Association for Talent Development

Using xAPI for Learning Data & Analytics

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1

TORRANCELEARNING

eleventure higher learning. @work.

LLAMA LOT LIKE AGILE MANAGEMENT APPROACH

xapi.ly xAPI STATEMENT BUILDER

CREW Cultivating Racial Equity in the Workplace

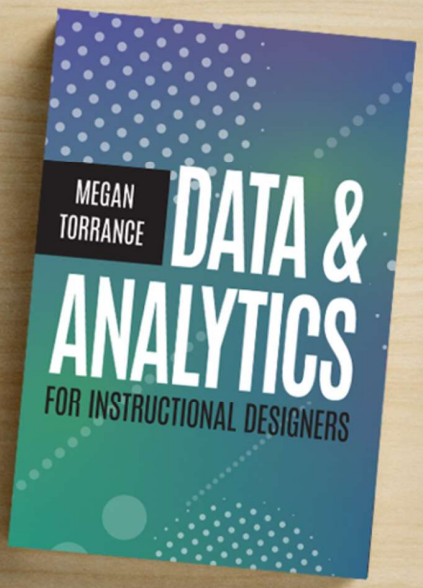
eCornell

MEGAN TORRANCE

mtorrance@torrancelearning.com

2

What do I do with all this data?!?!

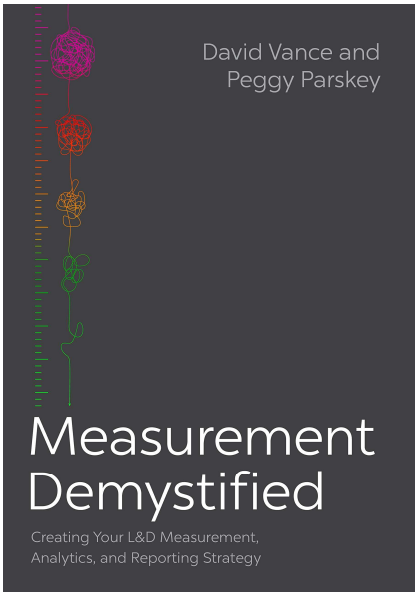


Available at Amazon, Borders, and other online retailers

3

4

Establish benchmarks
Communicate findings
Monitor results
Manage operations
Discover insights
Analyze results
Ensure goal accomplishment
Demonstrate process
Inform stakeholders
Evaluate programs
Assess value
Plot trends
Identify success rates
Assess gaps



Measurement Demystified, (2021) David Vance & Peggy Parskey

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xAPI is …

X = experience
API = application programming interface

Specification for sending, storing, retrieving activity about learning and performance experiences

xAPI Specification: https://github.com/adlnet/xAPI-Spec

Brought to you by the same folks who created SCORM

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SCORM

Time
Score
Location
Status
Answers

Interoperable
Interchangeable
Geek-free
Low barriers to entry

7

SCORM

Time
Score
Location
Status
Answers

xAPI

Actor verb object
Actor verb object result context

8

Claire read Business Writing for Professionals
John practiced frosting birthday cakes
Lindsey watched the Company History video
→ Rashad completed Oil Change Upselling
→ Cynthia completed Oil Change Upselling score 60%
Actor verb object
Actor verb object result context

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Actor verb object result context

Claire read Business Writing for Professionals
John practiced frosting birthday cakes
Lindsey watched the Company History video
Rashad completed Oil Change Upselling
Cynthia completed Oil Change Upselling score 60%
Cynthia sold premium synthetic oil
Ladan simulated landing successfully at LAS
Arthi simulated landing successfully at LAS with a score of 98% in SimSuite #4 by Instructor Tim
Bob performed landing successfully at LAS on Runway 2; windspeed 5; B737-900ER; Oct 20, 2019; 14:53
Oron rated event xAPI for Instructional Designers with @MMTorrance 5 stars "coffee rocked, nice use of PowerPoint"

10

actor

verb

activity

result

context

mtorrance@torrancelearning.com answered **How long have you used xAPI?**
12/16/2020, 10:00:53 AM


```
{
  "actor": {
    "mbox": "mailto:mtorrance@torrancelearning.com"
  },
  "verb": {
    "id": "http://adlnet.gov/expapi/verbs/answered",
    "display": {
      "en": "answered"
    }
  },
  "object": {
    "id": "https://docs.google.com/forms/d/1iiLDLF02vSrj8yXjdUIjVjCUfyYuVblP6Ck3VseNsLw/xapi-experience",
    "definition": {
      "name": {
        "en": "How long have you used xAPI?"
      },
      "description": {
        "en": "Question 2"
      },
      "type": "http://activitystrea.ms/schema/1.0/question"
    }
  },
  "result": {
    "completion": true,
    "response": "4+ years"
  },
  "id": "200b9219-9acc-4c4b-935b-7394c6cb772c",
  "timestamp": "2020-12-16T15:00:53.676Z",
  "stored": "2020-12-16T15:00:53.676Z",
  "authority": {
    "objectType": "Agent",
    "account": {
      "homePage": "https://xapi-handson-geekfree-01.lrs.io/keys/xapi-handson-geekfree-01",
      "name": "xapi-handson-geekfree-01"
    }
```


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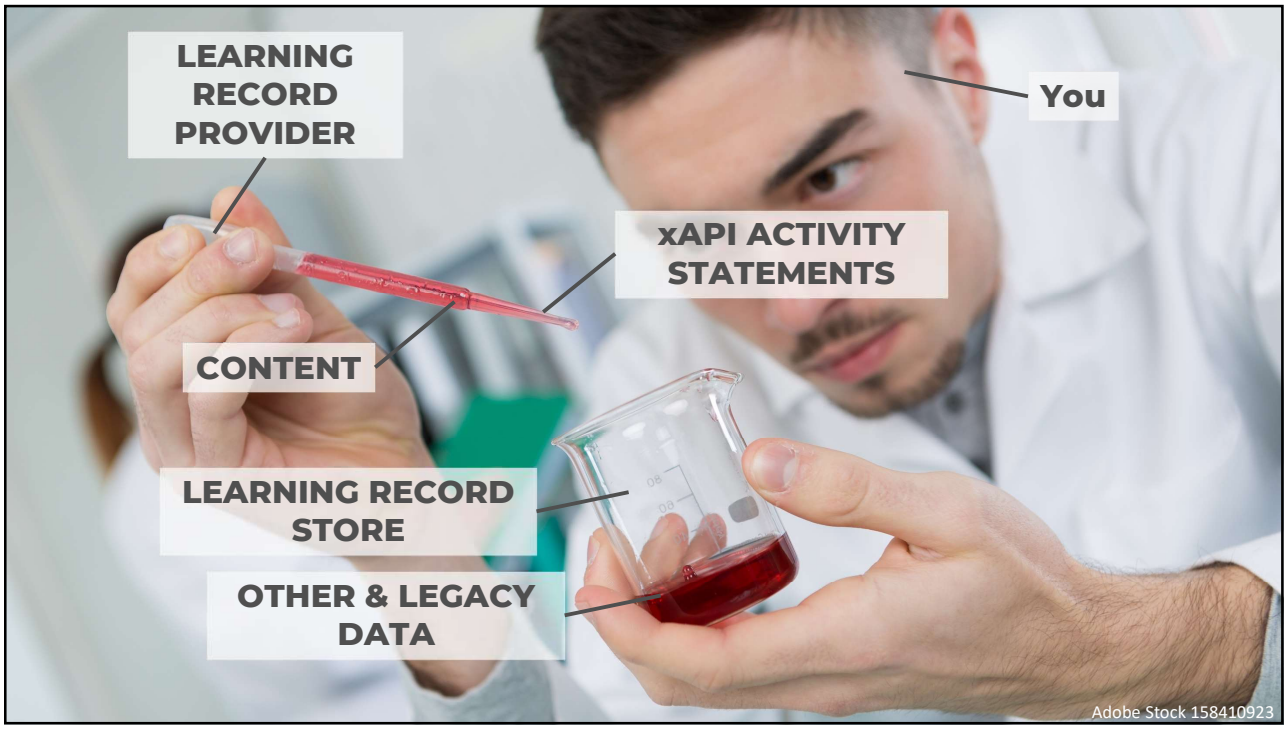
12



