9d30282f37",
  "timestamp": "2018-09-07T01:58:14.359Z",
  "stored": "2018-09-07T01:58:14.359Z",
  "authority": {
    "objectType": "Agent",
    "account": {
      "homePage": "https://canvas-cic.lrs.io/keys/canvas-cic",
      "name": "canvas-cic"
    }
  }
}
```

a more realistic example xAPI statement

(but its still very simple!)

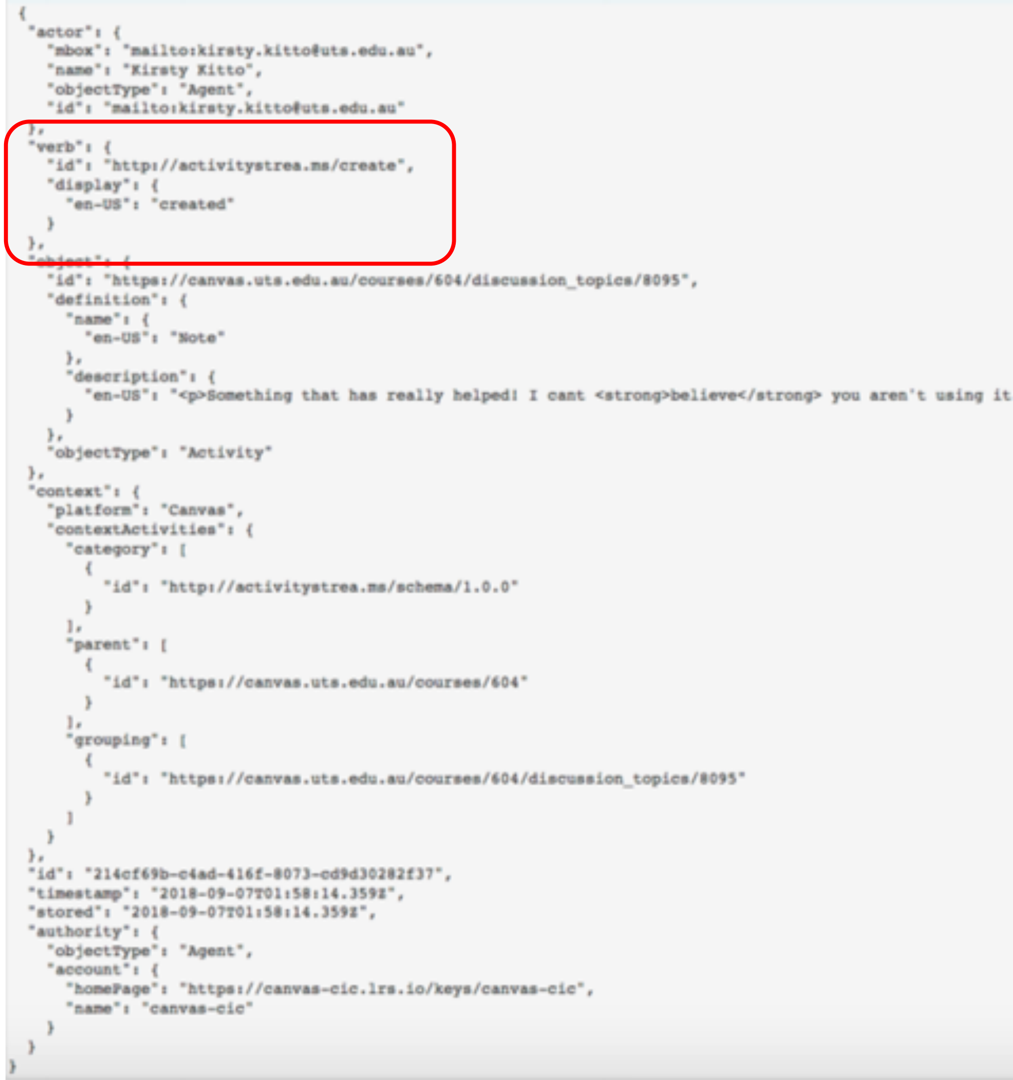
https://github.com/adlnet/xAPI-Spec/blob/master/xAPI-Data.md#Appendix2A



```
{
 "actor": {
   "mbox": "mailto:kirsty.kitto@uts.edu.au",
   "name": "Kirsty Kitto",
   "objectType": "Agent",
   "id": "mailto:kirsty.kitto@uts.edu.au"
 },
 "verb": {
   "id": "http://activitystrea.ms/create",
   "display": {
     "en-US": "created"
   }
 },
 "object": {
   "id": "https://canvas.uts.edu.au/courses/604/discussion_topics/8095",
   "definition": {
     "name": {
       "en-US": "Note"
     },
     "description": {
       "en-US": "<p>Something that has really helped! I cant <strong>believe</strong> you aren't using it
     }
   },
   "objectType": "Activity"
 },
 "context": {
   "platform": "Canvas",
   "contextActivities": {
     "category": [
       {
         "id": "http://activitystrea.ms/schema/1.0.0"
       }
     ],
     "parent": [
       {
         "id": "https://canvas.uts.edu.au/courses/604"
       }
     ],
     "grouping": [
       {
         "id": "https://canvas.uts.edu.au/courses/604/discussion_topics/8095"
       }
     ]
   }
 },
 "id": "214cf69b-c4ad-416f-8073-cd9d30282f37",
 "timestamp": "2018-09-07T01:58:14.359Z",
 "stored": "2018-09-07T01:58:14.359Z",
 "authority": {
   "objectType": "Agent",
   "account": {
     "homePage": "https://canvas-cic.lrs.io/keys/canvas-cic",
     "name": "canvas-cic"
   }
 }
}
```

a more realistic example xAPI statement

(but its still very simple!)



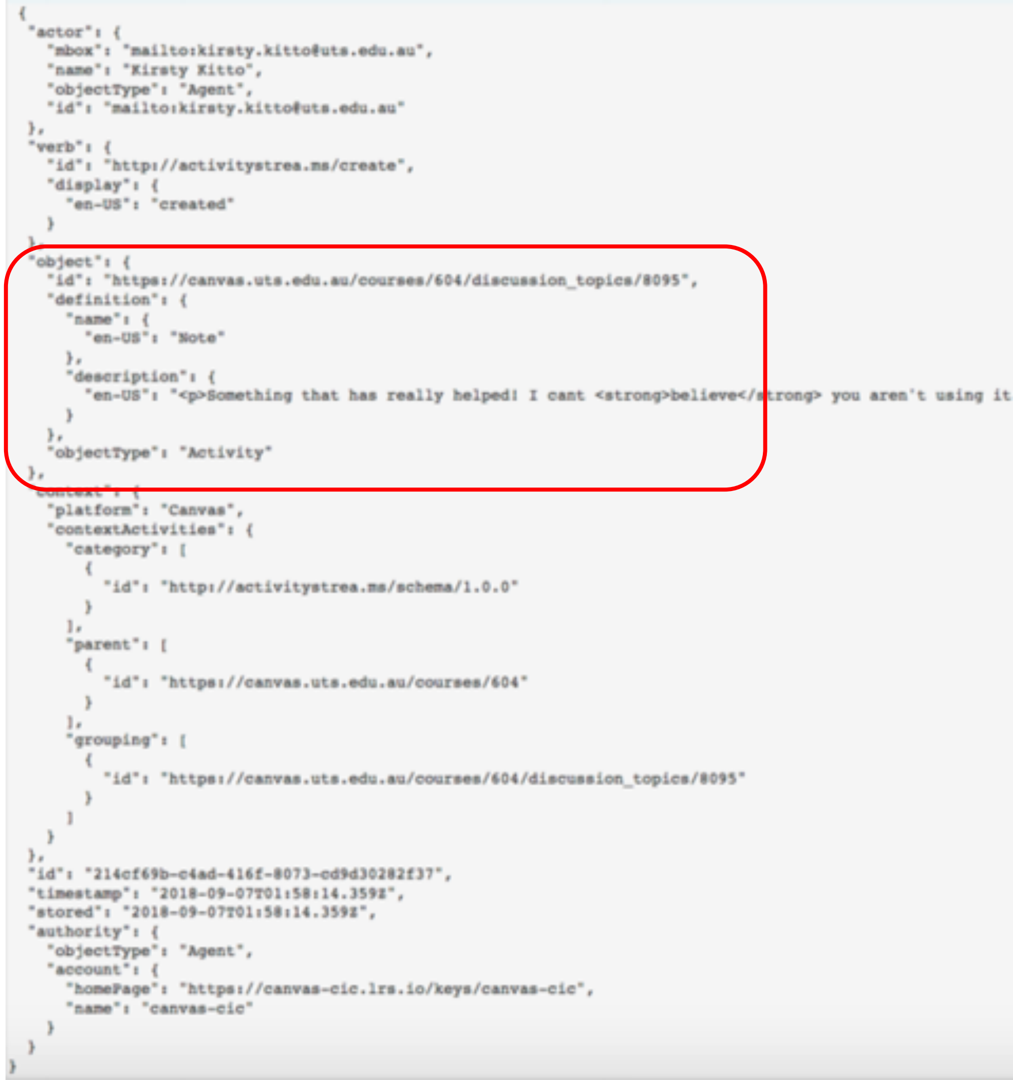
```
{
 "actor": {
   "mbox": "mailto:kirsty.kitto@uts.edu.au",
   "name": "Kirsty Kitto",
   "objectType": "Agent",
   "id": "mailto:kirsty.kitto@uts.edu.au"
 },
 "verb": {
   "id": "http://activitystrea.ms/create",
   "display": {
     "en-US": "created"
   }
 },
 "object": {
   "id": "https://canvas.uts.edu.au/courses/604/discussion_topics/8095",
   "definition": {
     "name": {
       "en-US": "Note"
     },
     "description": {
       "en-US": "<p>Something that has really helped! I cant <strong>believe</strong> you aren't using it
     }
   },
   "objectType": "Activity"
 },
 "context": {
   "platform": "Canvas",
   "contextActivities": {
     "category": [
       {
         "id": "http://activitystrea.ms/schema/1.0.0"
       }
     ],
     "parent": [
       {
         "id": "https://canvas.uts.edu.au/courses/604"
       }
     ],
     "grouping": [
       {
         "id": "https://canvas.uts.edu.au/courses/604/discussion_topics/8095"
       }
     ]
   }
 },
 "id": "214cf69b-c4ad-416f-8073-cd9d30282f37",
 "timestamp": "2018-09-07T01:58:14.359Z",
 "stored": "2018-09-07T01:58:14.359Z",
 "authority": {
   "objectType": "Agent",
   "account": {
     "homePage": "https://canvas-cic.lrs.io/keys/canvas-cic",
     "name": "canvas-cic"
   }
 }
}
```

https://github.com/adlnet/xAPI-Spec/blob/master/xAPI-Data.md#Appendix2A

a more realistic example xAPI statement

(but its still very simple!)

https://github.com/adlnet/xAPI-Spec/blob/master/xAPI-Data.md#Appendix2A

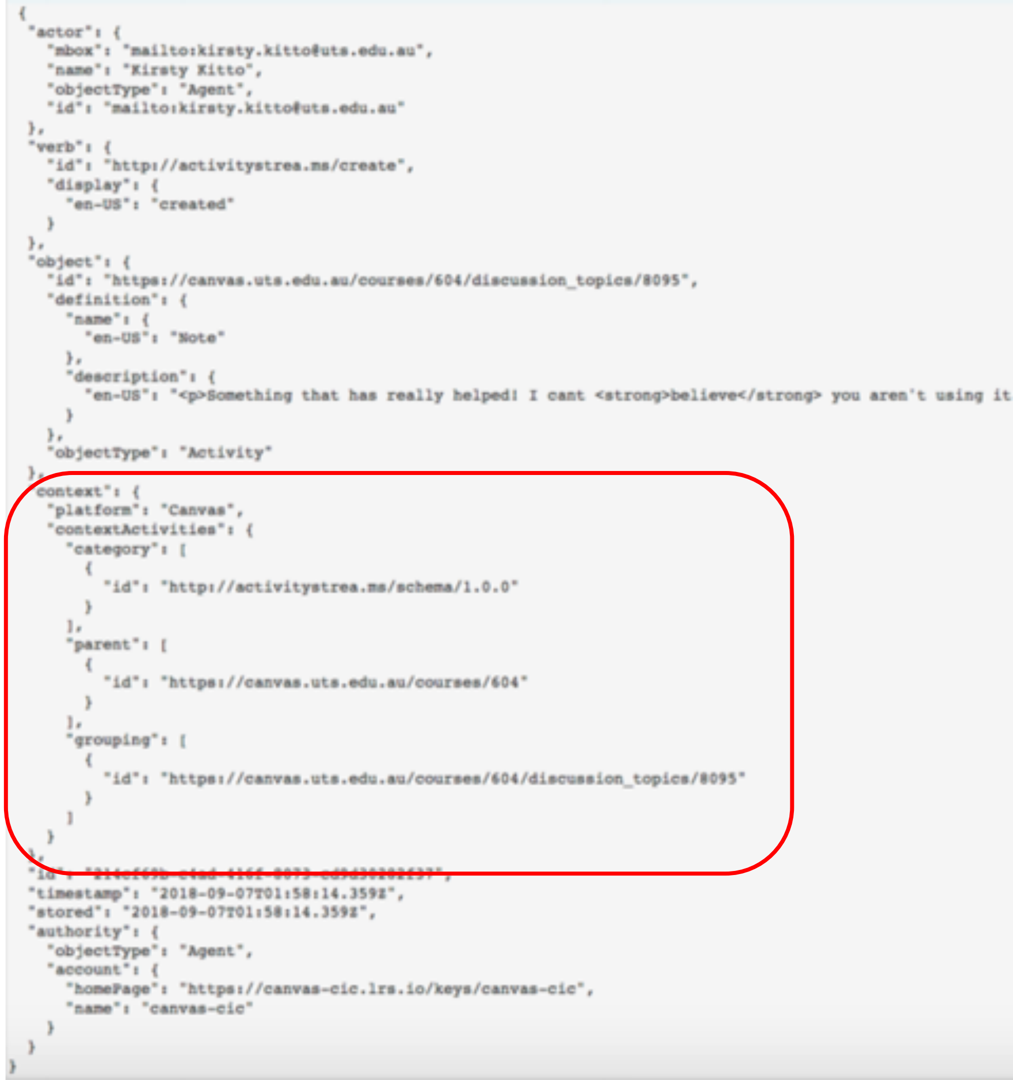


```
{
 "actor": {
   "mbox": "mailto:kirsty.kitto@uts.edu.au",
   "name": "Kirsty Kitto",
   "objectType": "Agent",
   "id": "mailto:kirsty.kitto@uts.edu.au"
 },
 "verb": {
   "id": "http://activitystrea.ms/create",
   "display": {
     "en-US": "created"
   }
 },
 "object": {
   "id": "https://canvas.uts.edu.au/courses/604/discussion_topics/8095",
   "definition": {
     "name": {
       "en-US": "Note"
     },
     "description": {
       "en-US": "<p>Something that has really helped! I cant <strong>believe</strong> you aren't using it
     }
   },
   "objectType": "Activity"
 },
 "context": {
   "platform": "Canvas",
   "contextActivities": {
     "category": [
       {
         "id": "http://activitystrea.ms/schema/1.0.0"
       }
     ],
     "parent": [
       {
         "id": "https://canvas.uts.edu.au/courses/604"
       }
     ],
     "grouping": [
       {
         "id": "https://canvas.uts.edu.au/courses/604/discussion_topics/8095"
       }
     ]
   }
 },
 "id": "214cf69b-c4ad-416f-8073-cd9d30282f37",
 "timestamp": "2018-09-07T01:58:14.359Z",
 "stored": "2018-09-07T01:58:14.359Z",
 "authority": {
   "objectType": "Agent",
   "account": {
     "homePage": "https://canvas-cic.lrs.io/keys/canvas-cic",
     "name": "canvas-cic"
   }
 }
}
```

a more realistic example xAPI statement

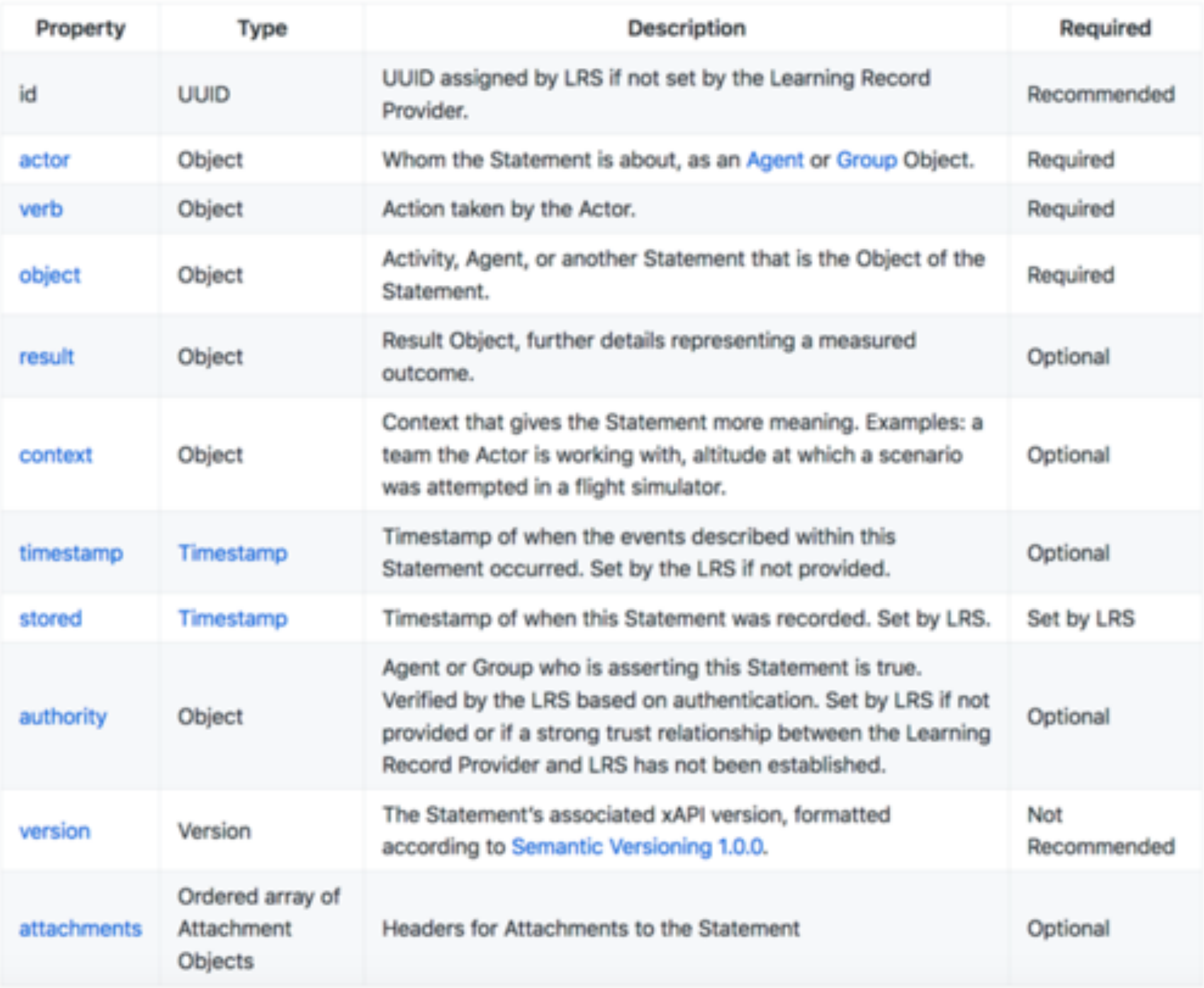
(but its still very simple!)

https://github.com/adlnet/xAPI-Spec/blob/master/xAPI-Data.md#Appendix2A