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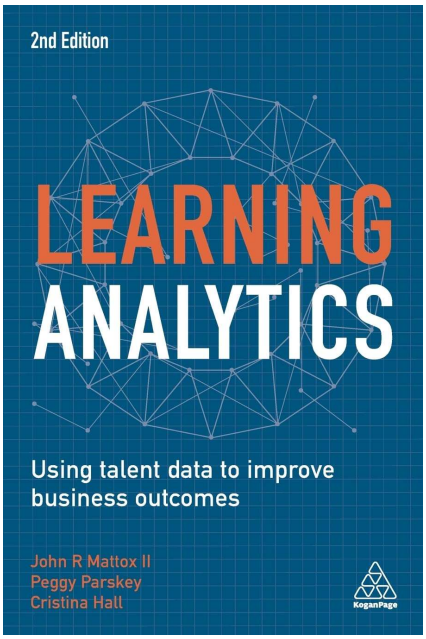
"LEARNING ANALYTICS is the **science and art** of **gathering, processing, and interpreting data and communicating results** including recommended decisions and actions related to the efficiency, effectiveness and business impact of development programs **designed to improve individual and organizational performance and inform stakeholders."**



Learning Analytics, Mattox, Parskey, and Hall (2020)

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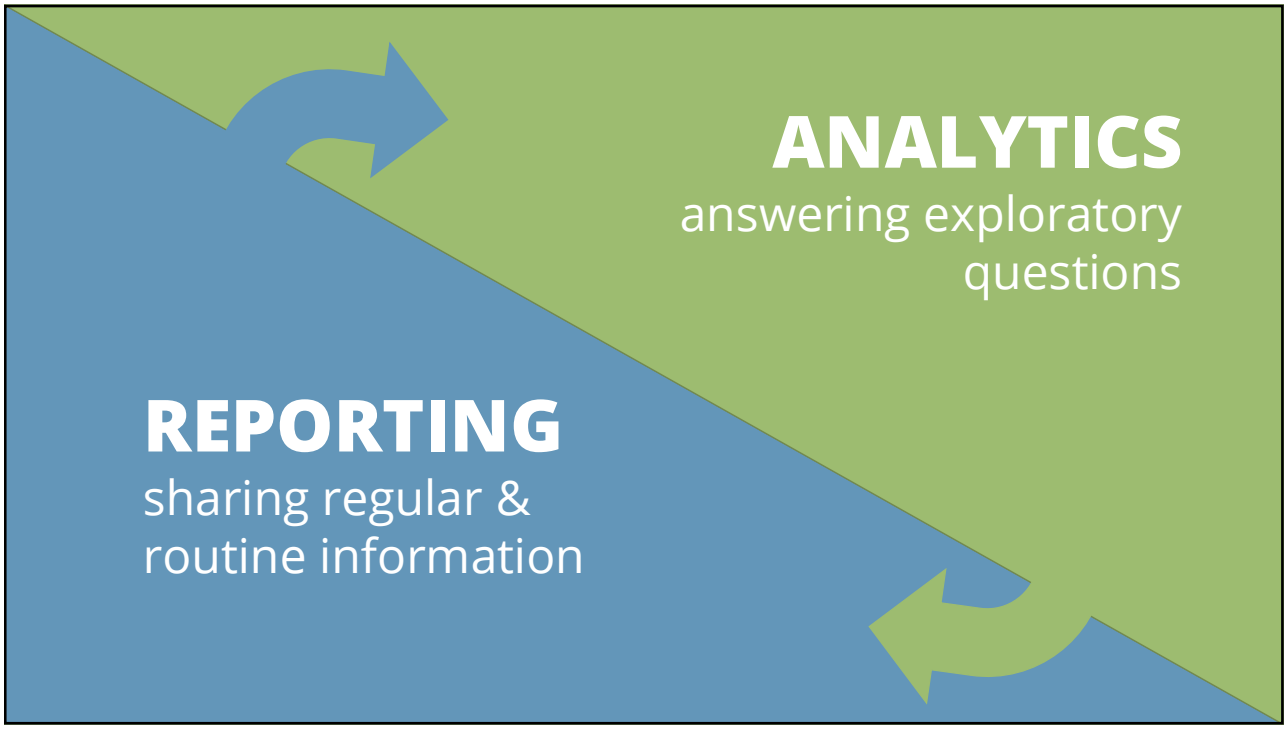

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FRAMEWORK FOR USING DATA

(it's not just analytics!)

ARCHIVE	Store & Secure
	Transcript & Credentialling
ANALYZE	Descriptive
	Diagnostic
	Predictive
	Prescriptive
ACT ON	Recommend Learning
	Personalize & Adapt Learning
	Incorporate in Workflow

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Most organizations start at the top and work downward to deeper questions.

- Descriptive — What happened?
- Diagnostic
- Predictive
- Prescriptive

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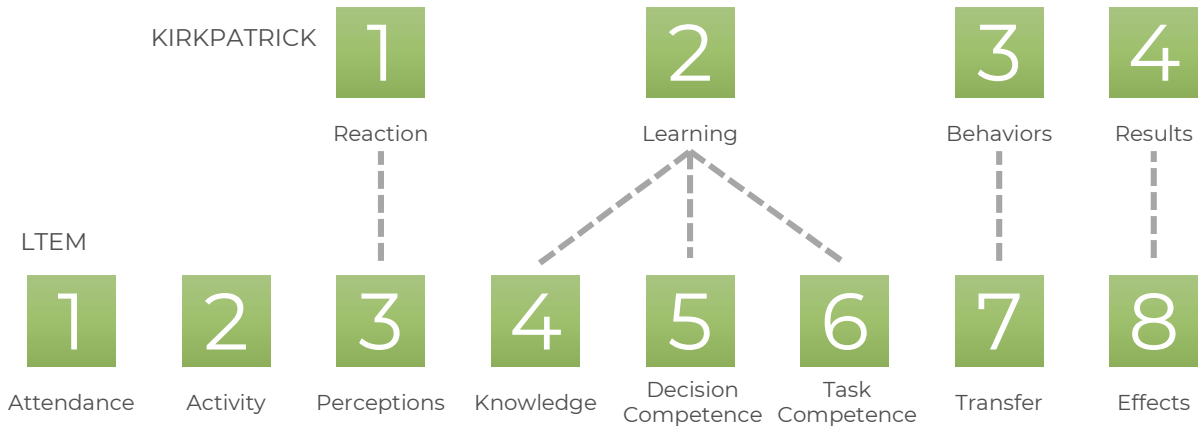
MEGAN'S

KIRKPATRICK & LTEM COMPARISON



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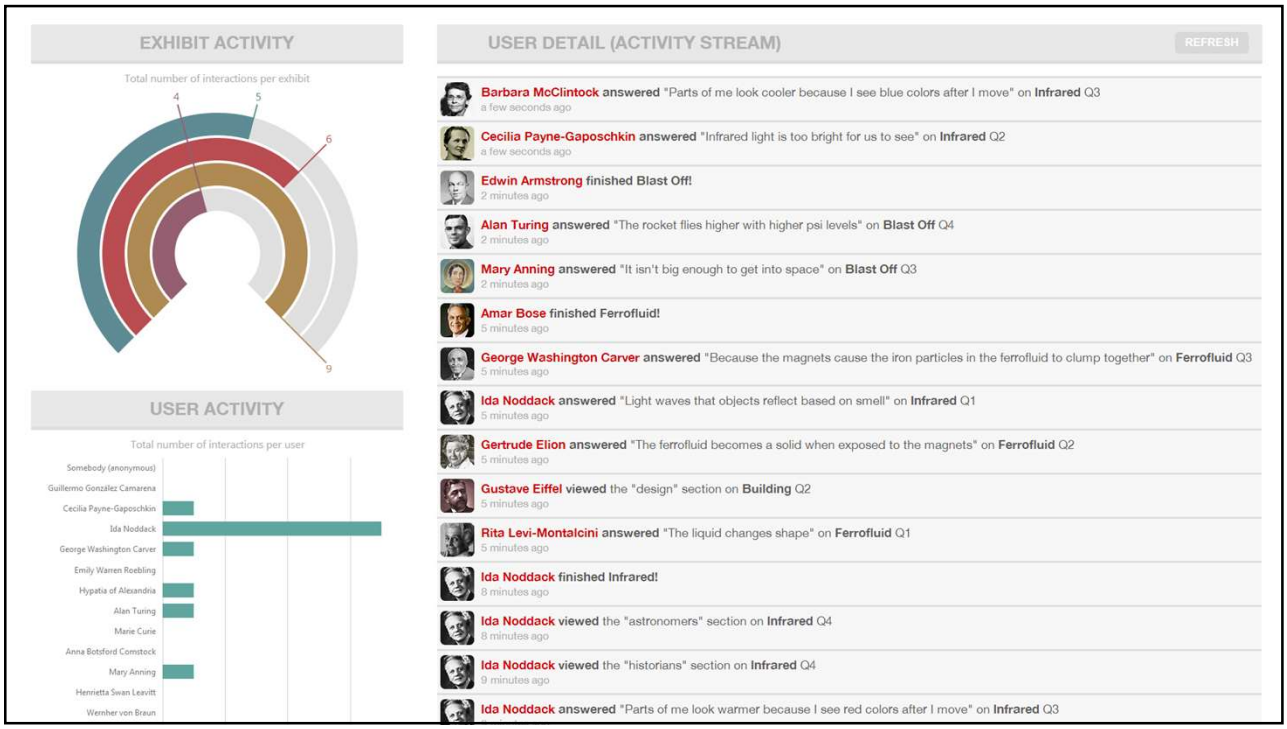
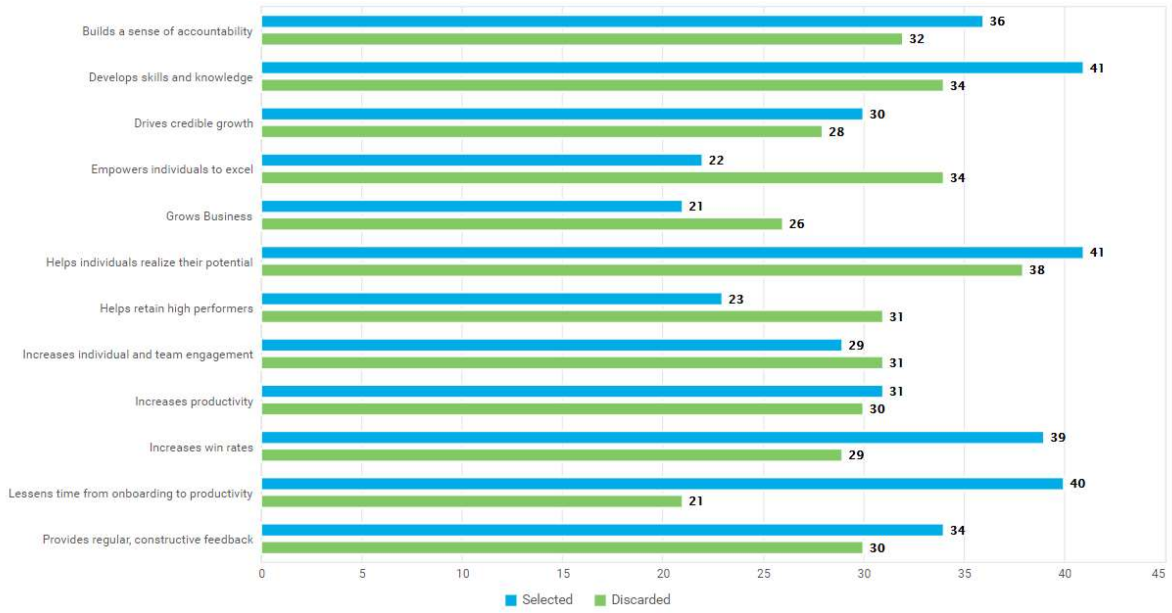


19

Most organizations start at the top and work downward to deeper questions.

Descriptive	What happened?
Diagnostic	Why did it happen?
Predictive	
Prescriptive	

20



21

Most organizations start at the top and work downward to deeper questions.