```
{
 "actor": {
   "mbox": "mailto:kirsty.kitto@uts.edu.au",
   "name": "Kirsty Kitto",
   "objectType": "Agent",
   "id": "mailto:kirsty.kitto@uts.edu.au"
 },
 "verb": {
   "id": "http://activitystrea.ms/create",
   "display": {
     "en-US": "created"
   }
 },
 "object": {
   "id": "https://canvas.uts.edu.au/courses/604/discussion_topics/8095",
   "definition": {
     "name": {
       "en-US": "Note"
     },
     "description": {
       "en-US": "<p>Something that has really helped! I cant <strong>believe</strong> you aren't using it
     }
   },
   "objectType": "Activity"
 },
 "context": {
   "platform": "Canvas",
   "contextActivities": {
     "category": [
       {
         "id": "http://activitystrea.ms/schema/1.0.0"
       }
     ],
     "parent": [
       {
         "id": "https://canvas.uts.edu.au/courses/604"
       }
     ],
     "grouping": [
       {
         "id": "https://canvas.uts.edu.au/courses/604/discussion_topics/8095"
       }
     ]
   }
 },
 "id": "214cf69b-c4ad-416f-8073-cd9d30282f37",
 "timestamp": "2018-09-07T01:58:14.359Z",
 "stored": "2018-09-07T01:58:14.359Z",
 "authority": {
   "objectType": "Agent",
   "account": {
     "homePage": "https://canvas-cic.lrs.io/keys/canvas-cic",
     "name": "canvas-cic"
   }
 }
}
```

statement properties

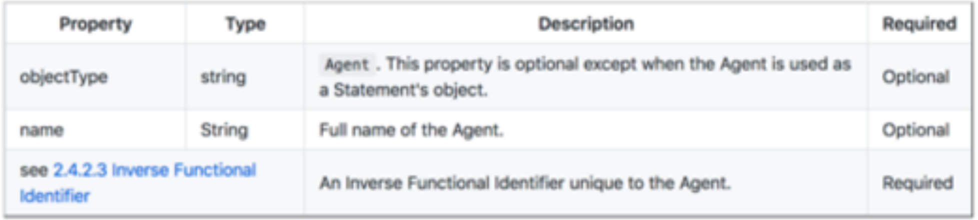


Property	Type	Description	Required
id	UUID	UUID assigned by LRS if not set by the Learning Record Provider.	Recommended
actor	Object	Whom the Statement is about, as an Agent or Group Object.	Required
verb	Object	Action taken by the Actor.	Required
object	Object	Activity, Agent, or another Statement that is the Object of the Statement.	Required
result	Object	Result Object, further details representing a measured outcome.	Optional
context	Object	Context that gives the Statement more meaning. Examples: a team the Actor is working with, altitude at which a scenario was attempted in a flight simulator.	Optional
timestamp	Timestamp	Timestamp of when the events described within this Statement occurred. Set by the LRS if not provided.	Optional
stored	Timestamp	Timestamp of when this Statement was recorded. Set by LRS.	Set by LRS
authority	Object	Agent or Group who is asserting this Statement is true. Verified by the LRS based on authentication. Set by LRS if not provided or if a strong trust relationship between the Learning Record Provider and LRS has not been established.	Optional
version	Version	The Statement's associated xAPI version, formatted according to Semantic Versioning 1.0.0.	Not Recommended
attachments	Ordered array of Attachment Objects	Headers for Attachments to the Statement	Optional

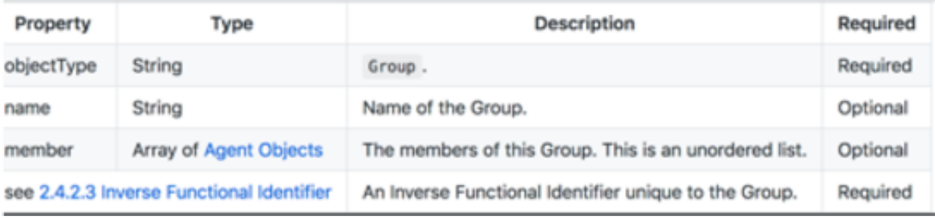
https://github.com/adlnet/xAPI-Spec/blob/master/xAPI-Data.md#statement-properties

actors

- **Actor**: An individual or group performing an action within an Activity
  - Individual: `Agent`
  - Group: `Group`
- an actor is the “I” in “I did this”
- they are the thing doing the learning!

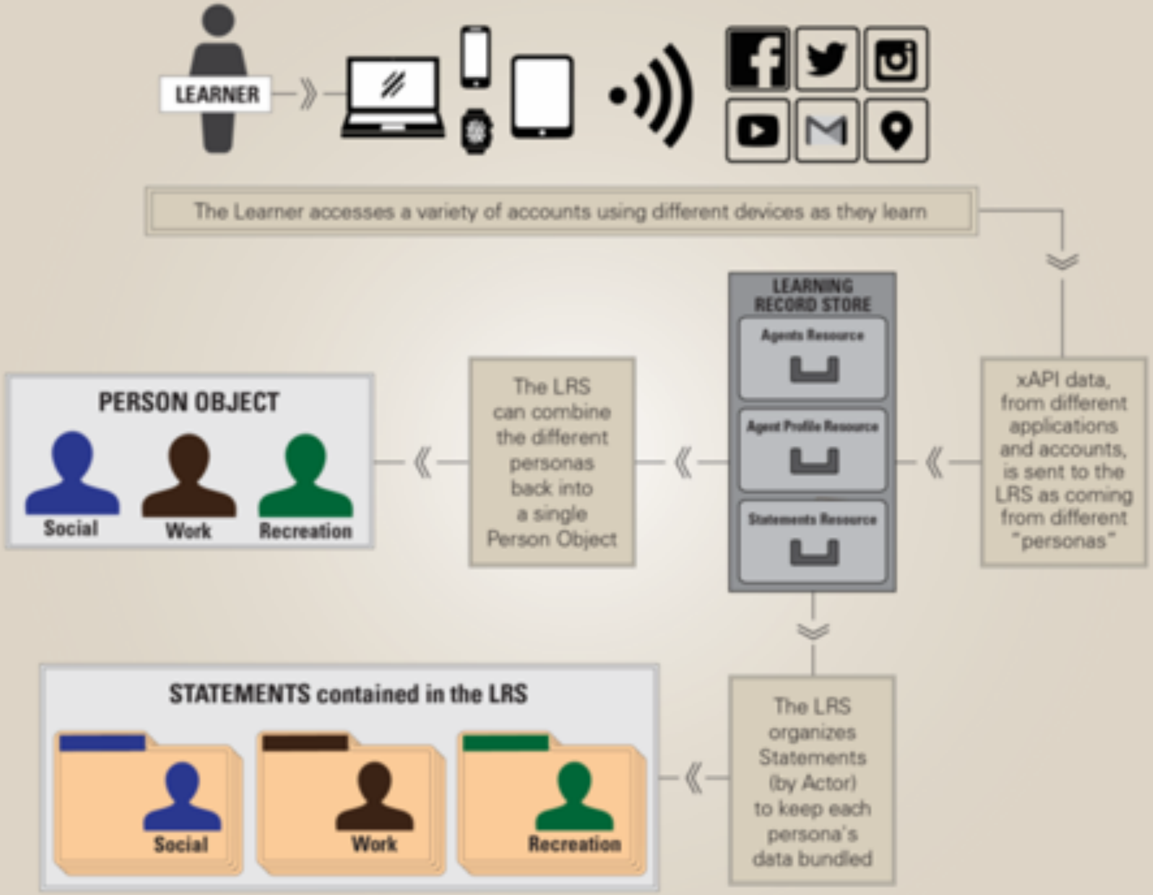


Property	Type	Description	Required
objectType	string	`Agent`. This property is optional except when the Agent is used as a Statement's object.	Optional
name	String	Full name of the Agent.	Optional
see 2.4.2.3 Inverse Functional Identifier		An Inverse Functional Identifier unique to the Agent.	Required



Property	Type	Description	Required
objectType	String	`Group`.	Required
name	String	Name of the Group.	Optional
member	Array of Agent Objects	The members of this Group. This is an unordered list.	Optional
see 2.4.2.3 Inverse Functional Identifier		An Inverse Functional Identifier unique to the Group.	Required

actors can have many different roles – termed **persona**

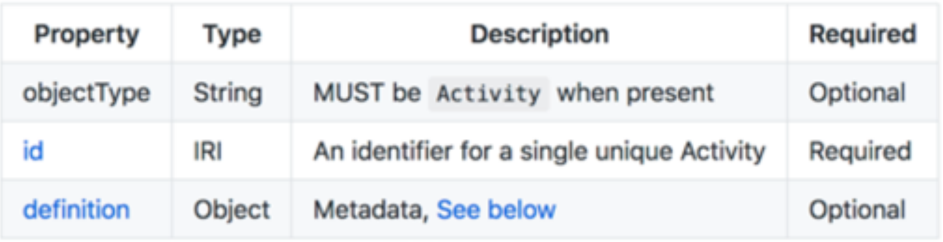

LEARNER
The Learner accesses a variety of accounts using different devices as they learn
LEARNING RECORD STORE
Agents Resource
Agent Profile Resource
Statements Resource
xAPI data, from different applications and accounts, is sent to the LRS as coming from different "personas"
The LRS can combine the different personas back into a single Person Object
PERSON OBJECT
Social
Work
Recreation
The LRS organizes Statements (by Actor) to keep each persona's data bundled
STATEMENTS contained in the LRS
Social
Work
Recreation

verbs

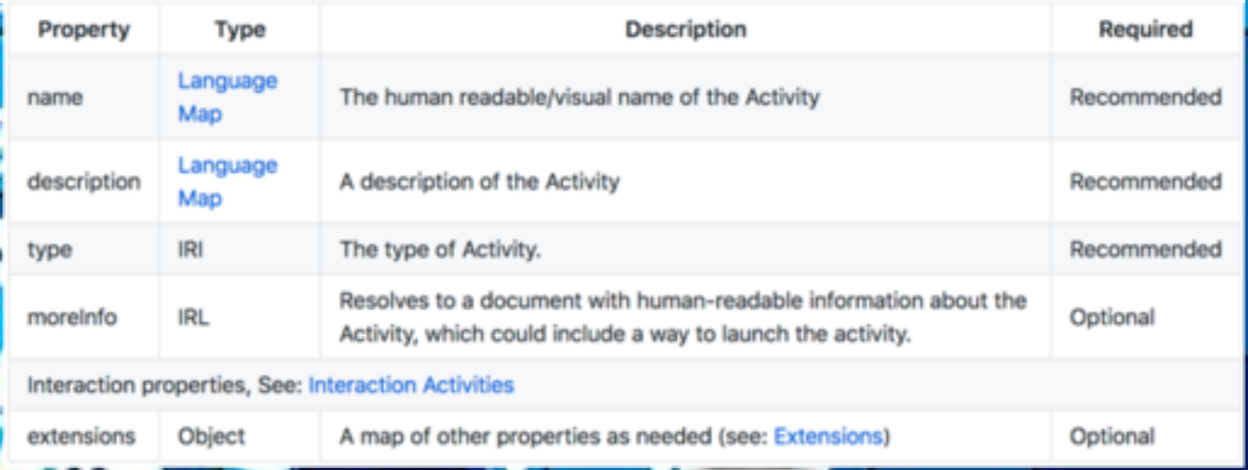
- define the action between an Actor and an Activity
- the specification does not define verbs
- instead, it defines how to create verbs so that communities of practice can establish verbs meaningful to their members and make ther available for use by anyone…
- new xAPI profile specification helps… more on this later

objects

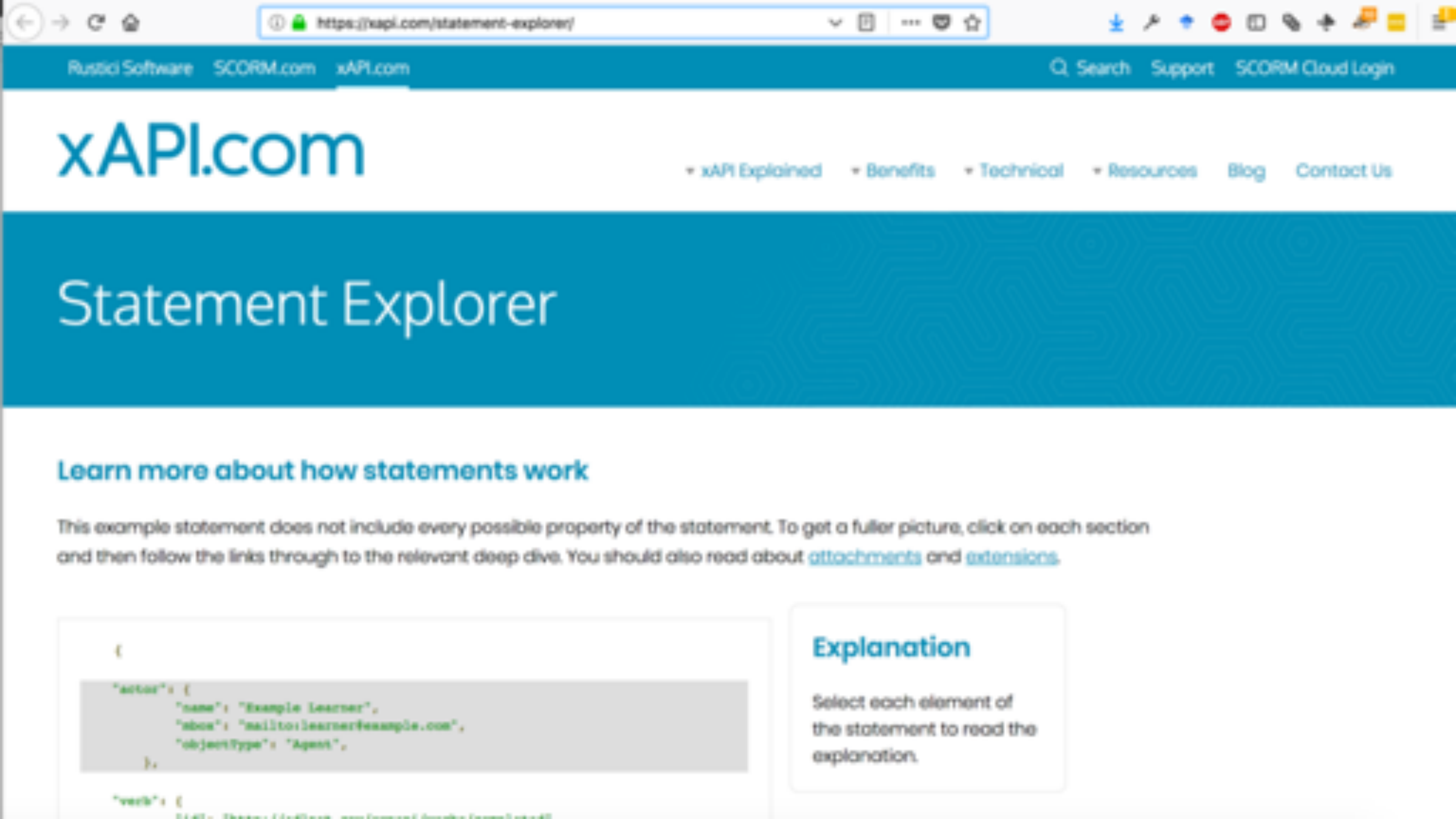
- define the thing acted on:
  - Activity
  - Agent/Group
  - SubStatement
  - StatementReference



Property	Type	Description	Required
objectType	String	MUST be `Activity` when present	Optional
id	IRI	An identifier for a single unique Activity	Required
definition	Object	Metadata, See below	Optional



Property	Type	Description	Required
name	Language Map	The human readable/visual name of the Activity	Recommended
description	Language Map	A description of the Activity	Recommended
type	IRI	The type of Activity.	Recommended
moreInfo	IRL	Resolves to a document with human-readable information about the Activity, which could include a way to launch the activity.	Optional
Interaction properties, See: Interaction Activities			
extensions	Object	A map of other properties as needed (see: Extensions)	Optional



Statement Explorer

Learn more about how statements work

This example statement does not include every possible property of the statement. To get a fuller picture, click on each section and then follow the links through to the relevant deep dive. You should also read about attachments and extensions.