Descriptive	What happened?
Diagnostic	Why did it happen?
Predictive	What will happen?
Prescriptive	

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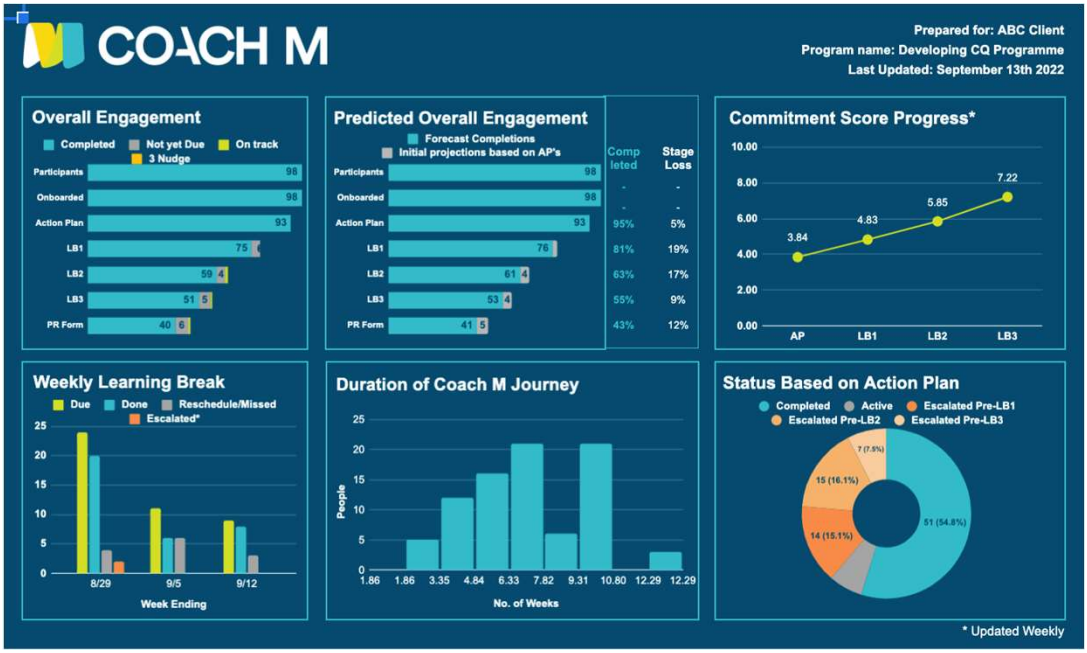

Image courtesy of Emma Weber, https://transferoflearning.com/

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Date	LO1	LO2	LO3	LO4
(Last Activity)	Identifies relevant assessments	Defines key purposes of a capacity assessment generally	Identifies key constructs underlying a capacity assessment	Administers a capacity assessment
7/7/2022, 10:04:43 PM	GREEN LIGHT	GREEN LIGHT	GREEN LIGHT	GREEN LIGHT
7/7/2022, 12:25:51 PM	RED LIGHT	GREEN LIGHT	YELLOW LIGHT	YELLOW LIGHT
7/6/2022, 4:44:54 PM	RED LIGHT	GREEN LIGHT	YELLOW LIGHT	GREEN LIGHT
7/6/2022, 10:19:51 AM	RED LIGHT	GREEN LIGHT	YELLOW LIGHT	GREEN LIGHT
7/5/2022, 3:02:52 PM	GREEN LIGHT	GREEN LIGHT	GREEN LIGHT	GREEN LIGHT
6/29/2022, 5:06:54 PM	GREEN LIGHT	GREEN LIGHT	GREEN LIGHT	GREEN LIGHT
GROUP RESULTS	RED LIGHT	GREEN LIGHT	RED LIGHT	GREEN LIGHT

Wendy Morgan, PHD: A Crucial Blended Learning Tool: The Traffic Light Dashboard, https://www.learningguild.com/articles/a-crucial-blended-learning-tool-the-traffic-light-dashboard/

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Most organizations start at the top and work downward to deeper questions.

Descriptive	What happened?
Diagnostic	Why did it happen?
Predictive	What will happen?
Prescriptive	How can we make "X" happen?

Read more: Ben Betts, Learning Analytics Maturity Model
https://learningpool.com/learning-analytics-maturity-model/

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Most organizations start at the top and work downward to deeper questions (& harder math).

Descriptive	Math & statistics
Diagnostic	Statistics
Predictive	Data science
Prescriptive	Data science & machine learning

This is a **gross oversimplification** and there are blurry lines between these categories.

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	Prototype	Pilot	1st Production Project	Multiple Projects	Full Scale Operation
Strategy & Purpose	Get feet wet Get buy-in	Actually collect data to get buy-in	Identify needs for data & standards	Educating the team & business	The org assumes we do this
Skillset & People	Few people know what xAPI is	Building capability	Borrowing data capability	Teams sharing best practices	Team is built for data use
Systems & Data Supply	Existing tools Often elearning	Free or low-cost LRS basic analysis	Elearning, code-free, maybe custom SW	Encouraging other LX tools to use xAPI	Only using LX tools that support xAPI
Statistics & Data Science	"It's aliiiiiivvve!"	Data collection might be an afterthought	Building it into existing processes	Building processes to support rollout	Design for data analytics
Relationships	May be solo, quiet project	May be solo or may bring in IT	L&D, IT, BI, Data Science	L&D, IT, BI, Data Science	Integrated work across teams

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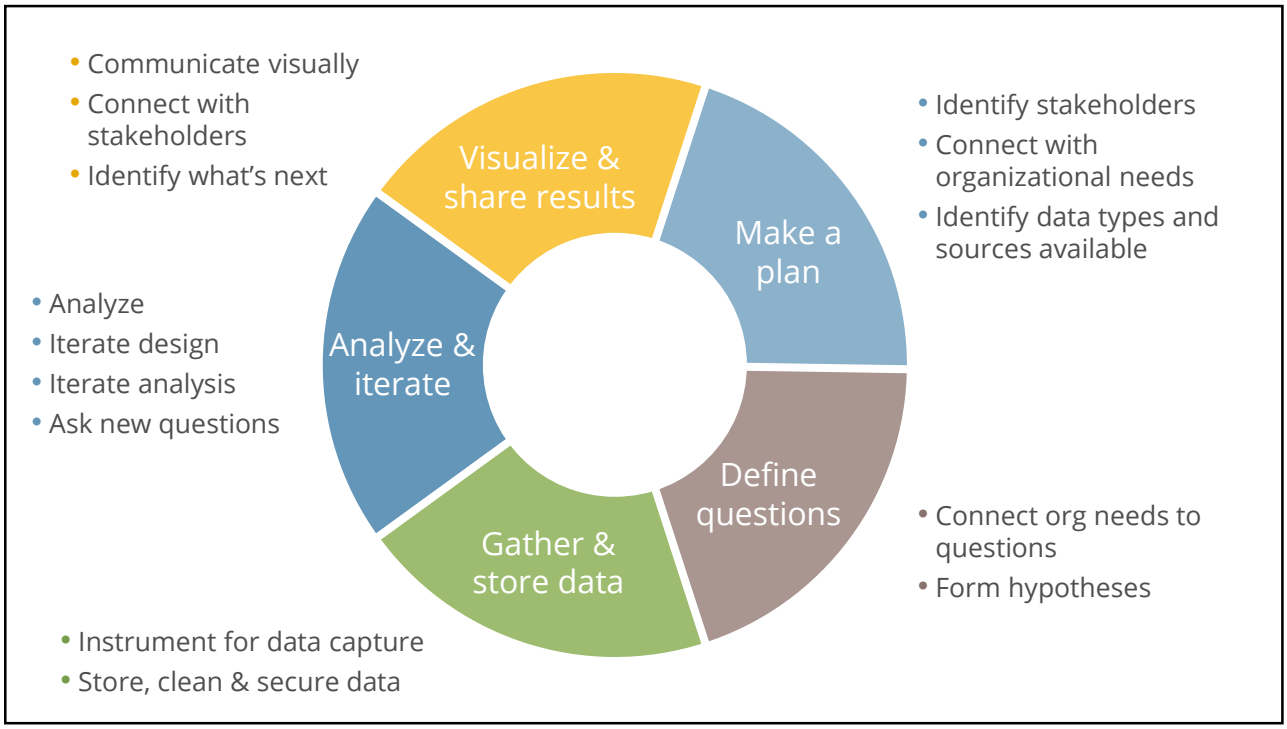

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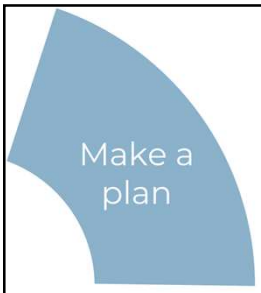

Purpose:	**Why** do we want data? **What** questions are we trying to solve?
Participants:	**Who** is involved in sending data? **Who** is involved in using data?
Data Sources:	**Where** is the data coming from?
Data Storages:	**Where** will we hold the data?
Data Consumers:	**What** systems and processes will use the data?
Data Details:	**How** will we organize the data so we can get to it later? **How** will we get data to the right people in the right places?

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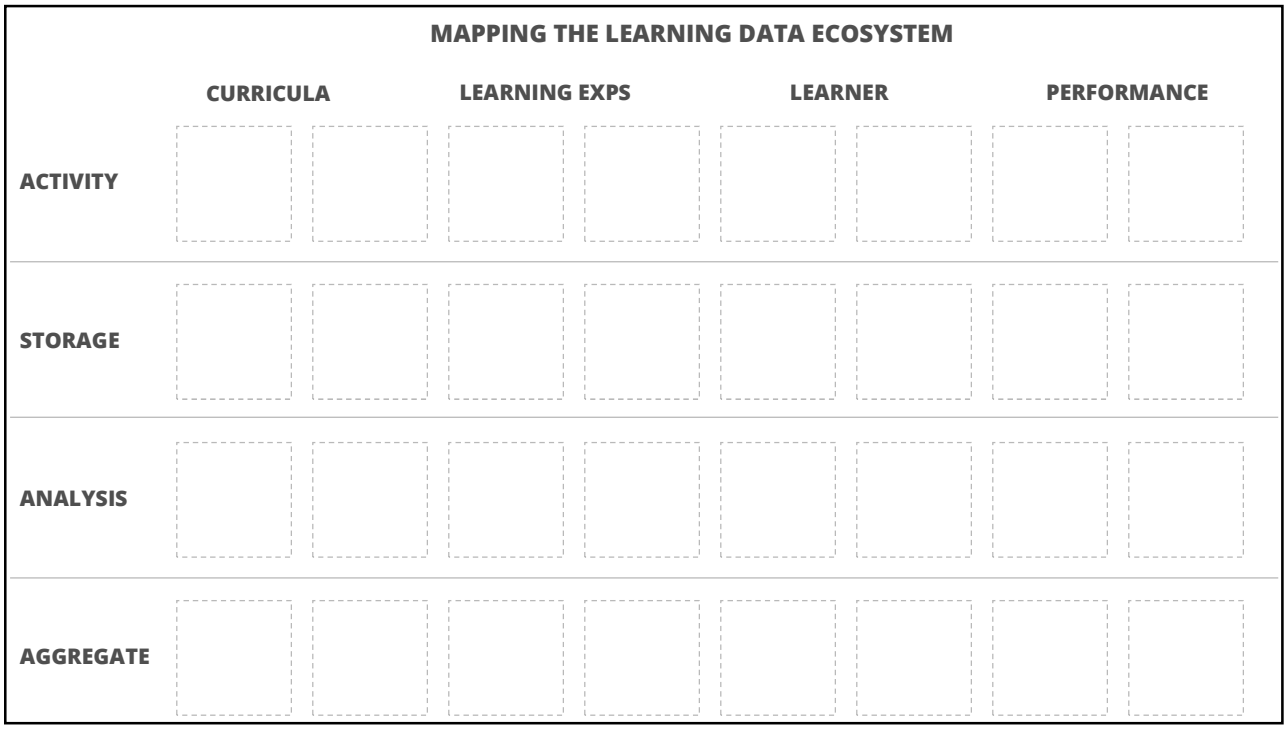
MAPPING THE LEARNING DATA ECOSYSTEM
CURRICULA
LEARNING EXPS
LEARNER
PERFORMANCE
ACTIVITY
STORAGE
ANALYSIS
AGGREGATE