```
{

"actor": {
        "name": "Example Learner",
        "mbox": "mailto:learner@example.com",
        "objectType": "Agent",
    },

"verb": {
        "id": "http://adlnet.gov/expapi/verbs/completed"
```

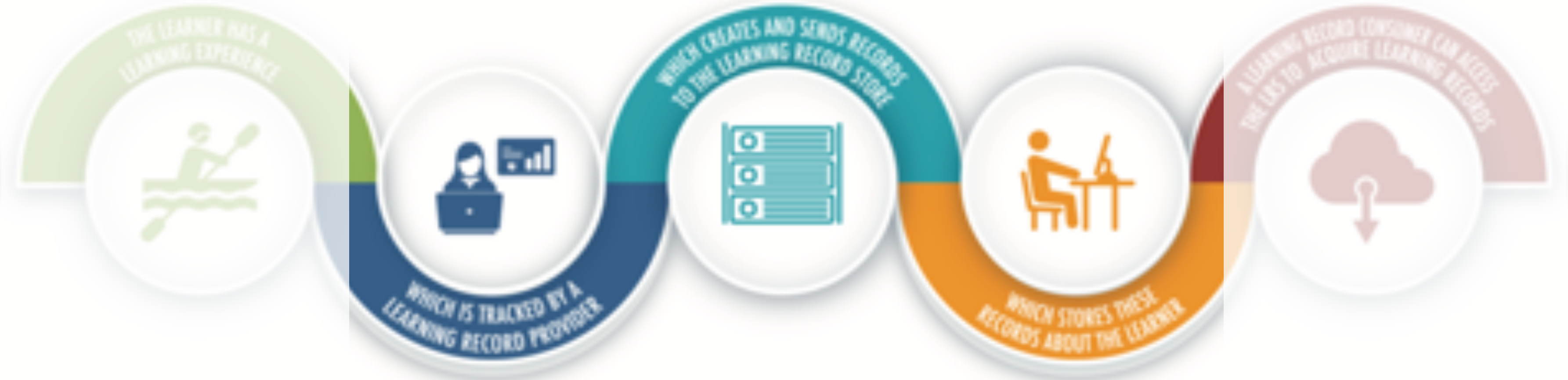
Explanation

Select each element of the statement to read the explanation.

but where do these statements go?

…and what can you do with them when they get there?

xAPI data flow



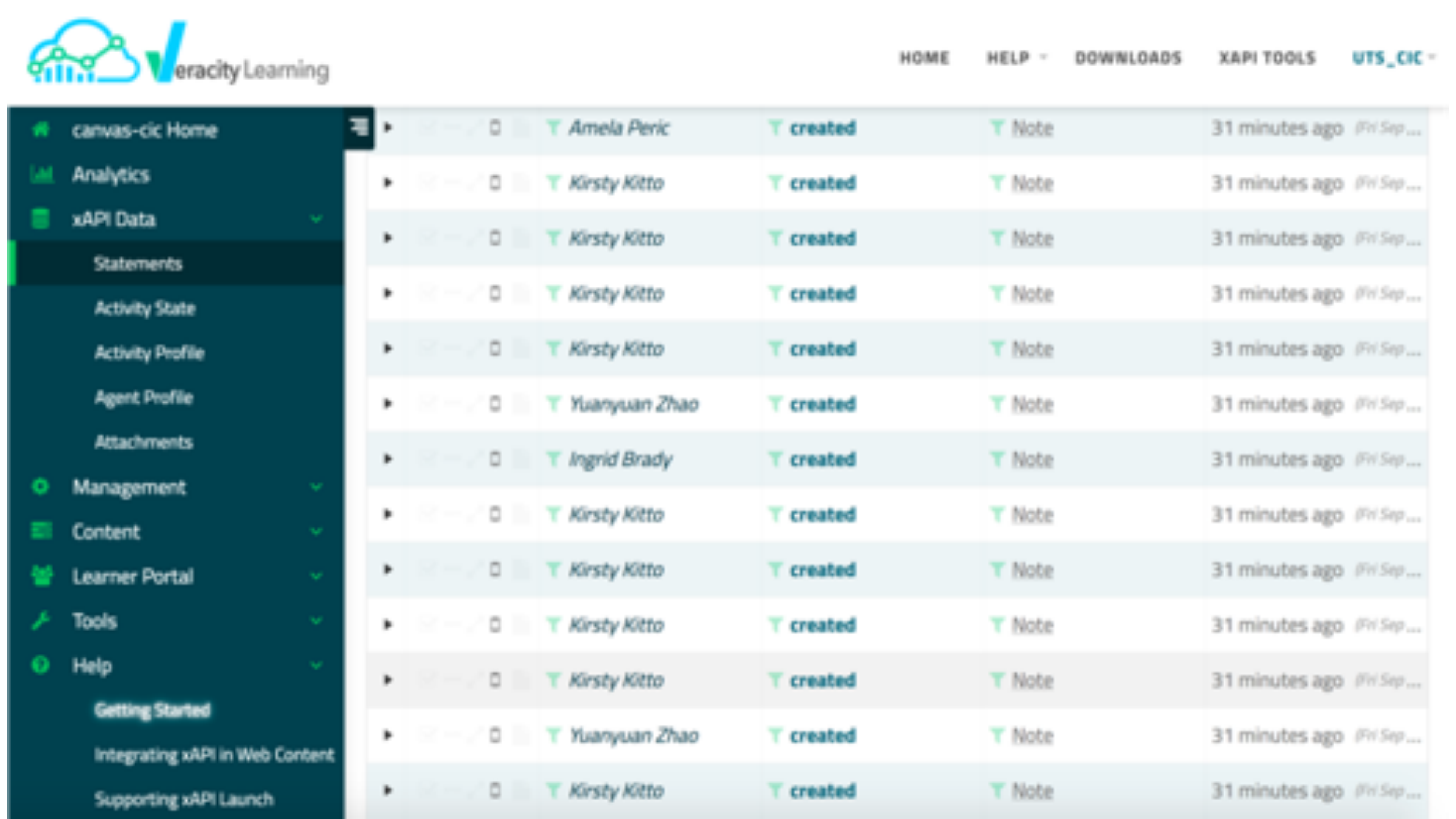
THE LEARNER HAS A LEARNING EXPERIENCE

WHICH IS TRACKED BY A LEARNING RECORD PROVIDER

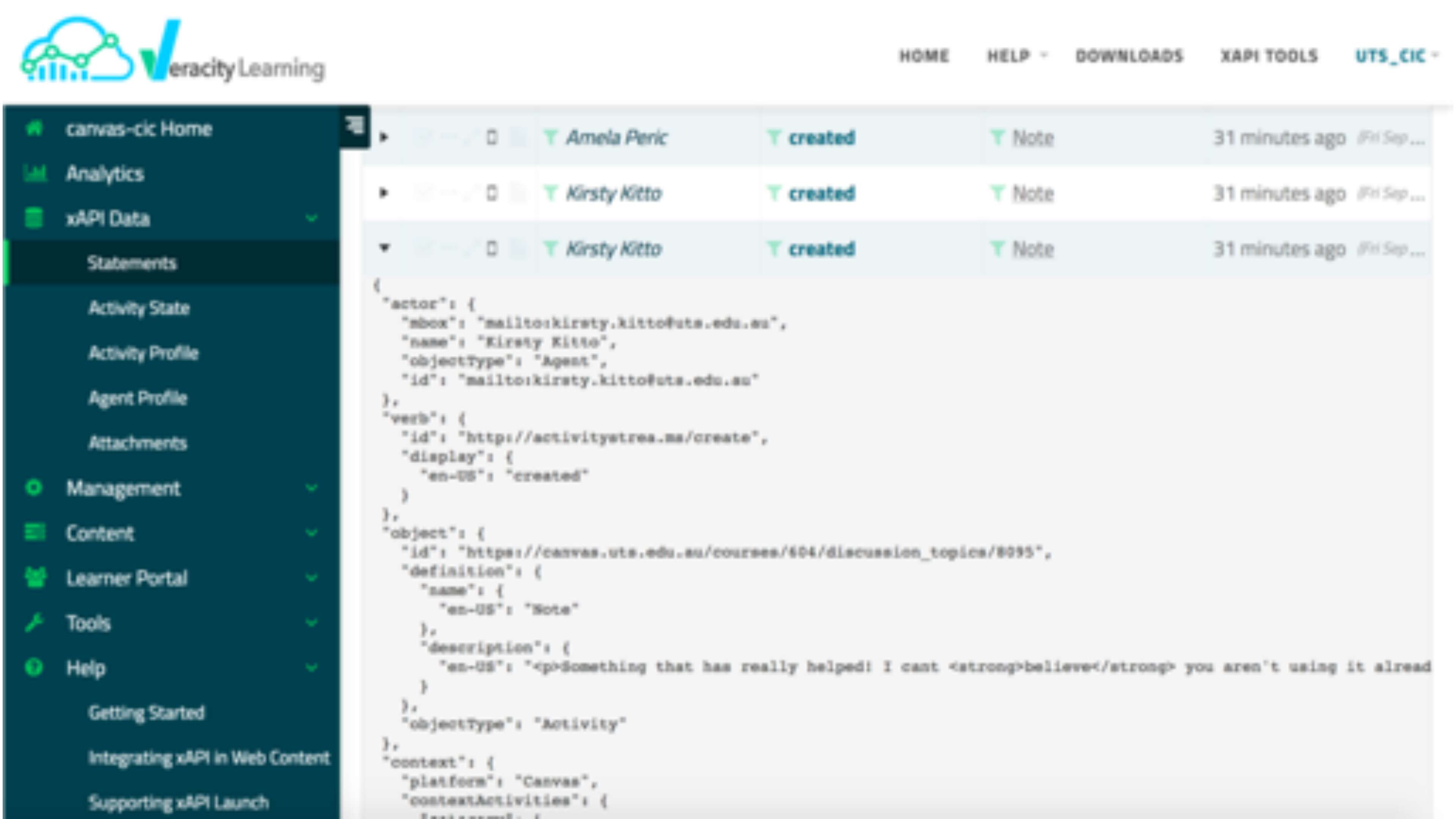
WHICH CREATES AND SENDS RECORDS TO THE LEARNING RECORD STORE

WHICH STORES THESE RECORDS ABOUT THE LEARNER

A LEARNING RECORD CONSUMER CAN ACCESS THE LRS TO ACQUIRE LEARNING RECORDS



Amela Peric	**created**	Note	31 minutes ago	*(Fri Sep ...*
Kirsty Kitto	**created**	Note	31 minutes ago	*(Fri Sep ...*
Kirsty Kitto	**created**	Note	31 minutes ago	*(Fri Sep ...*
Kirsty Kitto	**created**	Note	31 minutes ago	*(Fri Sep ...*
Kirsty Kitto	**created**	Note	31 minutes ago	*(Fri Sep ...*
Yuanyuan Zhao	**created**	Note	31 minutes ago	*(Fri Sep ...*
Ingrid Brady	**created**	Note	31 minutes ago	*(Fri Sep ...*
Kirsty Kitto	**created**	Note	31 minutes ago	*(Fri Sep ...*
Kirsty Kitto	**created**	Note	31 minutes ago	*(Fri Sep ...*
Kirsty Kitto	**created**	Note	31 minutes ago	*(Fri Sep ...*
Kirsty Kitto	**created**	Note	31 minutes ago	*(Fri Sep ...*
Yuanyuan Zhao	**created**	Note	31 minutes ago	*(Fri Sep ...*
Kirsty Kitto	**created**	Note	31 minutes ago	*(Fri Sep ...*

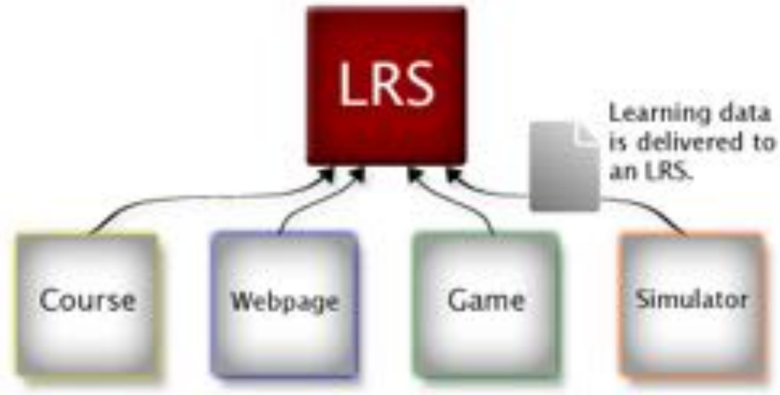


Amela Peric	created	Note	31 minutes ago (Fri Sep ...
Kirsty Kitto	created	Note	31 minutes ago (Fri Sep ...
Kirsty Kitto	created	Note	31 minutes ago (Fri Sep ...

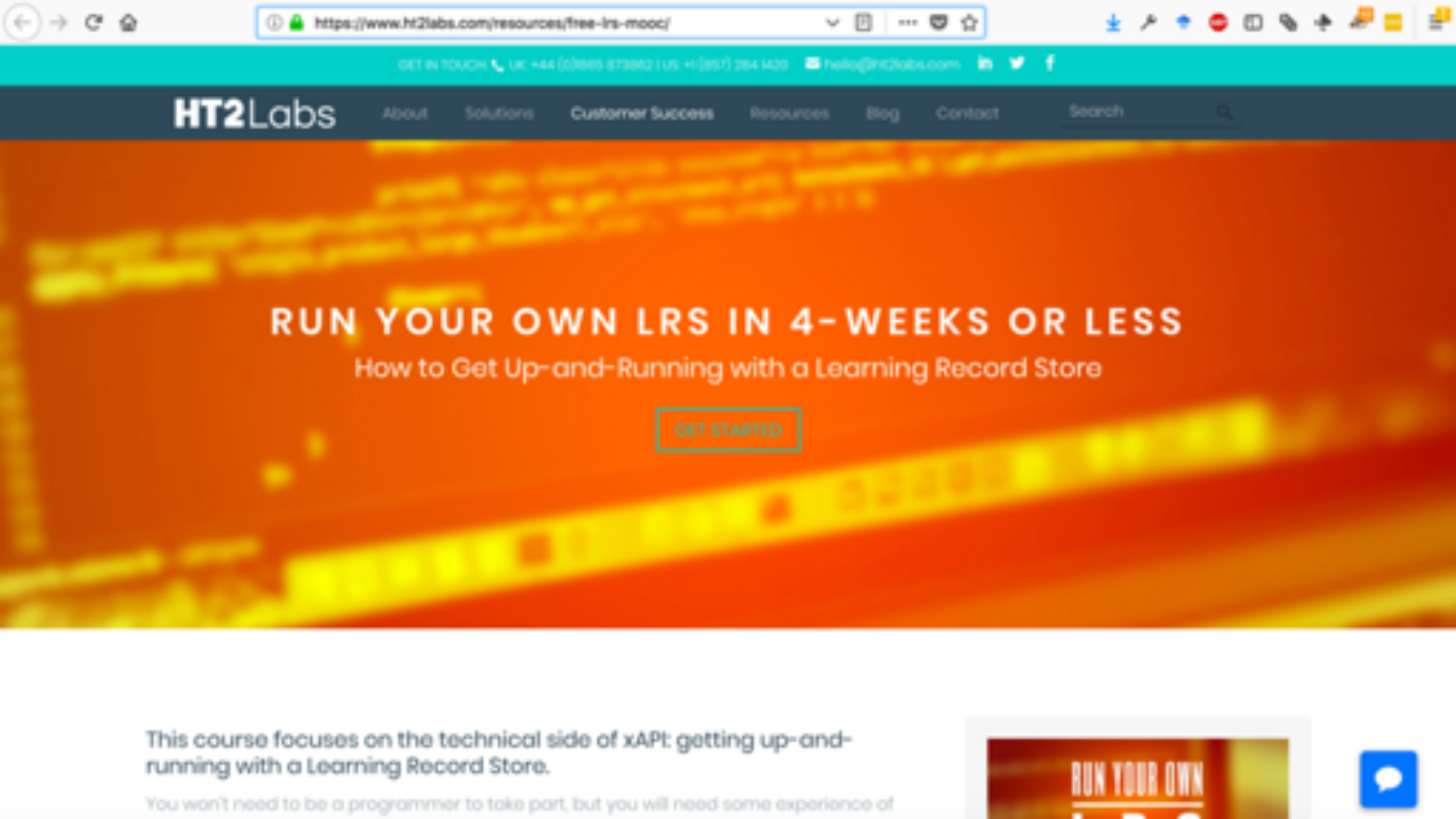
```
{
 "actor": {
   "mbox": "mailto:kirsty.kitto@uts.edu.au",
   "name": "Kirsty Kitto",
   "objectType": "Agent",
   "id": "mailto:kirsty.kitto@uts.edu.au"
 },
 "verb": {
   "id": "http://activitystrea.ms/create",
   "display": {
     "en-US": "created"
   }
 },
 "object": {
   "id": "https://canvas.uts.edu.au/courses/604/discussion_topics/8095",
   "definition": {
     "name": {
       "en-US": "Note"
     },
     "description": {
       "en-US": "<p>Something that has really helped! I cant <strong>believe</strong> you aren't using it alread
     }
   },
   "objectType": "Activity"
 },
 "context": {
   "platform": "Canvas",
   "contextActivities": {
```

learning record stores (LRS)

- accept and send xAPI statements!
- the specification is **very clear** about how these must behave
- but different vendors often enhance their LRS with further functionality (especially in the analytics and reporting)



- quite a few vendors have a free service:
  - Veracity: https://lrs.io/
  - HT2 (LearningLocker): https://www.ht2labs.com/learning-locker/
  - Rustici (Watershed): https://www.watershedlrs.com/product/pricing/essentials-learning-record-store



https://www.ht2labs.com/resources/free-lrs-mooc/
GET IN TOUCH UK: +44 (0)1865 873862 | US: +1 (857) 264 1420
hello@ht2labs.com
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GET STARTED
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RUN YOUR OWN LRS IN 4-WEEKS OR LESS

How to Get Up-and-Running with a Learning Record Store

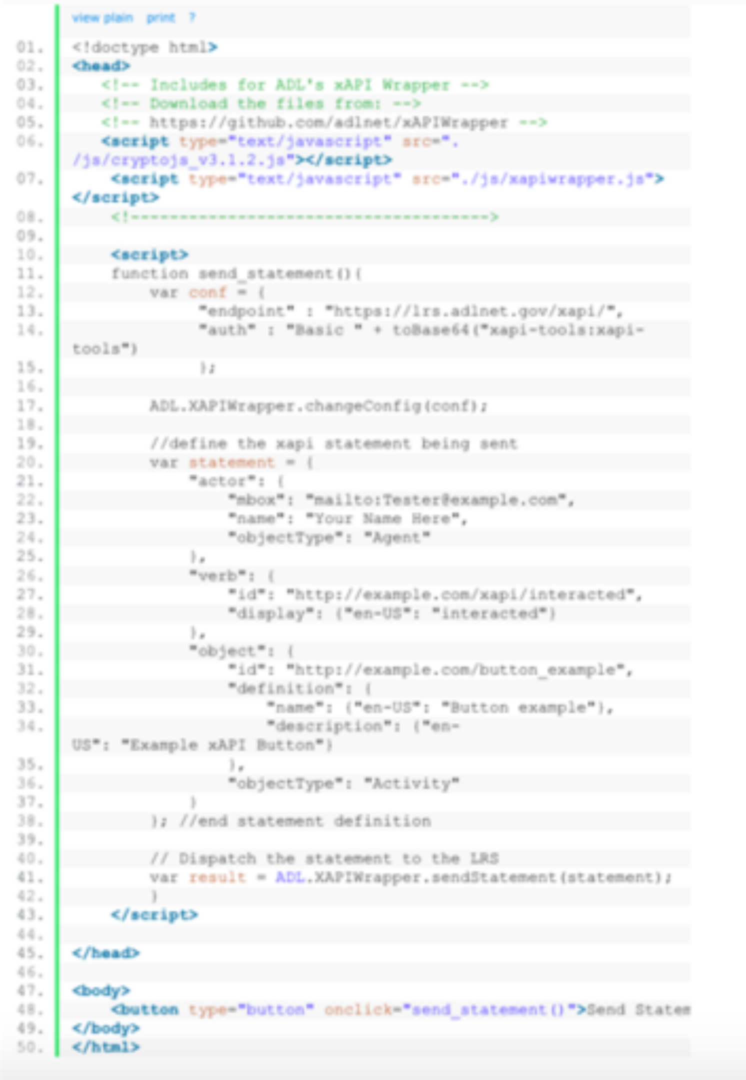
This course focuses on the technical side of xAPI: getting up-and-running with a Learning Record Store.

You won't need to be a programmer to take part, but you will need some experience of

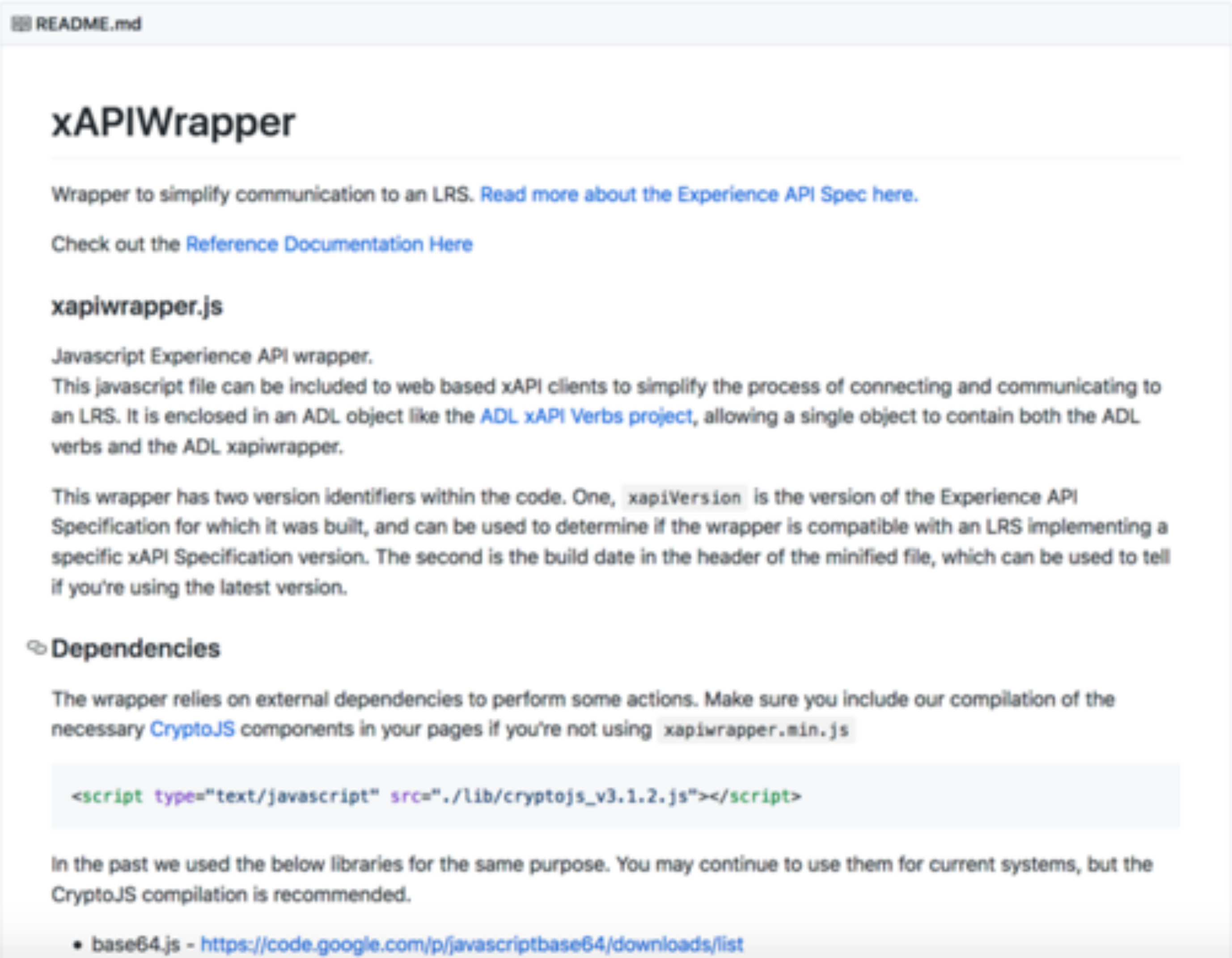
sending xAPI statements to a LRS

- Step 1: Define a variable that holds the URL address of the LRS and the username and password to authenticate.
- Step 2: Tell your xAPI wrapper to use that variable for the LRS.
- Step 3: create a variable to hold the xAPI statement
- Step 4: Send the statement!

https://www.learningsolutionsmag.com/articles/2322/getting-started-with-xapi-four-lines-of-code
https://www.linkedin.com/pulse/follow-along-3-getting-started-xapi-tutorials-melissa-milloway-msit/



```
<!doctype html>
<head>
   <!-- Includes for ADL's xAPI Wrapper -->
   <!-- Download the files from: -->
   <!-- https://github.com/adlnet/xAPIWrapper -->
   <script type="text/javascript" src=".
/js/cryptojs_v3.1.2.js"></script>
    <script type="text/javascript" src="./js/xapiwrapper.js">
</script>
    <!--------------------------------------->

    <script>
    function send_statement(){
        var conf = {
             "endpoint" : "https://lrs.adlnet.gov/xapi/",
             "auth" : "Basic " + toBase64("xapi-tools:xapi-
tools")
             };

        ADL.XAPIWrapper.changeConfig(conf);

        //define the xapi statement being sent
        var statement = {
            "actor": {
                "mbox": "mailto:Tester@example.com",
                "name": "Your Name Here",
                "objectType": "Agent"
            },
            "verb": {
                "id": "http://example.com/xapi/interacted",
                "display": {"en-US": "interacted"}
            },
            "object": {
                "id": "http://example.com/button_example",
                "definition": {
                    "name": {"en-US": "Button example"},
                    "description": {"en-
US": "Example xAPI Button"}
                },
                "objectType": "Activity"
            }
        }; //end statement definition

        // Dispatch the statement to the LRS
        var result = ADL.XAPIWrapper.sendStatement(statement);
        }
    </script>

</head>

<body>
    <button type="button" onclick="send_statement()">Send Statem
</body>
</html>
```



README.md

xAPIWrapper

Wrapper to simplify communication to an LRS. Read more about the Experience API Spec here.

Check out the Reference Documentation Here

xapiwrapper.js

Javascript Experience API wrapper.
This javascript file can be included to web based xAPI clients to simplify the process of connecting and communicating to an LRS. It is enclosed in an ADL object like the ADL xAPI Verbs project, allowing a single object to contain both the ADL verbs and the ADL xapiwrapper.

This wrapper has two version identifiers within the code. One, `xapiVersion` is the version of the Experience API Specification for which it was built, and can be used to determine if the wrapper is compatible with an LRS implementing a specific xAPI Specification version. The second is the build date in the header of the minified file, which can be used to tell if you're using the latest version.

Dependencies

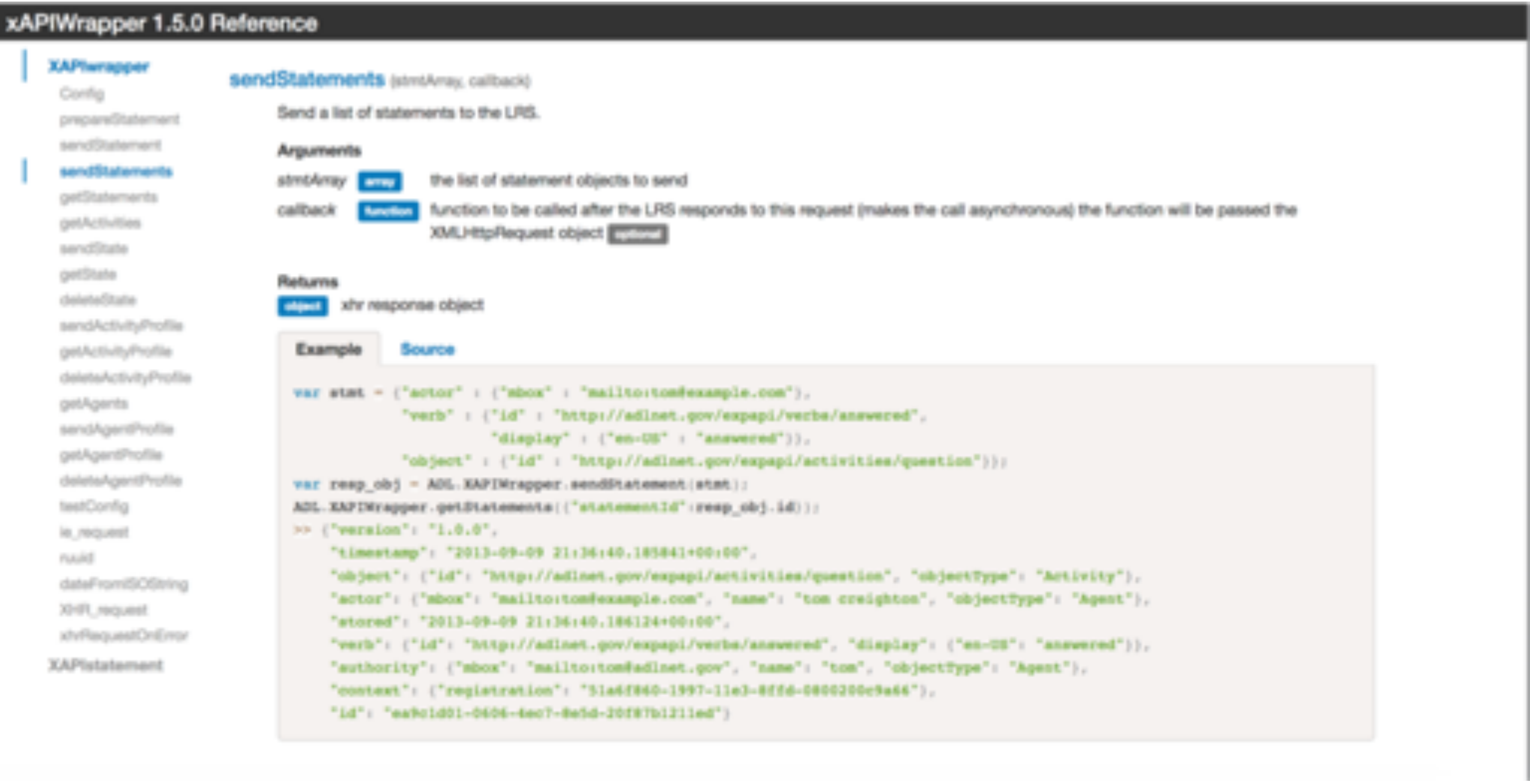
The wrapper relies on external dependencies to perform some actions. Make sure you include our compilation of the necessary CryptoJS components in your pages if you're not using `xapiwrapper.min.js`

```
<script type="text/javascript" src="./lib/cryptojs_v3.1.2.js"></script>
```

In the past we used the below libraries for the same purpose. You may continue to use them for current systems, but the CryptoJS compilation is recommended.

- base64.js - https://code.google.com/p/javascriptbase64/downloads/list

https://github.com/
adlnet/xAPIWrapper



xAPIWrapper 1.5.0 Reference

- XAPIwrapper
  - Config
  - prepareStatement
  - sendStatement
  - sendStatements
  - getStatements
  - getActivities
  - sendState
  - getState
  - deleteState
  - sendActivityProfile
  - getActivityProfile
  - deleteActivityProfile
  - getAgents
  - sendAgentProfile
  - getAgentProfile
  - deleteAgentProfile
  - testConfig
  - ie_request
  - ruuid
  - dateFromISOString
  - XHR_request
  - xhrRequestOnError
- XAPIstatement

sendStatements (stmtArray, callback)

Send a list of statements to the LRS.

Arguments

stmtArray	array	the list of statement objects to send
callback	function	function to be called after the LRS responds to this request (makes the call asynchronous) the function will be passed the XMLHttpRequest object optional

Returns

object xhr response object

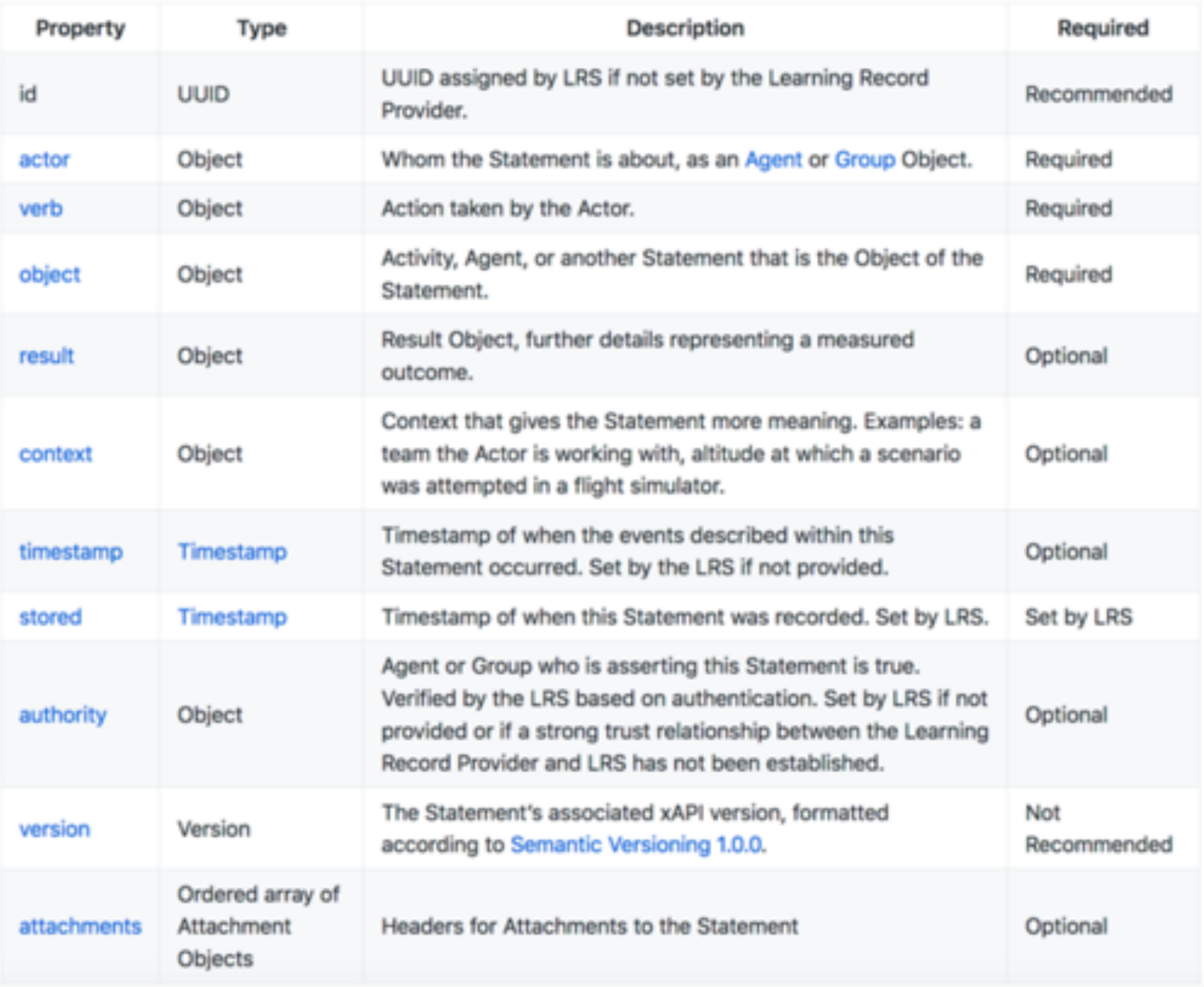
Example | Source