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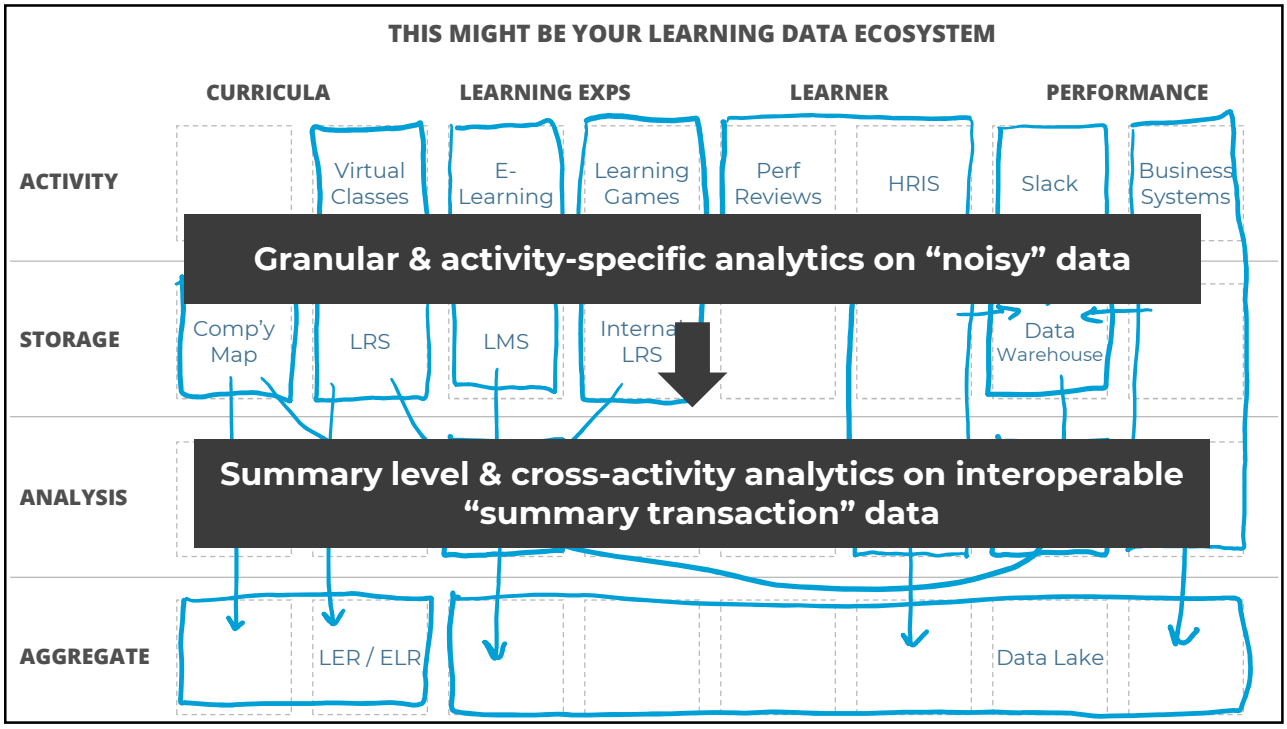
THIS MIGHT BE YOUR LEARNING DATA ECOSYSTEM
CURRICULA
LEARNING EXPS
LEARNER
PERFORMANCE
ACTIVITY
Virtual Classes
E-Learning
Learning Games
Perf Reviews
HRIS
Slack
Business Systems
Granular & activity-specific analytics on "noisy" data
STORAGE
Comp'y Map
LRS
LMS
Interna LRS
Data Warehouse
ANALYSIS
Summary level & cross-activity analytics on interoperable "summary transaction" data
AGGREGATE
LER / ELR
Data Lake

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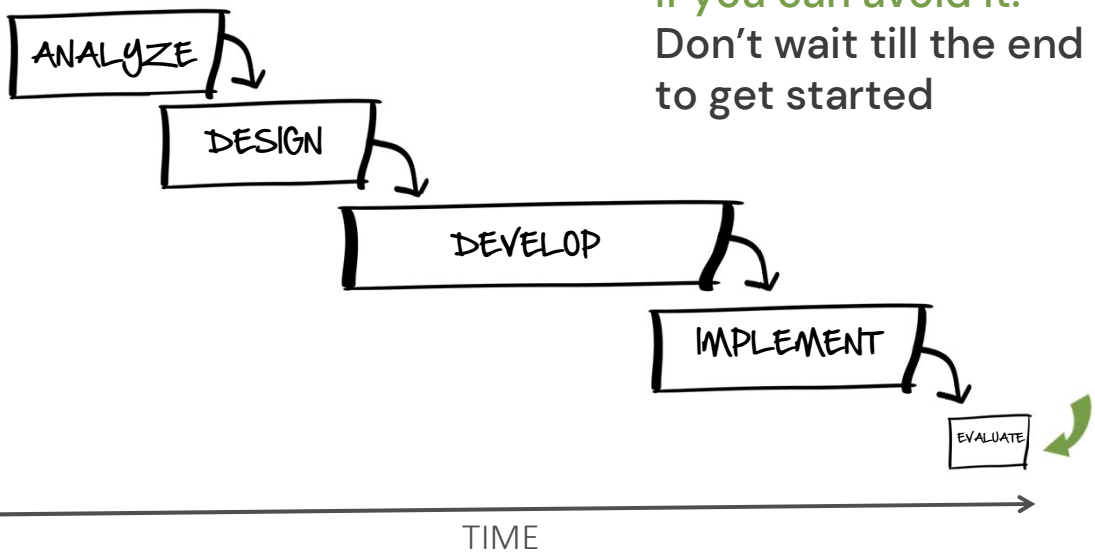

If you can avoid it:
Don't wait till the end to get started

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Define questions

How do we come up with questions for analysis?

1	2	3	4
What does the organization need? What are we curious about?	What do evaluation frameworks suggest to us?	Where is the data to answer our questions?	Form hypotheses & analyze

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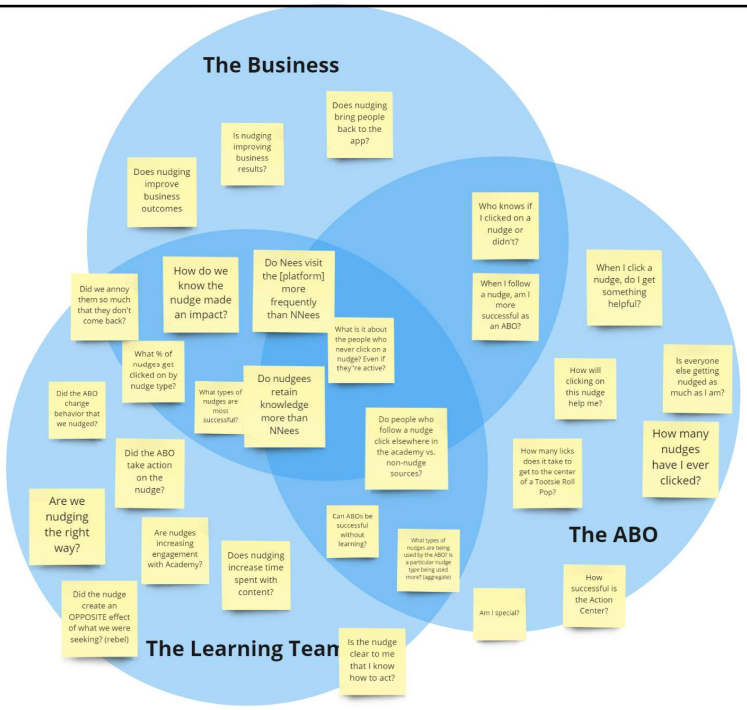
1

What does the organization need? What are we curious about?



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2

What do evaluation frameworks suggest to us?

	Desired Outcomes	Efficiency Measures	Effectiveness Measures
Attendance	Time delay between delivery, receipt, action Which ABO segment or LOS responds to nudges more?	What drives training more - Shares or Nudges?	What % of nudges get acted on?
Activity		Did a piece of content get more traffic because it was nudged? How long does a Nee spend in Academy?	Did ABO come back after nudge?
Perceptions			Did people who were nudged rate it higher than people who weren't? Do people who are following Nudges feel better about learning in general?
Knowledge			Did Nees score higher in learning assessments?
Decision Competence			
Task Competence			
Transfer	Did Nee share Academy content with someone else?		
Effects	Did productivity go up after Nudges?	Do people who are nudged share more content with others?	Do Higher Nudge users stay as Active ABOs longer?