```
var stmt = {"actor" : {"mbox" : "mailto:tom@example.com"},
            "verb" : {"id" : "http://adlnet.gov/expapi/verbs/answered",
                      "display" : {"en-US" : "answered"}},
            "object" : {"id" : "http://adlnet.gov/expapi/activities/question"}};
var resp_obj = ADL.XAPIWrapper.sendStatement(stmt);
ADL.XAPIWrapper.getStatements({"statementId":resp_obj.id});
>> {"version": "1.0.0",
    "timestamp": "2013-09-09 21:36:40.185841+00:00",
    "object": {"id": "http://adlnet.gov/expapi/activities/question", "objectType": "Activity"},
    "actor": {"mbox": "mailto:tom@example.com", "name": "tom creighton", "objectType": "Agent"},
    "stored": "2013-09-09 21:36:40.186124+00:00",
    "verb": {"id": "http://adlnet.gov/expapi/verbs/answered", "display": {"en-US": "answered"}},
    "authority": {"mbox": "mailto:tom@adlnet.gov", "name": "tom", "objectType": "Agent"},
    "context": {"registration": "51a6f860-1997-11e3-8ffd-0800200c9a66"},
    "id": "ea9c1d01-0606-4ec7-8e5d-20f87b1211ed"}
```

some things people get wrong

- keep track of the version of the spec supported by your LRS!
- make sure you use the ADL wrapper! (https://github.com/adlnet/xAPIWrapper)
- xAPI v1.0.3 is quite strict so statements accepted by LRSs conformant with earlier versions of the specification might accept statements that newer ones do not
- often you need web links (which can make e.g. contextActivities can be a bit spicy to define)
- make sure you use the statement validators! (most LRSs have them)
- look at the log files… they will tell you a lot (if your LRS is good)

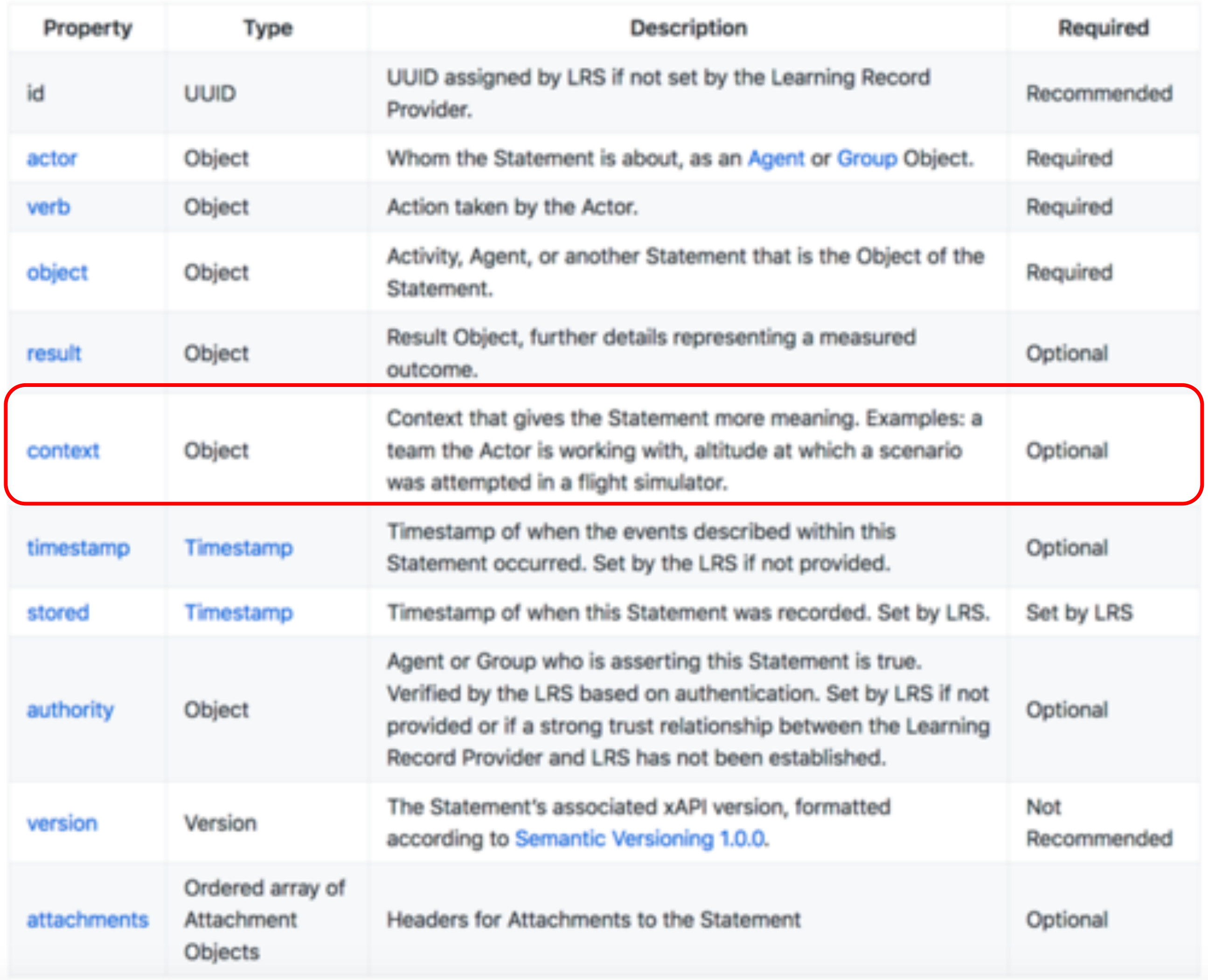
the importance of context for xAPI



Property	Type	Description	Required
id	UUID	UUID assigned by LRS if not set by the Learning Record Provider.	Recommended
actor	Object	Whom the Statement is about, as an Agent or Group Object.	Required
verb	Object	Action taken by the Actor.	Required
object	Object	Activity, Agent, or another Statement that is the Object of the Statement.	Required
result	Object	Result Object, further details representing a measured outcome.	Optional
context	Object	Context that gives the Statement more meaning. Examples: a team the Actor is working with, altitude at which a scenario was attempted in a flight simulator.	Optional
timestamp	Timestamp	Timestamp of when the events described within this Statement occurred. Set by the LRS if not provided.	Optional
stored	Timestamp	Timestamp of when this Statement was recorded. Set by LRS.	Set by LRS
authority	Object	Agent or Group who is asserting this Statement is true. Verified by the LRS based on authentication. Set by LRS if not provided or if a strong trust relationship between the Learning Record Provider and LRS has not been established.	Optional
version	Version	The Statement's associated xAPI version, formatted according to Semantic Versioning 1.0.0.	Not Recommended
attachments	Ordered array of Attachment Objects	Headers for Attachments to the Statement	Optional

the importance of context for xAPI

optional?



Property	Type	Description	Required
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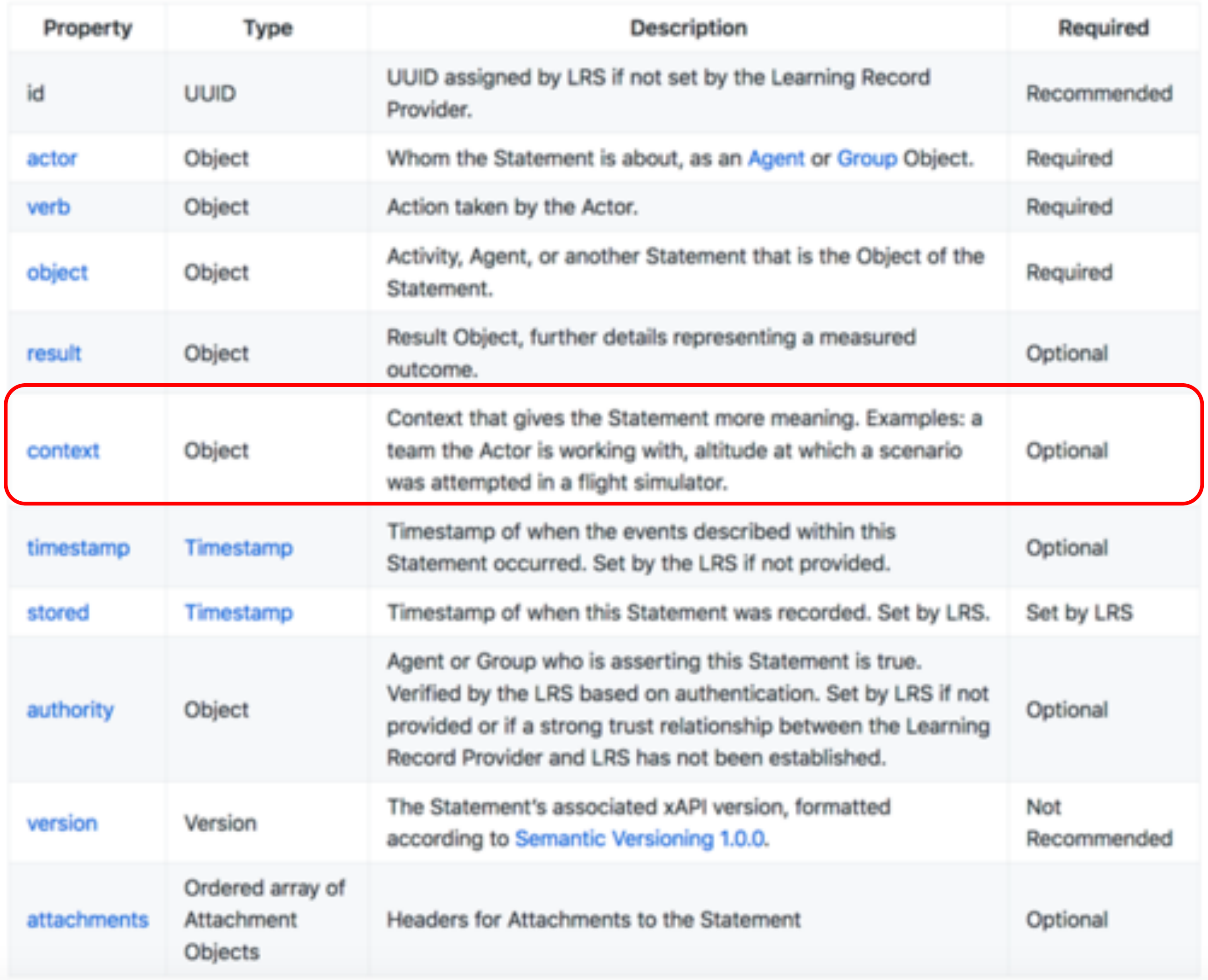
timestamp	Timestamp	Timestamp of when the events described within this Statement occurred. Set by the LRS if not provided.	Optional
stored	Timestamp	Timestamp of when this Statement was recorded. Set by LRS.	Set by LRS
authority	Object	Agent or Group who is asserting this Statement is true. Verified by the LRS based on authentication. Set by LRS if not provided or if a strong trust relationship between the Learning Record Provider and LRS has not been established.	Optional
version	Version	The Statement's associated xAPI version, formatted according to Semantic Versioning 1.0.0.	Not Recommended
attachments	Ordered array of Attachment Objects	Headers for Attachments to the Statement	Optional

the importance of context for xAPI

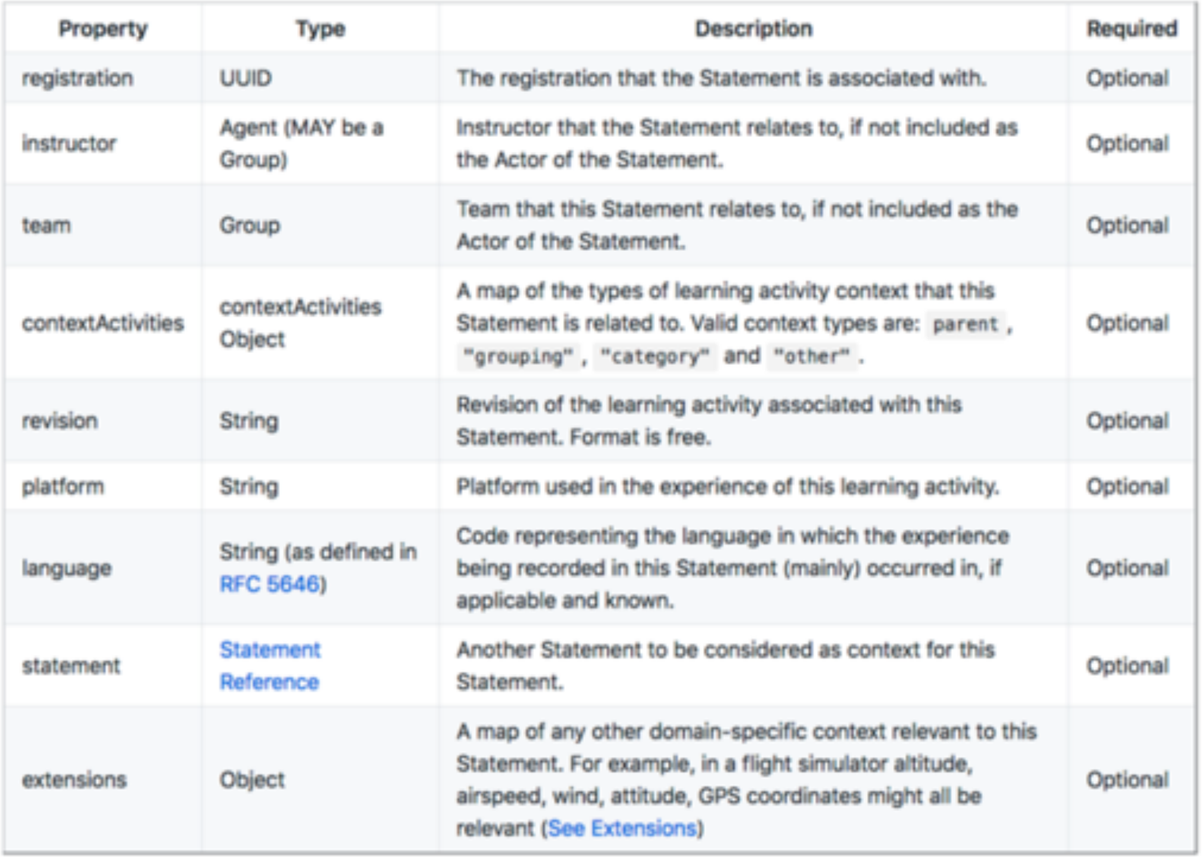
optional?

for LA?



Property	Type	Description	Required
id	UUID	UUID assigned by LRS if not set by the Learning Record Provider.	Recommended
actor	Object	Whom the Statement is about, as an Agent or Group Object.	Required
verb	Object	Action taken by the Actor.	Required
object	Object	Activity, Agent, or another Statement that is the Object of the Statement.	Required
result	Object	Result Object, further details representing a measured outcome.	Optional
context	Object	Context that gives the Statement more meaning. Examples: a team the Actor is working with, altitude at which a scenario was attempted in a flight simulator.	Optional
timestamp	Timestamp	Timestamp of when the events described within this Statement occurred. Set by the LRS if not provided.	Optional
stored	Timestamp	Timestamp of when this Statement was recorded. Set by LRS.	Set by LRS
authority	Object	Agent or Group who is asserting this Statement is true. Verified by the LRS based on authentication. Set by LRS if not provided or if a strong trust relationship between the Learning Record Provider and LRS has not been established.	Optional
version	Version	The Statement's associated xAPI version, formatted according to Semantic Versioning 1.0.0.	Not Recommended
attachments	Ordered array of Attachment Objects	Headers for Attachments to the Statement	Optional

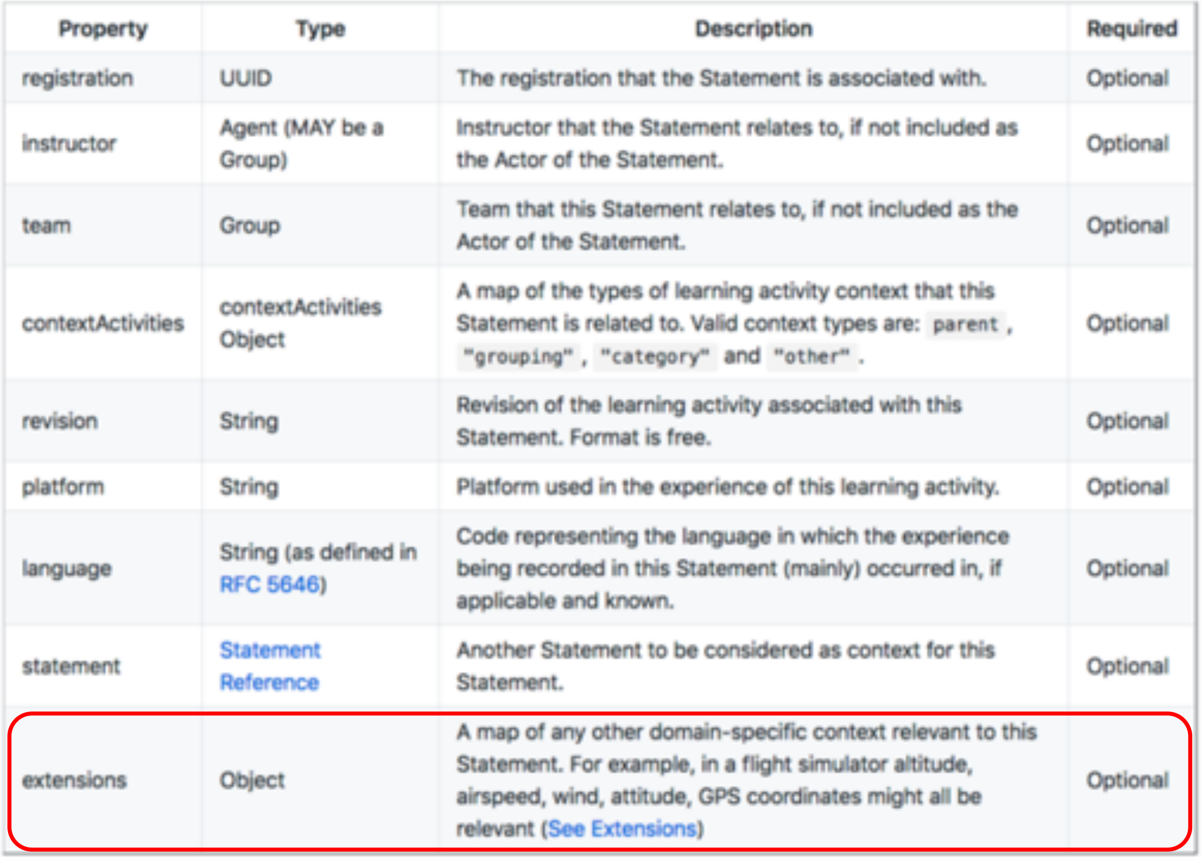
but just how big is a context?



Property	Type	Description	Required
registration	UUID	The registration that the Statement is associated with.	Optional
instructor	Agent (MAY be a Group)	Instructor that the Statement relates to, if not included as the Actor of the Statement.	Optional
team	Group	Team that this Statement relates to, if not included as the Actor of the Statement.	Optional
contextActivities	contextActivities Object	A map of the types of learning activity context that this Statement is related to. Valid context types are: `parent` , `"grouping"` , `"category"` and `"other"` .	Optional
revision	String	Revision of the learning activity associated with this Statement. Format is free.	Optional
platform	String	Platform used in the experience of this learning activity.	Optional
language	String (as defined in RFC 5646)	Code representing the language in which the experience being recorded in this Statement (mainly) occurred in, if applicable and known.	Optional
statement	Statement Reference	Another Statement to be considered as context for this Statement.	Optional
extensions	Object	A map of any other domain-specific context relevant to this Statement. For example, in a flight simulator altitude, airspeed, wind, attitude, GPS coordinates might all be relevant (See Extensions)	Optional

how long might this information need to make sense for?

but just how big is a context?



Property	Type	Description	Required
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statement	Statement Reference	Another Statement to be considered as context for this Statement.	Optional
extensions	Object	A map of any other domain-specific context relevant to this Statement. For example, in a flight simulator altitude, airspeed, wind, attitude, GPS coordinates might all be relevant (See Extensions)	Optional

how long might this information need to make sense for?