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Question	Stakeholders			Required Data to Answer*	Data Sources		
	Biz	L&D	ABO		App	Academy	Other
Does nudging bring people back to the app?	x			# nudges viewed # visits to app	x		
Does nudging improve business results?	x			# nudges viewed sales metric	x		
Are we annoying learners with nudges so much that they don't come back?	x			# nudges viewed # visits to app	x		
D…ver organic e…	x			# nudges viewed # visits to app via Action Center # organic/direct visits to app	x		
D…avior that was r…	x			Nudge click-through rate Nudge action**	x		
D…e behavior that was nudged? (or the opposite behavior)	x			Nudge click-through rate Nudge action**	x		
Do nudged learners spend more time in the Academy?		x		# Academy-related nudges viewed # nudges viewed # sessions in Academy Duration per session in Academy	x	x	
Do learners take action on the nudges?	x			Nudge click-through rate Nudge action**	x		
What is the % of nudges that get acted on by nudge type?		x		Type of nudge Nudge click-through rate Nudge action**	x		
Do nudged learners access the platform more frequently than non-nudged learners?		x		# nudges viewed # visits to app via Action Center	x		

3

Where is the data to answer our questions?

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4

Form hypotheses & analyze

Exploratory analysis vs. hypothesis-testing

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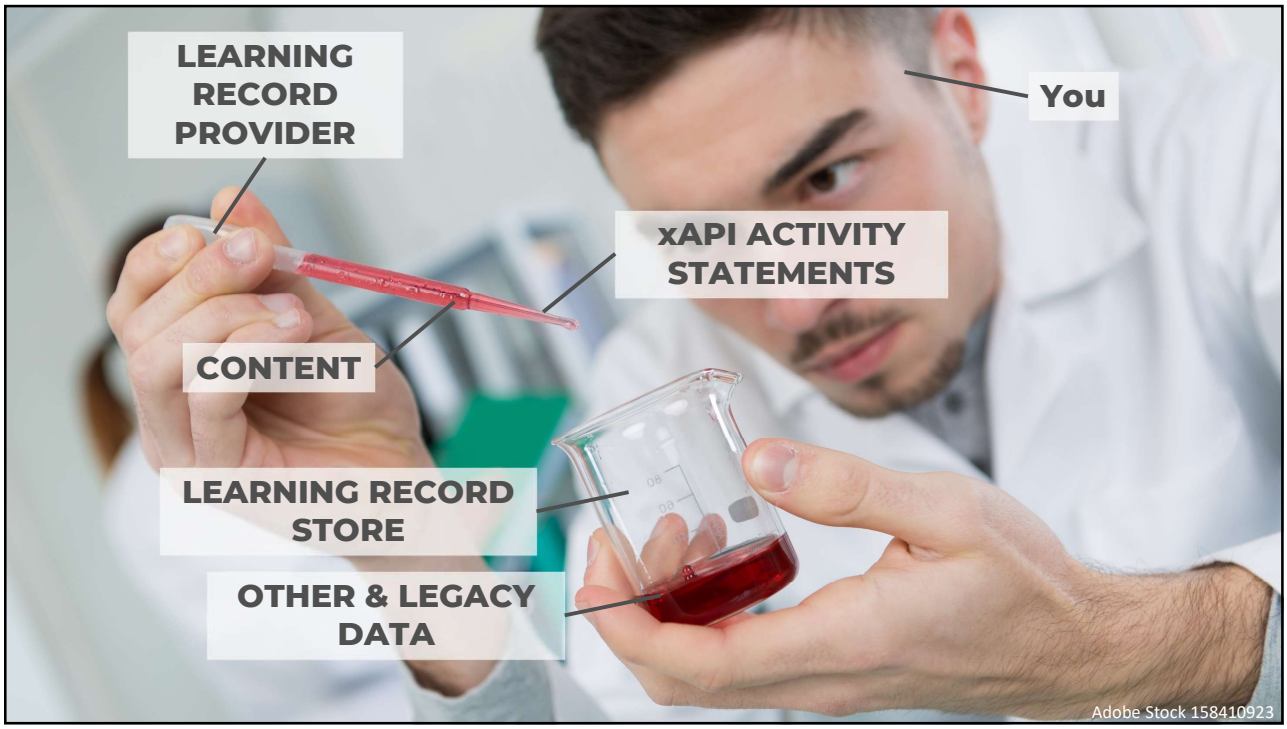

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STEP #1

CAPTURE & SEND ACTIVITY DATA

1. Use your existing elearning authoring tools
2. Get your favorite product vendor to send the data
3. Use your platform to assemble things into a trackable path
4. Write some custom code (not as hard as it sounds!)
5. Import from business data

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THIS LIST IS GROWING & THEREFORE INCOMPLETE

YOUR AUTHORING TOOLS DO THIS

Out of the box:
- SCORM-like transactions
- Individual page views
- Actions and triggers (depends)

With a little JavaScript or xapi.ly statement builder:
- Any action, trigger, variable

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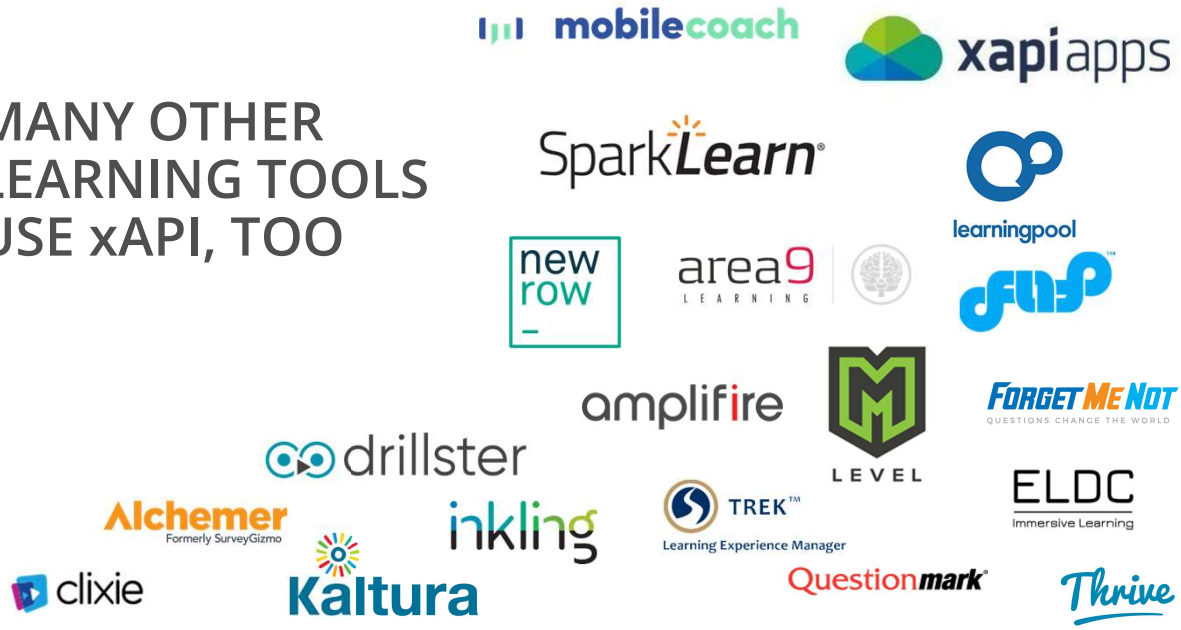
THIS LIST IS GROWING & THEREFORE INCOMPLETE