Susie's journey

Susie represents a learner growing up within this vision. She has difficult decisions to make at key stages throughout her life as a learner and will need support and guidance. However, Susie will have the benefit of a lifelong learning record or e-Portfolio to assist her in making decisions. Her school, college, employers and friends will support her to maintain a valuable record and to make effective use of it throughout her life, to apply for courses and jobs as well as make informed planned decisions to ensure she leads a fulfilled career.

Glamorgan: evaluating the student e-learning experience at college and university

Liverpool: exploring transition between college and university using PDP.

Worcester: exploring delivery of Foundation Degrees.

MOSAIC: sharing learner records and resources across schools and colleges.
SHELL: developing and piloting a multi-institution lifelong learning record based on qualifications.

Nottingham: learner data transferred from City eProgress File to University system to support wider access to higher education.

Loughborough: transition between school, college and university with access needs.

WWLE: giving students access to a lifelong learning record through a web portal.

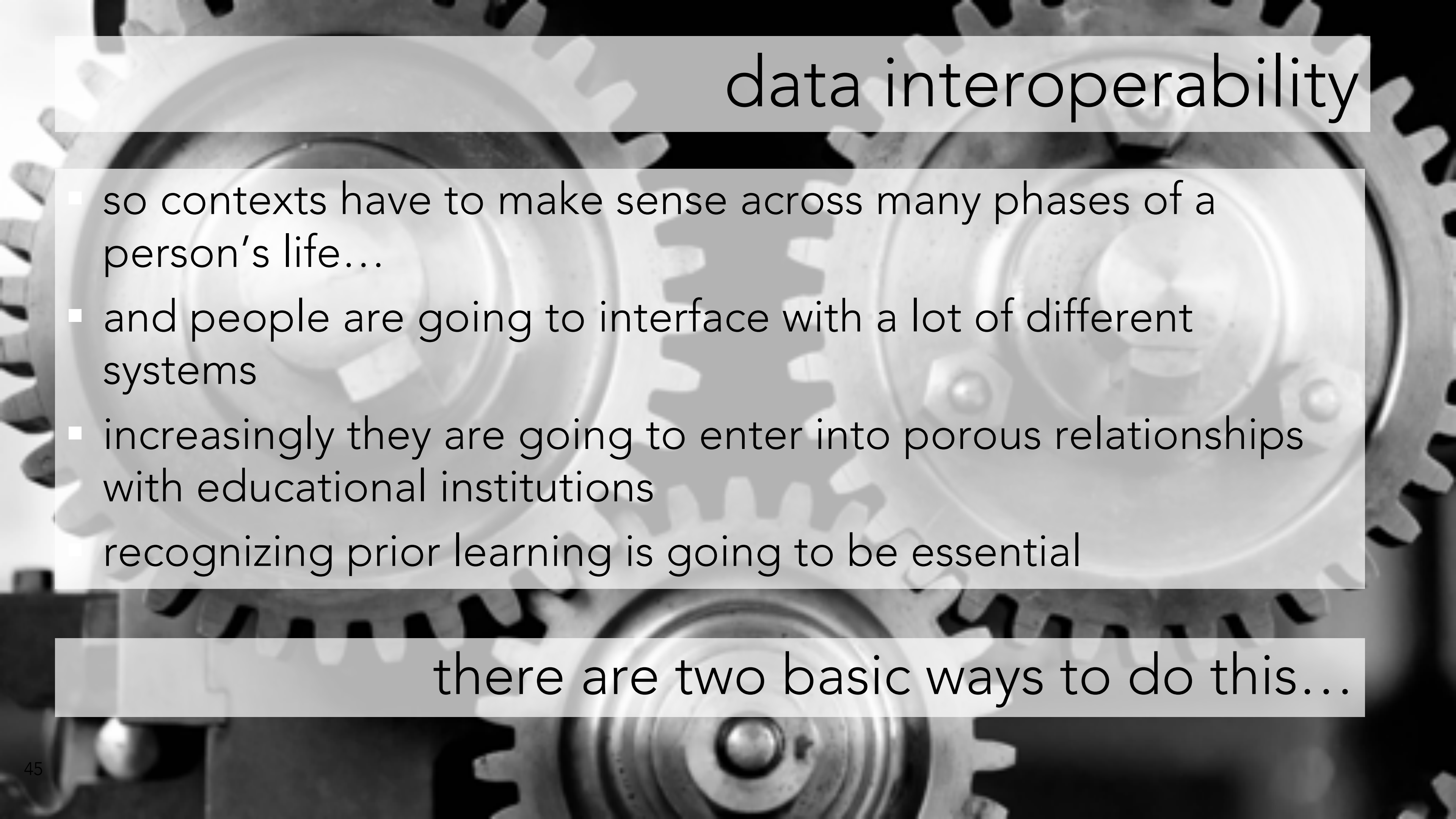
PROGRESS: supporting online PDP for work-based learners on degree courses.

UEG: providing nationally accredited training for union representatives through a UK-wide network of colleges, with centrally hosted learning materials.
CRA: work to develop technically sustainable lifelong learning records.

Linking SMART: Exploring the legal and records management issues relating to the concept of the lifelong learner record.

JISC
Leaving school
College, travel or job?
3 years working for the council
I'll use my City Learner Passport to apply to College and get a better job
Can't afford University
But can apply for a Foundation Degree using my learning plan
Finished my work based learning degree
I'm looking for a new job with skills evidenced in my e-portfolio
I've kept my e-portfolio up to date
Now I can carry on adding to it, to support my voluntary work.
Age 6 months
Creche
Age 16 years
18
21
25
30
40
50
60
70
Learner Passport
University
learndirect
Local College

learning goes on for a lifetime!



data interoperability

- so contexts have to make sense across many phases of a person's life…
- and people are going to interface with a lot of different systems
- increasingly they are going to enter into porous relationships with educational institutions
- recognizing prior learning is going to be essential

there are two basic ways to do this…

big and comprehensive?
or loose and modular?

you could ensure that *all* educational technology uses one data stack…

- but how long would this remain current?
- and how quickly will it evolve as new use cases arise?
- and who is control of it anyway?
- and how comprehensive can this approach actually be?

or you could try and do something that is more modular…

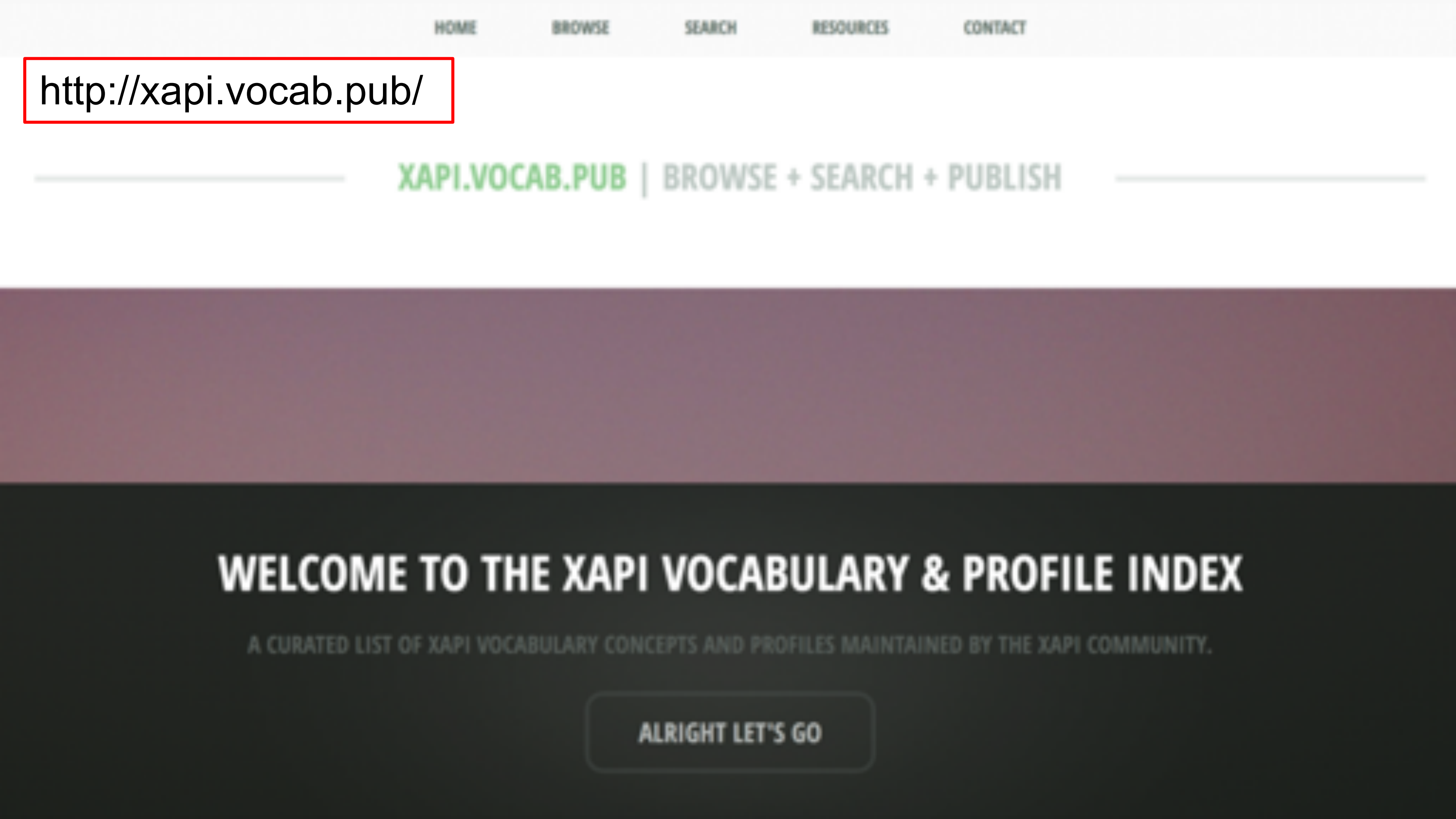
- where any LRP can get up and running quickly to provide data
- but then you need to ensure that there is a way to map data between different providers

each solution has advantages and disadvantages…

xAPI profiles for data interoperability

- a companion specification to the core xAPI standard (https://github.com/adlnet/xapi-profiles)
- blueprint for a successful, semantically interoperable xAPI implementation… defined by communities of practice
  - offer a common way to express controlled vocabularies
  - provide instruction on xAPI Statement formation
  - describe patterns of xAPI Statements which are meaningful in some way to a profile
- extend the notion of xAPI recipes using linked data standards
  - JSON-LD (to specify the profile)
  - SKOS (to connect xAPI concepts together)
  - PROV (to describe provenance of profiles)
  - SPARQL (to find profiles on the web)

http://xapi.vocab.pub/

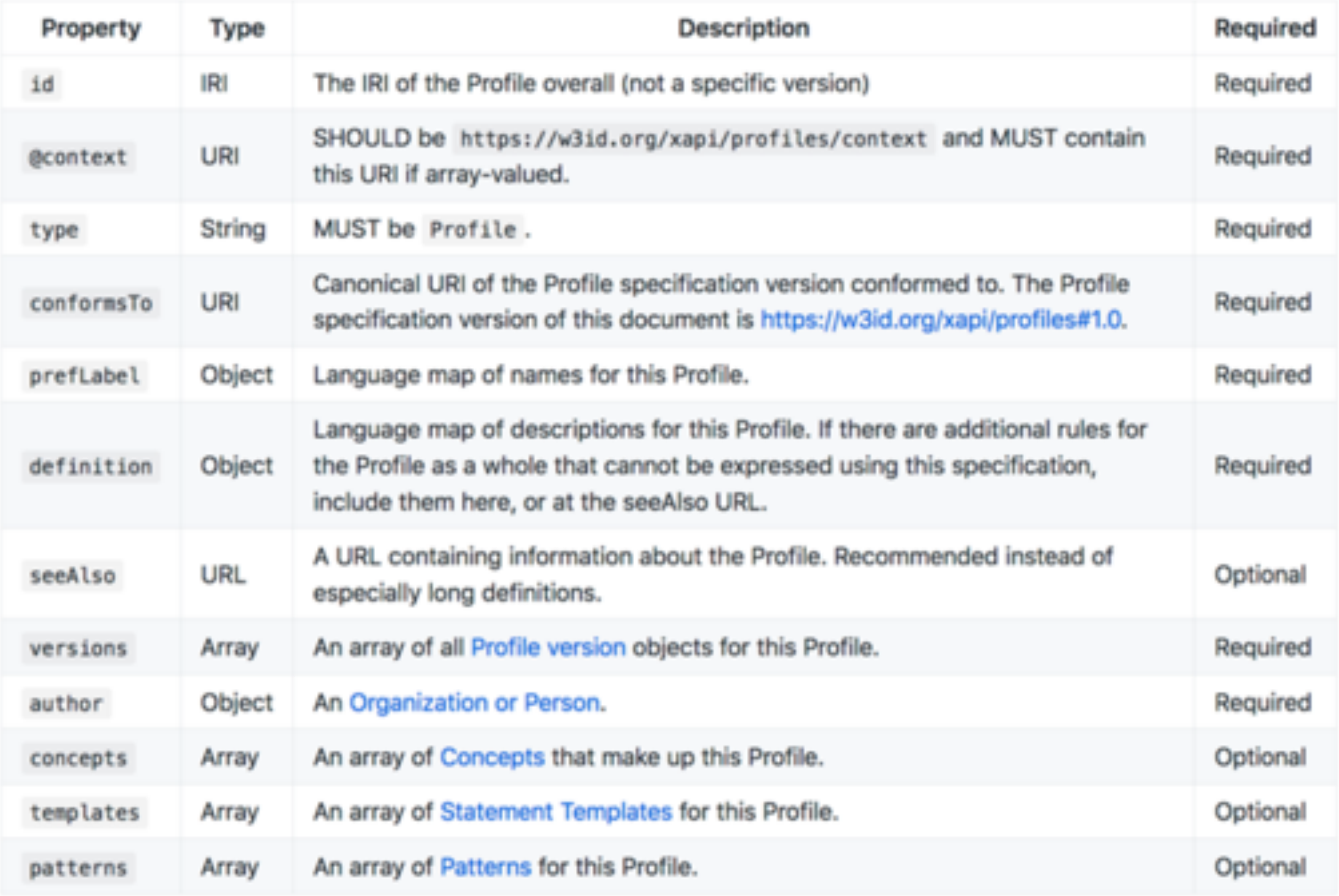


XAPI.VOCAB.PUB | BROWSE + SEARCH + PUBLISH

WELCOME TO THE XAPI VOCABULARY & PROFILE INDEX

A CURATED LIST OF XAPI VOCABULARY CONCEPTS AND PROFILES MAINTAINED BY THE XAPI COMMUNITY.

xAPI profile properties



Property	Type	Description	Required
`id`	IRI	The IRI of the Profile overall (not a specific version)	Required
`@context`	URI	SHOULD be `https://w3id.org/xapi/profiles/context` and MUST contain this URI if array-valued.	Required
`type`	String	MUST be `Profile`.	Required
`conformsTo`	URI	Canonical URI of the Profile specification version conformed to. The Profile specification version of this document is https://w3id.org/xapi/profiles#1.0.	Required
`prefLabel`	Object	Language map of names for this Profile.	Required
`definition`	Object	Language map of descriptions for this Profile. If there are additional rules for the Profile as a whole that cannot be expressed using this specification, include them here, or at the seeAlso URL.	Required
`seeAlso`	URL	A URL containing information about the Profile. Recommended instead of especially long definitions.	Optional
`versions`	Array	An array of all Profile version objects for this Profile.	Required
`author`	Object	An Organization or Person.	Required
`concepts`	Array	An array of Concepts that make up this Profile.	Optional
`templates`	Array	An array of Statement Templates for this Profile.	Optional
`patterns`	Array	An array of Patterns for this Profile.	Optional

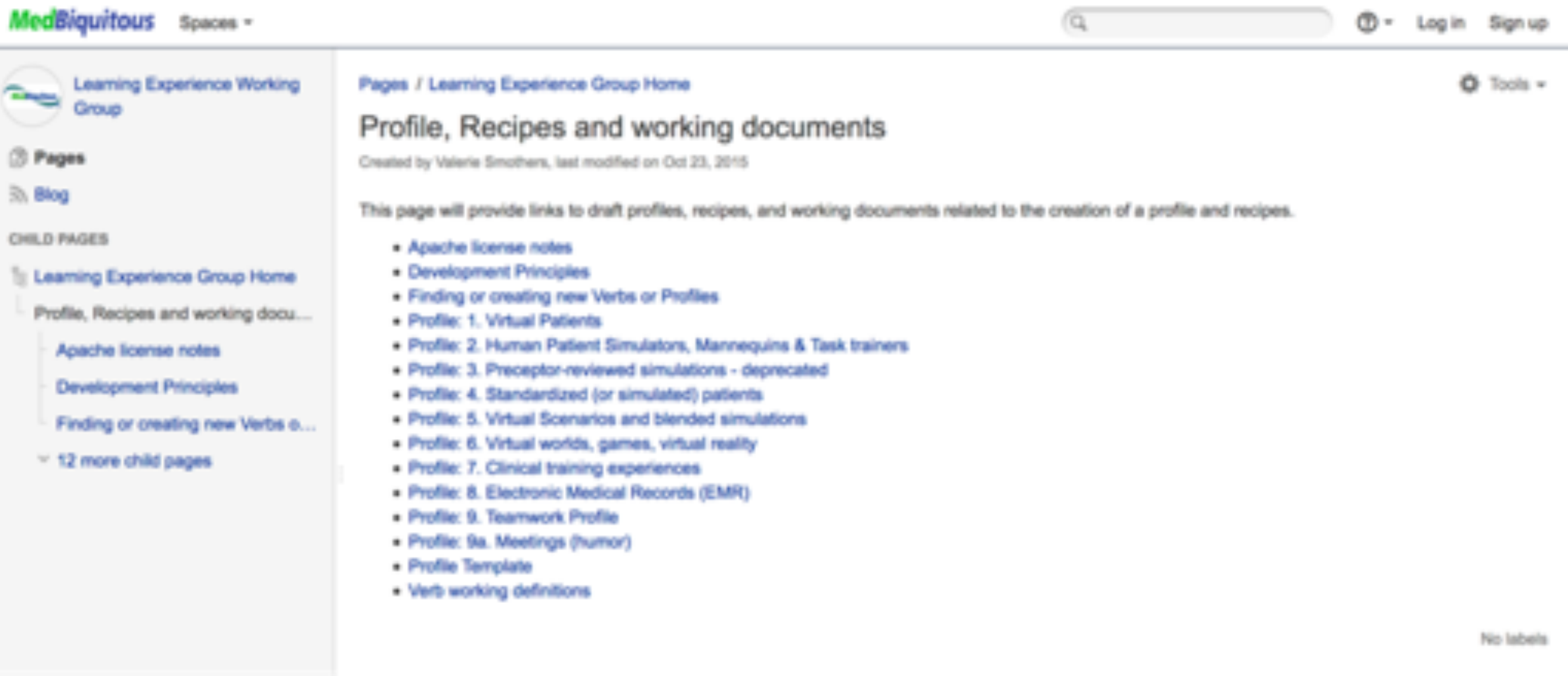
using xAPI profiles in statements

Using an introduced Concept, such as an activity type, verb, attachment usage type, extension, activity, or document resource, can be done freely, provided the defined usage and meaning are adhered to.

But a Learning Record Provider can go further, and make sure to adhere to Profile-described Statement Templates and Patterns.

https://github.com/adlnet/xapi-profiles/ (section 5)

medical training



MedBiquitous
Spaces ▾
Log in
Sign up
Learning Experience Working Group
Pages
Blog
CHILD PAGES
Learning Experience Group Home
Profile, Recipes and working docu...
Apache license notes
Development Principles
Finding or creating new Verbs o...
12 more child pages
Pages / Learning Experience Group Home
Tools ▾

Profile, Recipes and working documents

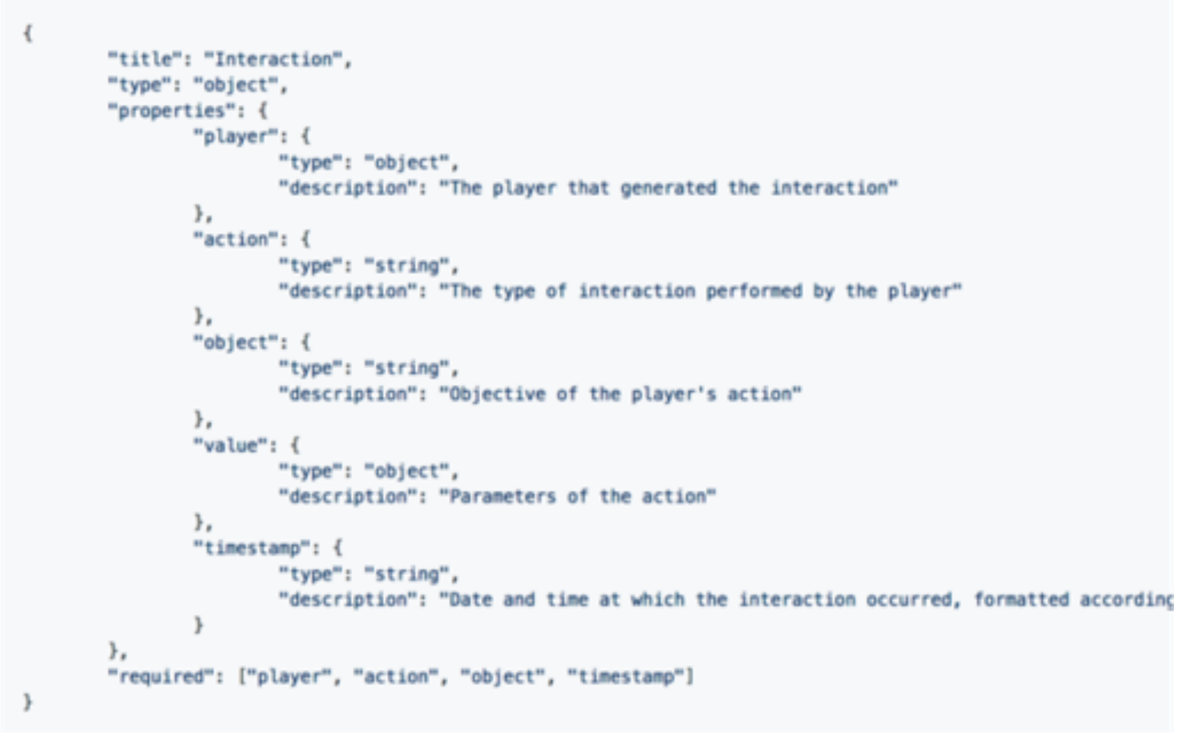
Created by Valerie Smothers, last modified on Oct 23, 2015

This page will provide links to draft profiles, recipes, and working documents related to the creation of a profile and recipes.

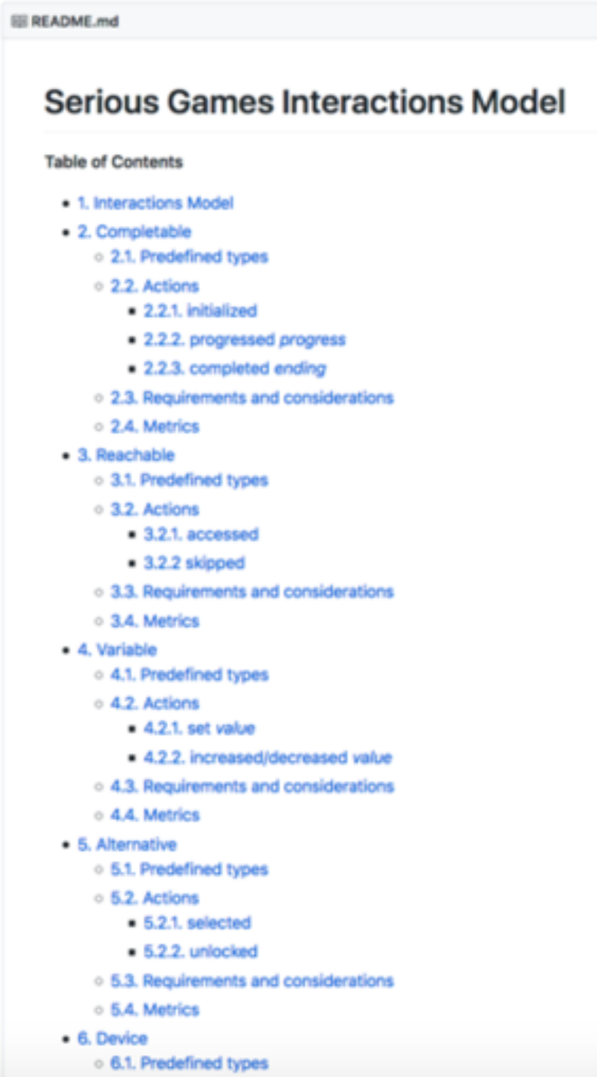
- Apache license notes
- Development Principles
- Finding or creating new Verbs or Profiles
- Profile: 1. Virtual Patients
- Profile: 2. Human Patient Simulators, Mannequins & Task trainers
- Profile: 3. Preceptor-reviewed simulations - deprecated
- Profile: 4. Standardized (or simulated) patients
- Profile: 5. Virtual Scenarios and blended simulations
- Profile: 6. Virtual worlds, games, virtual reality
- Profile: 7. Clinical training experiences
- Profile: 8. Electronic Medical Records (EMR)
- Profile: 9. Teamwork Profile
- Profile: 9a. Meetings (humor)
- Profile Template
- Verb working definitions

No labels

serious games



```
{
        "title": "Interaction",
        "type": "object",
        "properties": {
                "player": {
                        "type": "object",
                        "description": "The player that generated the interaction"
                },
                "action": {
                        "type": "string",
                        "description": "The type of interaction performed by the player"
                },
                "object": {
                        "type": "string",
                        "description": "Objective of the player's action"
                },
                "value": {
                        "type": "object",
                        "description": "Parameters of the action"
                },
                "timestamp": {
                        "type": "string",
                        "description": "Date and time at which the interaction occurred, formatted according
                }
        },
        "required": ["player", "action", "object", "timestamp"]
}
```



README.md

Serious Games Interactions Model

Table of Contents

more resources on xAPI Profiles

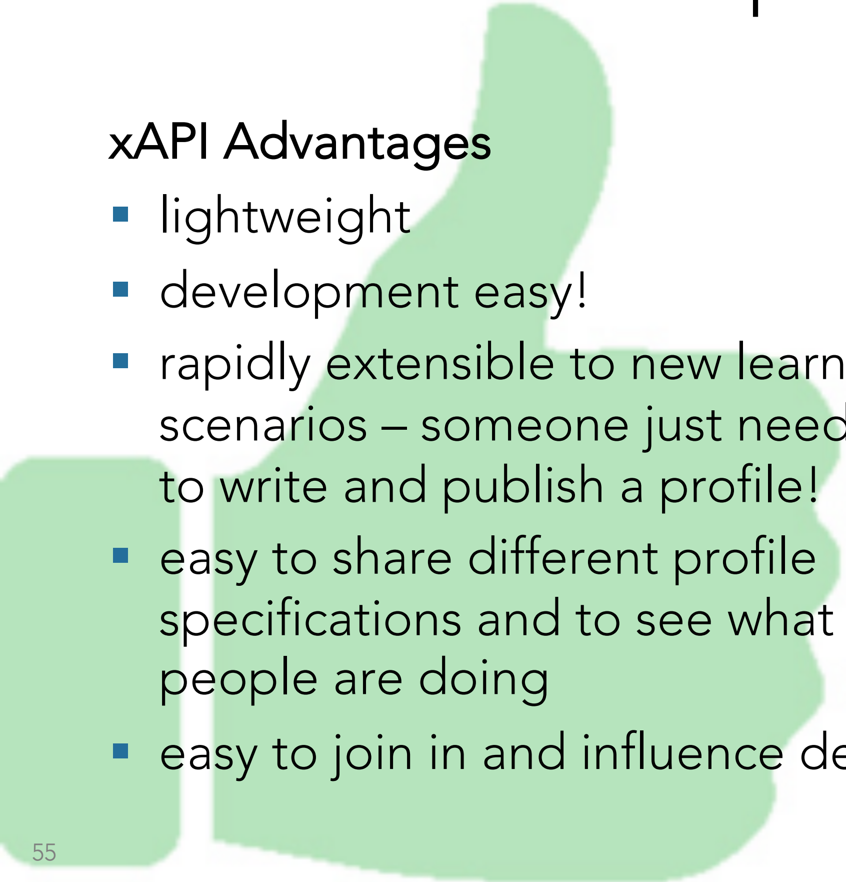
Examples of profiles:

- all published profiles: http://xapi.vocab.pub/
- video: https://liveaspankaj.gitbooks.io/xapi-video-profile/content/templates.html
- cmi-5 (LMS data): https://github.com/AICC/CMI-5_Spec_Current/blob/quartz/cmi5_spec.md

More information:

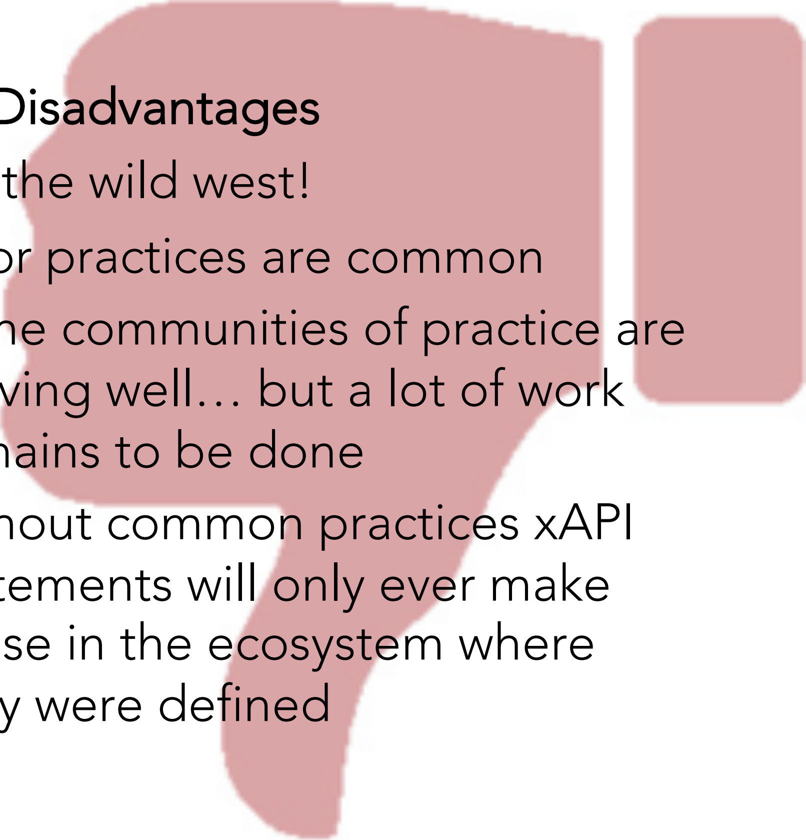
- specification: https://github.com/adlnet/xapi-profiles
- an introduction to their benefits: https://www.learningsolutionsmag.com/articles/2553/benefits-of-xapi-profiles-extend-across-development-teams

but the need for profiles points to a tension!



xAPI Advantages

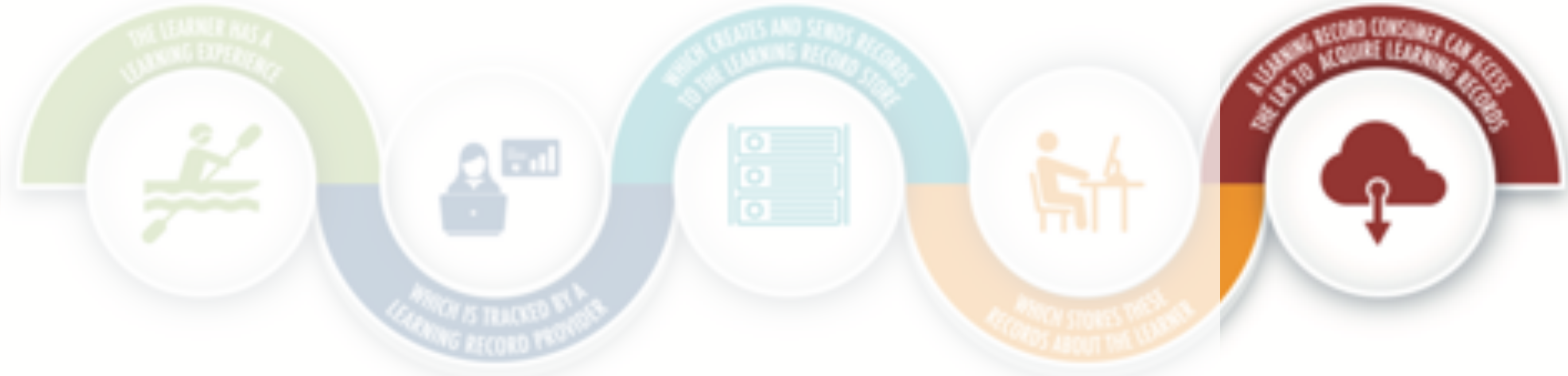
- lightweight
- development easy!
- rapidly extensible to new learning scenarios – someone just needs to write and publish a profile!
- easy to share different profile specifications and to see what people are doing
- easy to join in and influence dev



xAPI Disadvantages

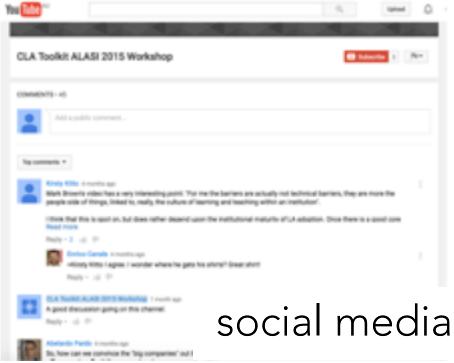
- it's the wild west!
- poor practices are common
- some communities of practice are moving well… but a lot of work remains to be done
- without common practices xAPI statements will only ever make sense in the ecosystem where they were defined

xAPI data flow



THE LEARNER HAS A LEARNING EXPERIENCE
WHICH IS TRACKED BY A LEARNING RECORD PROVIDER
WHICH CREATES AND SENDS RECORDS TO THE LEARNING RECORD STORE
WHICH STORES THESE RECORDS ABOUT THE LEARNER
A LEARNING RECORD CONSUMER CAN ACCESS THE LRS TO ACQUIRE LEARNING RECORDS

example: the CLA toolkit

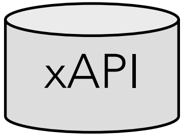


CLA Toolkit ALASI 2015 Workshop

social media

scraping

Learning
Record Store



xAPI

analysis

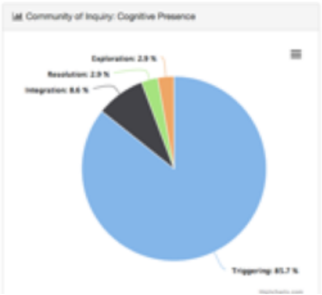
```
class TOPICMODELView(DefaultsMixin, APIView):