MANY OTHER LEARNING TOOLS USE xAPI, TOO



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STEP #2

RECEIVE & STORE THE DATA

The Learning Record Store (LRS):

- receives, stores, & gives back your xAPI data
- can be tested for **conformance** which ensures interoperability (https://adopters.adlnet.gov/)
- is **not** an LMS
- often supports **analytics & visualizations**

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Establish be
Communi
Monitor r
Manage
Discove
Analyz
Ensure
Demor
Inform
Evaluat
Assess
Plot tre
Identify
Assess

Question	Stakeholders: Biz	L&D	ABO	Required Data to Answer*	Data Sources: App	Academy	Other
Does nudging bring people back to the app?	x			# nudges viewed # visits to app	x		
Does nudging improve business results?	x			# nudges viewed sales metric	x		
Are we annoying learners with nudges so much that they don't come back?	x			# nudges viewed # visits to app	x		
Do nudged learners have fewer organic engagements with the app?	x			# nudges viewed # visits to app via Action Center # organic/direct visits to app	x		
Did the learner take the behavior that was nudged?	x			Nudge click-through rate Nudge action**	x		
Did the learner take less of the behavior that was nudged? (or the opposite behavior)	x			Nudge click-through rate Nudge action**	x		
Do nudged learners spend more time in the Academy?		x		# Academy-related nudges viewed # nudges viewed # sessions in Academy Duration per session in Academy	x	x	
Do learners take action on the nudges?	x			Nudge click-through rate Nudge action**	x		
What is the % of nudges that get acted on by nudge type?		x		Type of nudge Nudge click-through rate Nudge action**	x		
Do nudged learners access the platform more frequently than non-nudged learners?		x		# nudges viewed # visits to app via Action Center	x		

The boring message here is that what you do to "Analyze" depends on what your questions are & the nature of your data.

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WHERE??? It depends …

Within the platform that creates the data

(LMS, EPSS, etc.)

Aggregated into a single platform across data sources

(LRS, etc.)

Downstream analysis & visualization tools

(Tableau, PowerBI, etc.)

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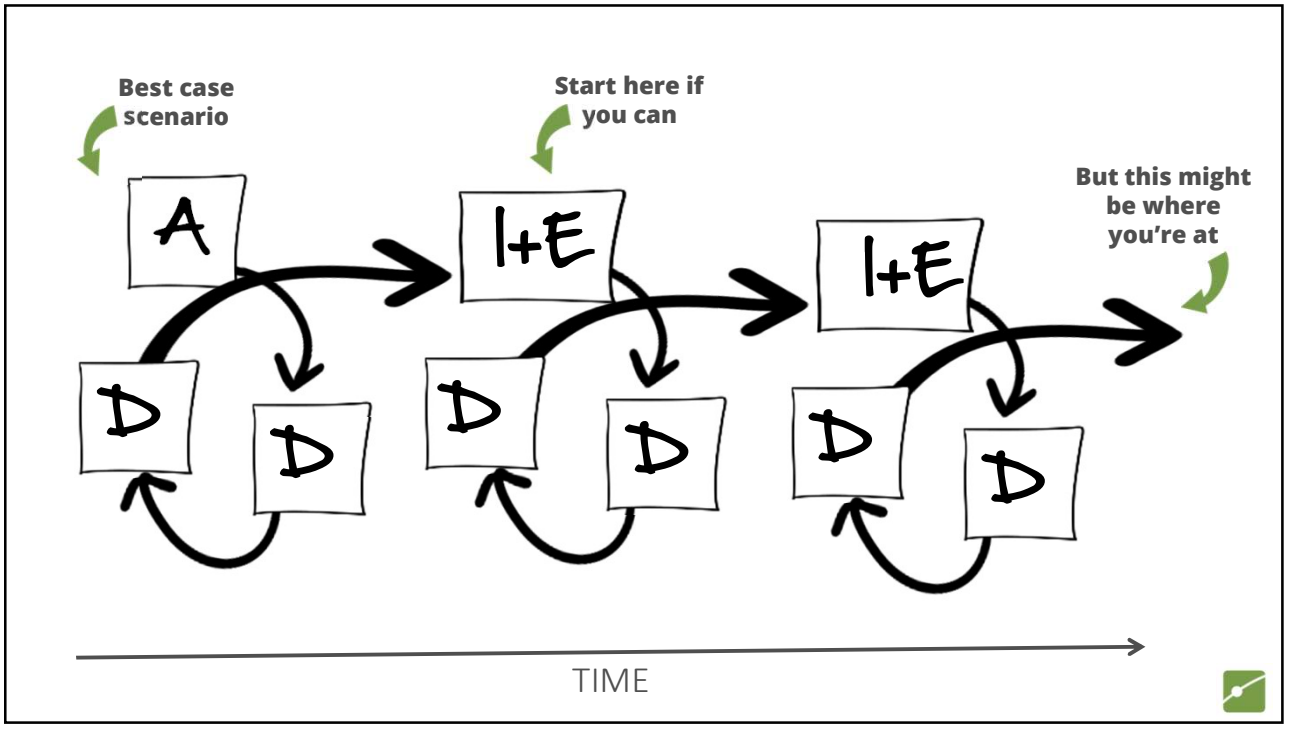

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Hannah Fry

@FryRsquared

Every single person who confuses correlation and causation ends up dying.

An image I pulled from my Facebook feed, 2023.

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"There is no guarantee that a decision based on data will be a good decision."
Christopher Anderson, Professor, Cornell University

"What gets measured gets managed – even when it's pointless to measure and manage it, and even if it harms the purpose of the organization to do so."
Simon Caulkin, *Administrative Science Quarterly,* 1956

"With great power comes great responsibility."
Uncle Ben to Peter Parker, Spider-Man

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xAPI Learning Cohort
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xapi.com
Udemy
LinkedIn Learning
Learning Dojo

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xAPI COHORT

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Weekly web meetings 2-3pm ET (recorded).

Ad hoc teams form to tackle a project together and provide weekly report-outs.

Learning-by-lurking is just fine!

www.xapicohort.com

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WHAT QUESTIONS DO YOU HAVE?

MEGAN TORRANCE
mtorrance@torrancelearning.com

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