    def get(self, request, *args, **kw):

        course_code = request.GET.get('course_code', None)
        platform = request.GET.get('platform', None)
        start_date = request.GET.get('start_date', None)
        end_date = request.GET.get('end_date', None)
        num_topics = int(request.GET.get('num_topics', None))

        result = json.loads(get_LDAVis_JSON(platform, num_topics, cour
        response = Response(result, status=status.HTTP_200_OK)
        return response

class MLCLASSIFY(DefaultsMixin, APIView):

    def get(self, request, *args, **kw):

        course_code = request.GET.get('course_code', None)
        platform = request.GET.get('platform', None)

        result = classify(course_code,platform)
        response = Response(result, status=status.HTTP_200_OK)
        return response

class MLTRAIN(DefaultsMixin, APIView):

    def get(self, request, *args, **kw):
```

learning analytics

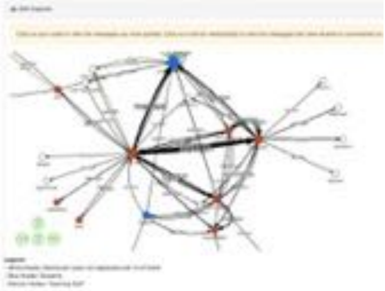
students

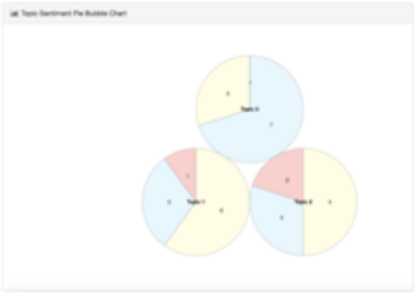
academics

admin & developers

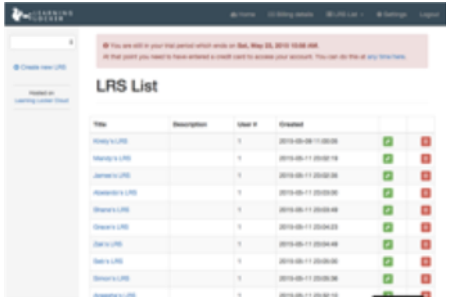


Community of Inquiry: Cognitive Presence





Topic Sentiment Pie Bubble Chart



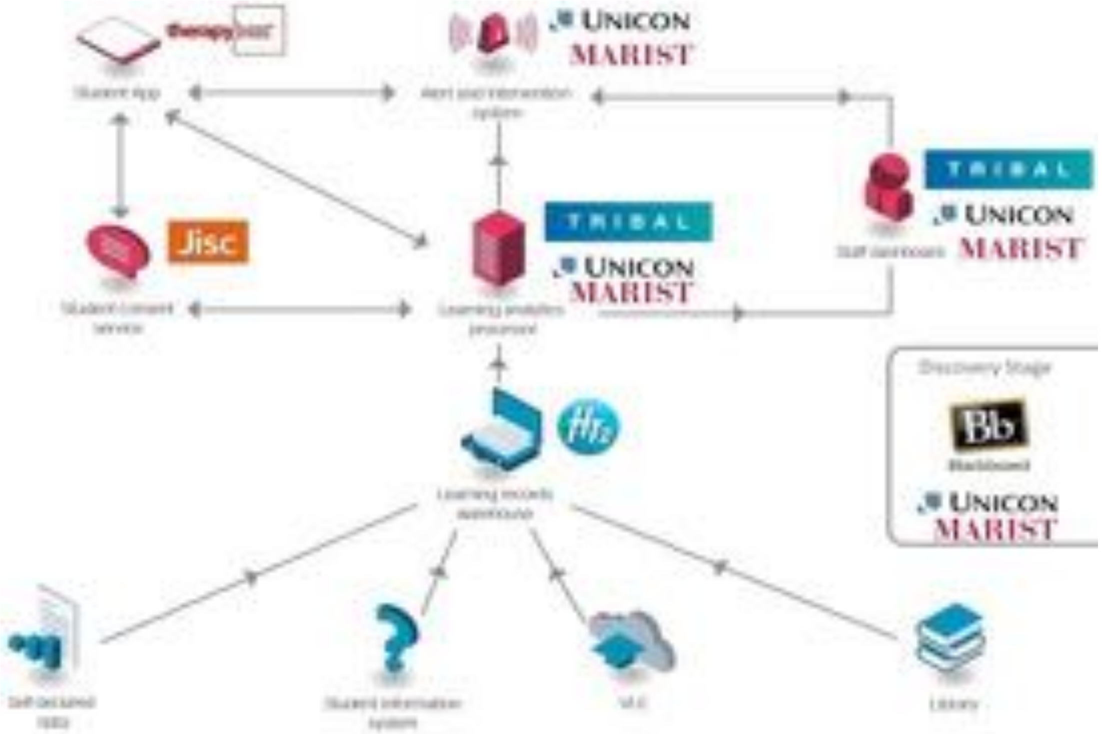
LRS List

Kitto, K., Cross, S., Waters, Z., Lupton, M. (2015). Learning Analytics beyond the LMS: the Connected Learning Analytics Toolkit. In Proceedings of the Fifth International Conference on Learning Analytics and Knowledge (LAK15). ACM, New York, NY, USA, 11-15.

using xAPI in large scale LA infrastructure projects

effective learning analytics (Jisc)

- freemium student insight tool
- bespoke tool based on Aperio LAP
- student app (privacy management, goalsetting…)



https://www.jisc.ac.uk/rd/projects/effective-learning-analytics

Apereo Learning Analytics Strategic Vision

An Open Learning Analytics Platform

Learning Activities Collection – Standards-based data capture from any potential source using open standards: xAPI and/or IMS Caliper/Sensor API

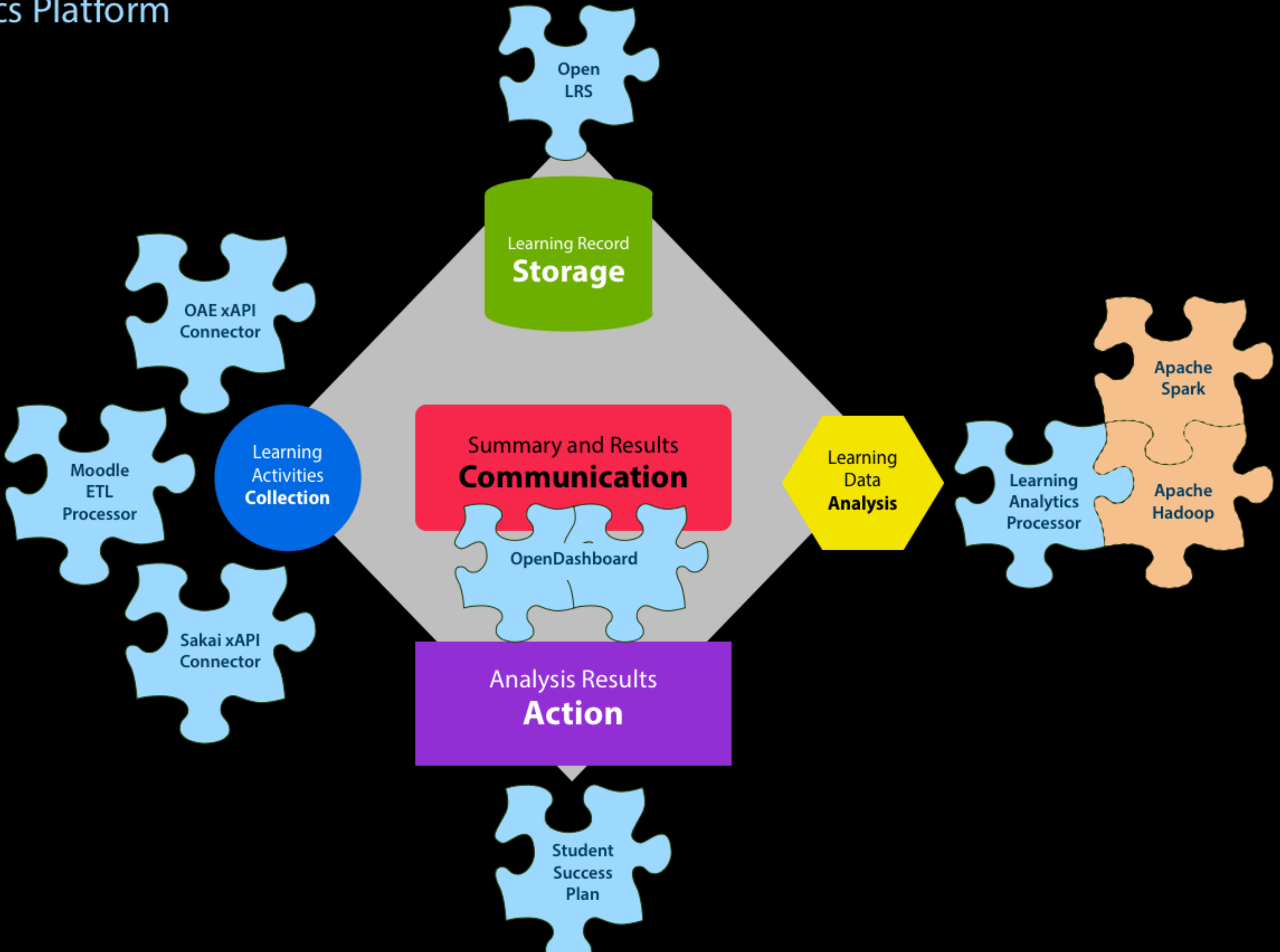
Storage – Single repository for all learning-related data using Learning Record Store (LRS) standard. Over the past year OpenLRS has made significant progress toward maturity. In addition to its support of the Experience API (xAPI), OpenLRS has added support for the IMS Caliper learning event specification. OpenLRS has also seen its first production deployment at the University of Notre Dame. Several additional productions deployments are planned for 2016 at both higher education institutions and global publishers.

Analysis – Flexible Learning Analytics Processor (LAP) that can prototype data mining, data processing (ETL), predictive model scoring and reporting. Work on larger datasets is handled by Apache Hadoop and Apache Spark.

Communication – Dashboard technology for displaying LAP output.

Action – LAP output can be fed into other systems to trigger alerts, etc.

Apereo members are building software around this platform. OpenLRS, Learning Analytics Processor, OpenDashboard and Student Success Plan are early examples of the benefits of a platform-based approach.

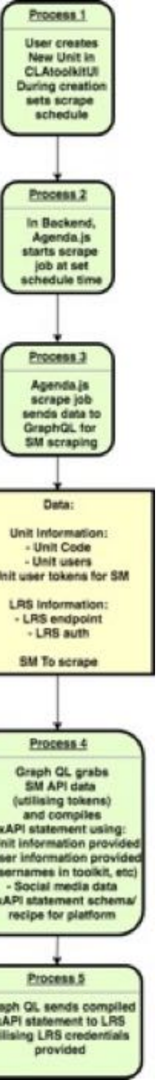


what about UTS?

lets start with a question first…

CLA toolkit V2

- no dashboards reports!
- it just collects data and sends it to the LRS
- maintains modularity!
- built in last 2 months!
- trello, slack, twitter, GitHub integrations prioritised
- a second suite of tools are used to deliver LA, dashboards, and other tools (e.g. piping data to OnTask)



Process 1

User creates New Unit in CLAtoolkitUI During creation sets scrape schedule

Process 2

In Backend, Agenda.js starts scrape job at set schedule time

Process 3

Agenda.js scrape job sends data to GraphQL for SM scraping

Data:

Unit Information:
- Unit Code
- Unit users
nit user tokens for SM

LRS Information:
- LRS endpoint
- LRS auth

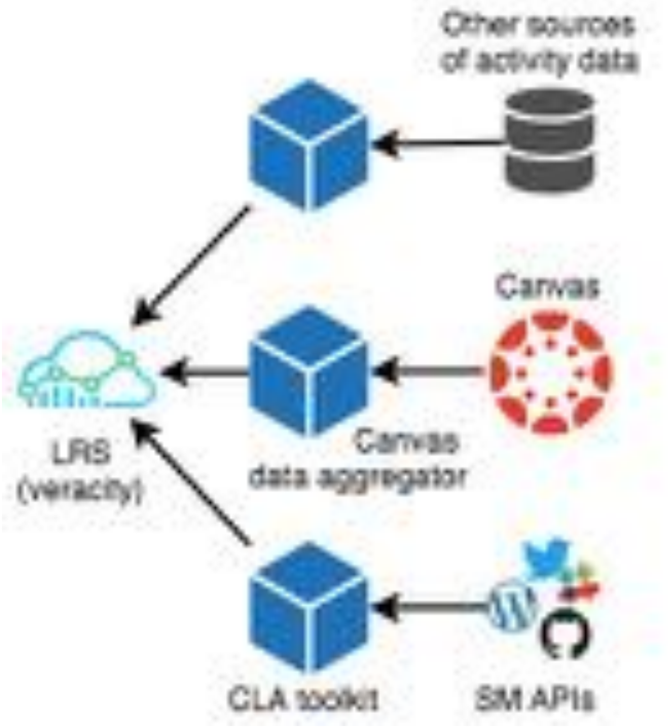
SM To scrape

Process 4

Graph QL grabs SM API data (utilising tokens) and compiles xAPI statement using:
nit information provided
ser information provided
sernames in toolkit, etc)
- Social media data
xAPI statement schema/ recipe for platform

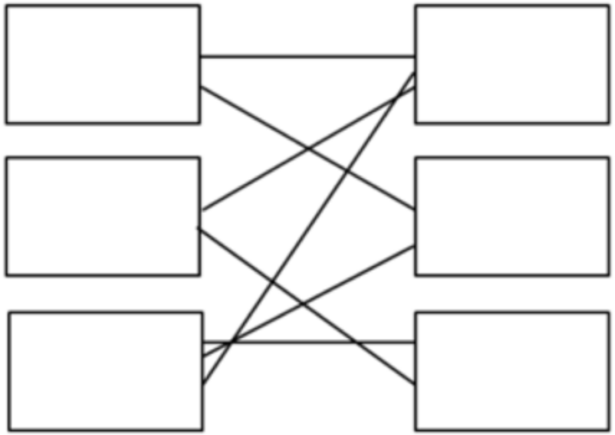
Process 5

aph QL sends compiled xAPI statement to LRS ilising LRS credentials provided



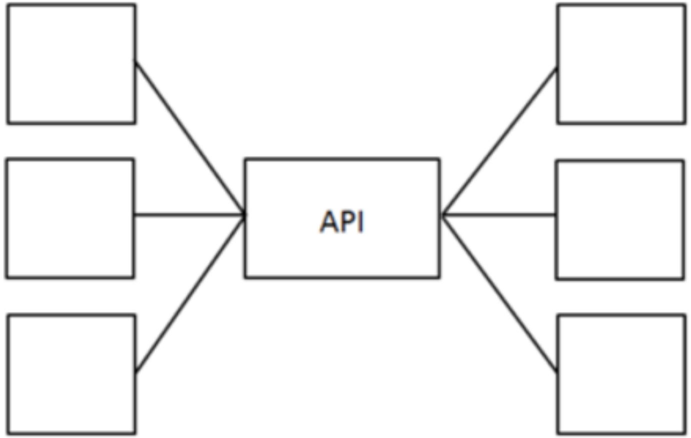
loose couplings

what types of architectures should we be designing for university systems?



Legacy architecture. Point to point integrations mean increased QA efforts whenever any one system is modified or upgraded.

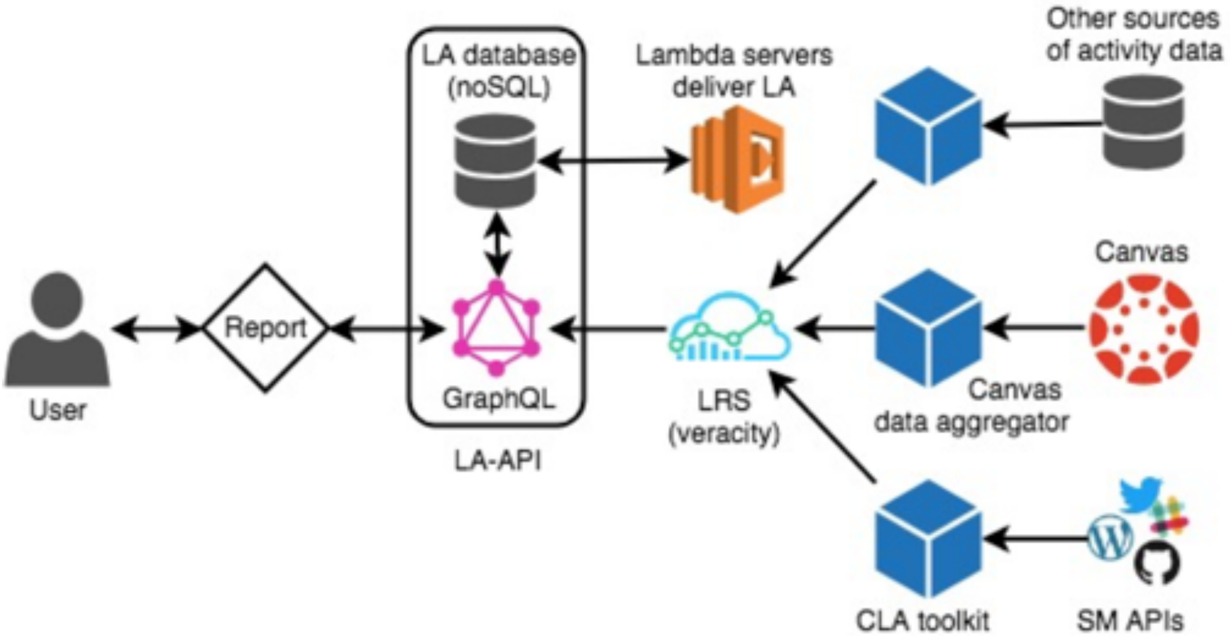
OR



API-based architecture. Systems can be built on top of stable APIs and upgraded/replaced independent of each other with reduced QA effort.

https://edutechnica.com/2015/06/09/flipping-the-model-the-campus-api/

scaling up: a Learning Analytics API



why graphQL?

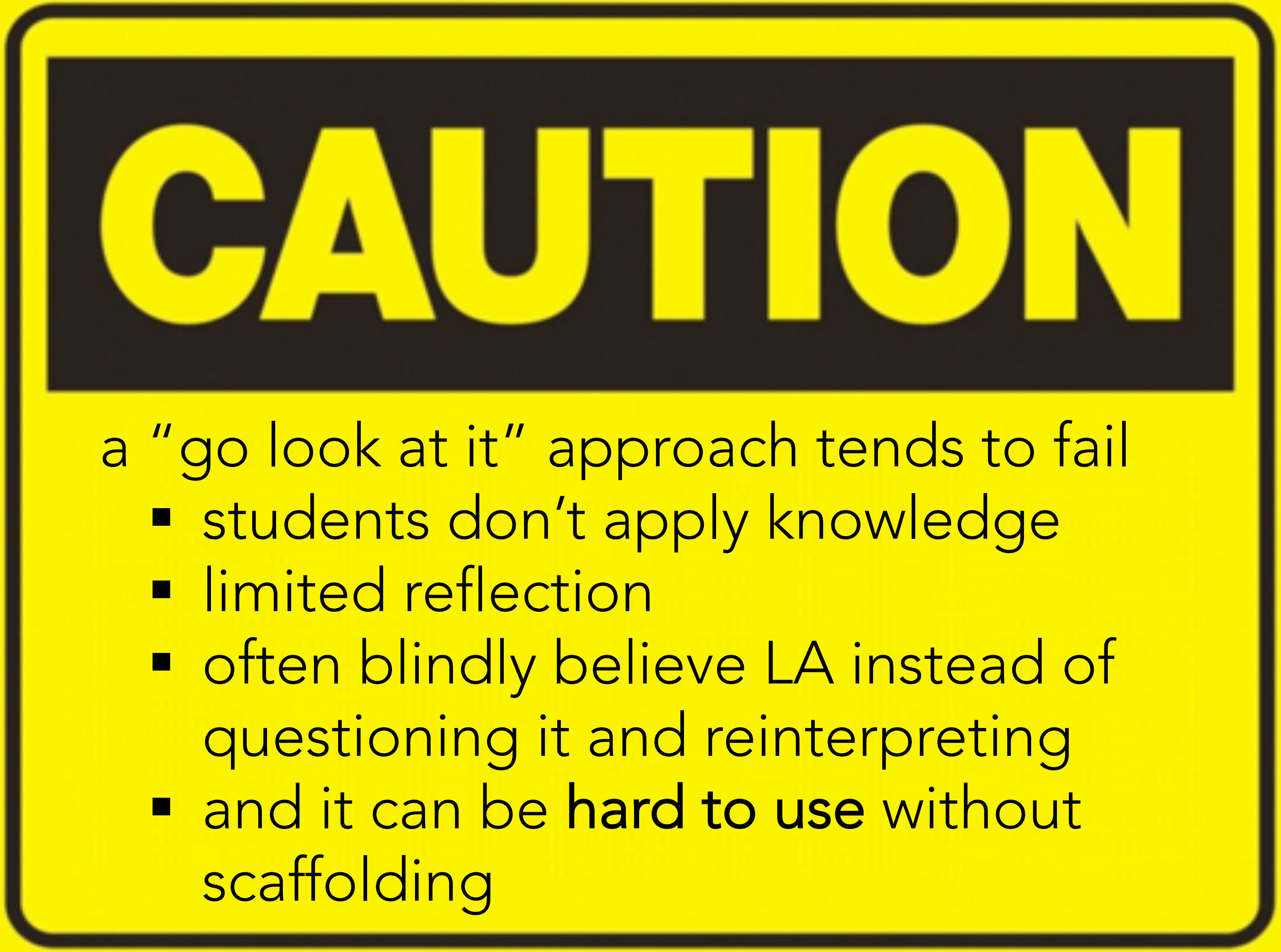
GraphQL is a query language that enables an abstraction of server-side API calls under a single neat wrapper, instead of to multiple endpoints…

- efficient data retrieval - student facing LA applications and dashboards need to be mobile
- flexible - many different applications will need access to student data
- strongly typed - clearly defines how the client can access the data, so acts as an intermediate layer between back end complex infrastructure and front end user interfaces
- extensible – enables ongoing addition of LA services as necessary

but data must be cooked with care!

- *are you capturing all of the relevant data?*
- *is what you are collecting even useful?*
- *or are you just collecting it because you can?*
- *and what metrics are you developing from your data?*

Bowker, G. C. (2005). Memory practices in the sciences (Vol. 205). Cambridge, MA: Mit Press.



a "go look at it" approach tends to fail

- students don't apply knowledge
- limited reflection
- often blindly believe LA instead of questioning it and reinterpreting
- and it can be **hard to use** without scaffolding

things can go very wrong with naïve approaches

"our combination of leaderboards, badges, and competition mechanics do not improve educational outcomes and at worst can harm motivation, satisfaction, and empowerment"

(Hanus and Fox, 2015)

Hanus, M. D., & Fox, J. (2015). Assessing the effects of gamification in the classroom: A longitudinal study of intrinsic motivation, social comparison, satisfaction, effort, and academic performance. Computers & Education, 8, 152–161.

Khan, I., & Pardo, A. (2016). Data2U: Scalable real time student feedback in active learning environments. In Proceedings of the international conference on learning analytics and knowledge (pp. 249–253). Edinburgh, Scotland: ACM.

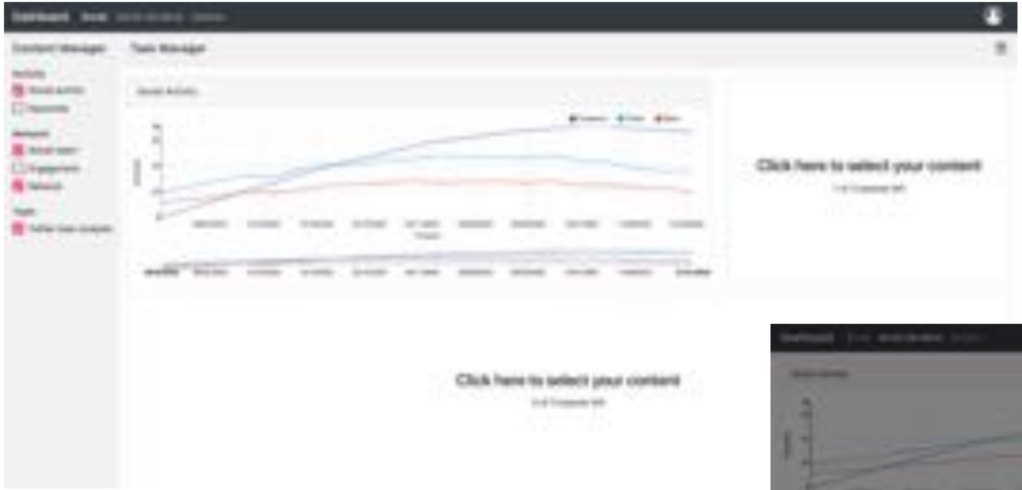
Learning designs for student facing LA

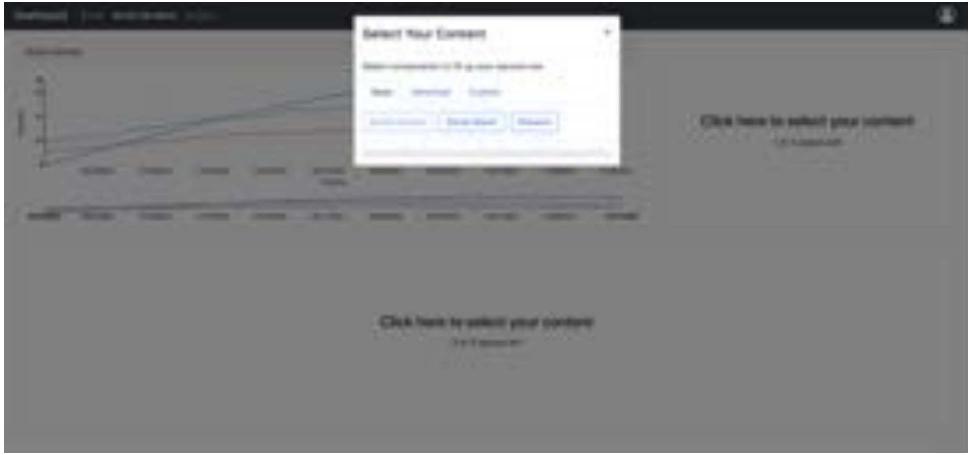
- authentic integration with assessment is necessary
- 3 learning design patterns are being used right now
  - do-analyse-change-reflect
  - active learning squared
  - Groupwork
- More will come in time!

Kitto, K., Lupton, M., Davis, K., Waters, Z. (2017). Designing for Student Facing Learning Analytics, Australasian Journal of Educational Technology, 33(5), 152-168.

Kitto, K., Lupton, M., Davis, K., Waters, Z. (2016). Incorporating student-facing learning analytics into pedagogical practice. In S. Barker, S. Dawson, A. Pardo, & C. Colvin (Eds.), Show Me The Learning. Proceedings ASCILITE 2016 Adelaide, pp. 338-347.

user configurable dashboards


Dashboard
Click here to select your content
Click here to select your content


Select Your Content
Click here to select your content
Click here to select your content

coupled to
learning design

in summary – why do I use xAPI?

- learning happens everywhere!
- xAPI is highly flexible - helps future proof it as a specification
- enables rapid development of data infrastructure
- provides a modular way of linking up data from multiple LRPs
- enables data interoperability (if you follow best practice) open development model
- vibrant and open community effort – anyone can contribute!

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Questions?

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