Learning Analytics

Standardization Activities and Issues

성공적인 학습분석을 위한 트리거

표준화 현황 및 쟁점 소개

주관기관 : Korea Education and Research Information Service
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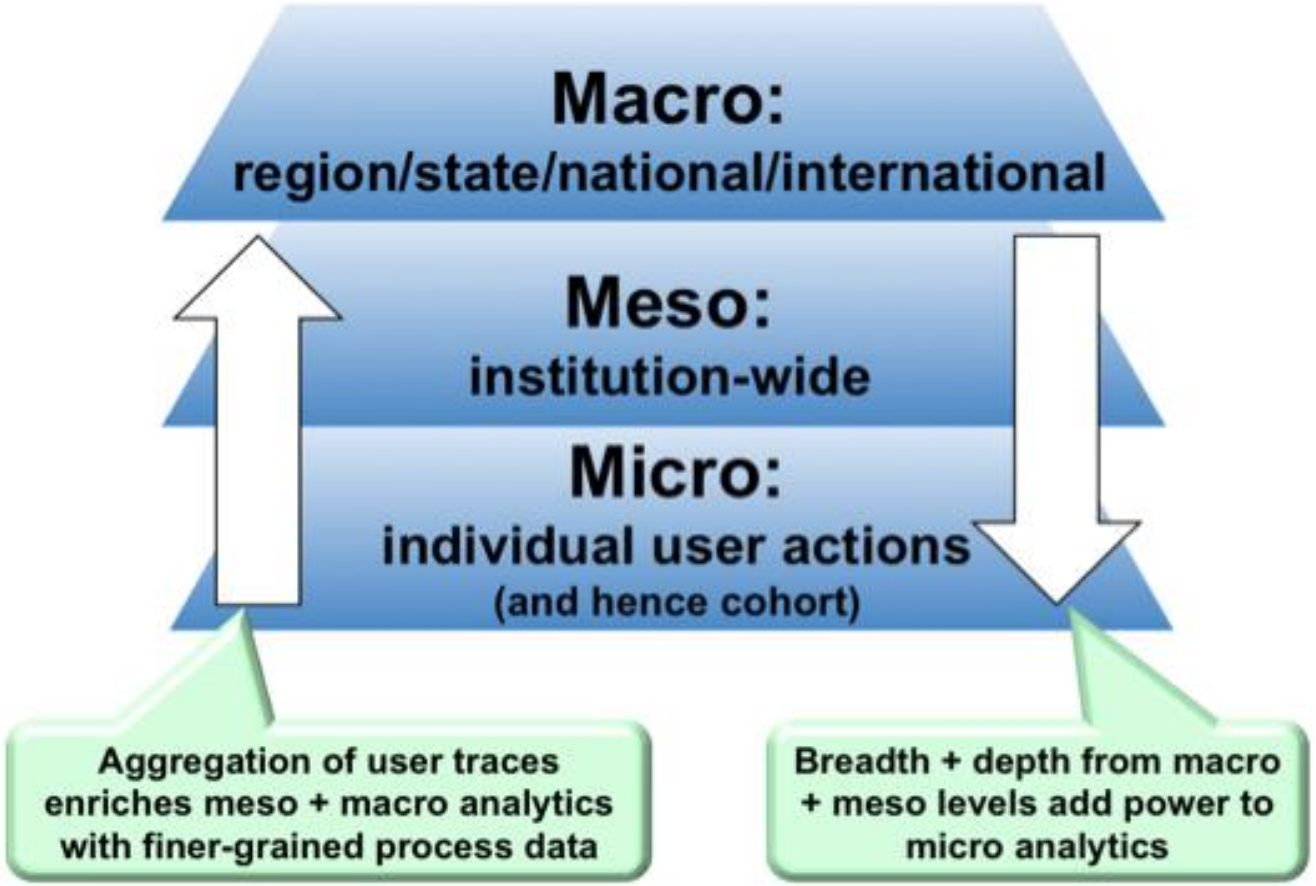
Learning Analytics? (Wikipedia)

- the measurement, collection, analysis and reporting of data about learners and their contexts, for purposes of understanding and optimizing learning and the environments in which it occurs

- (the use of intelligent data, learner-produced data, and analysis models to discover information and social connections for predicting and advising people's learning)

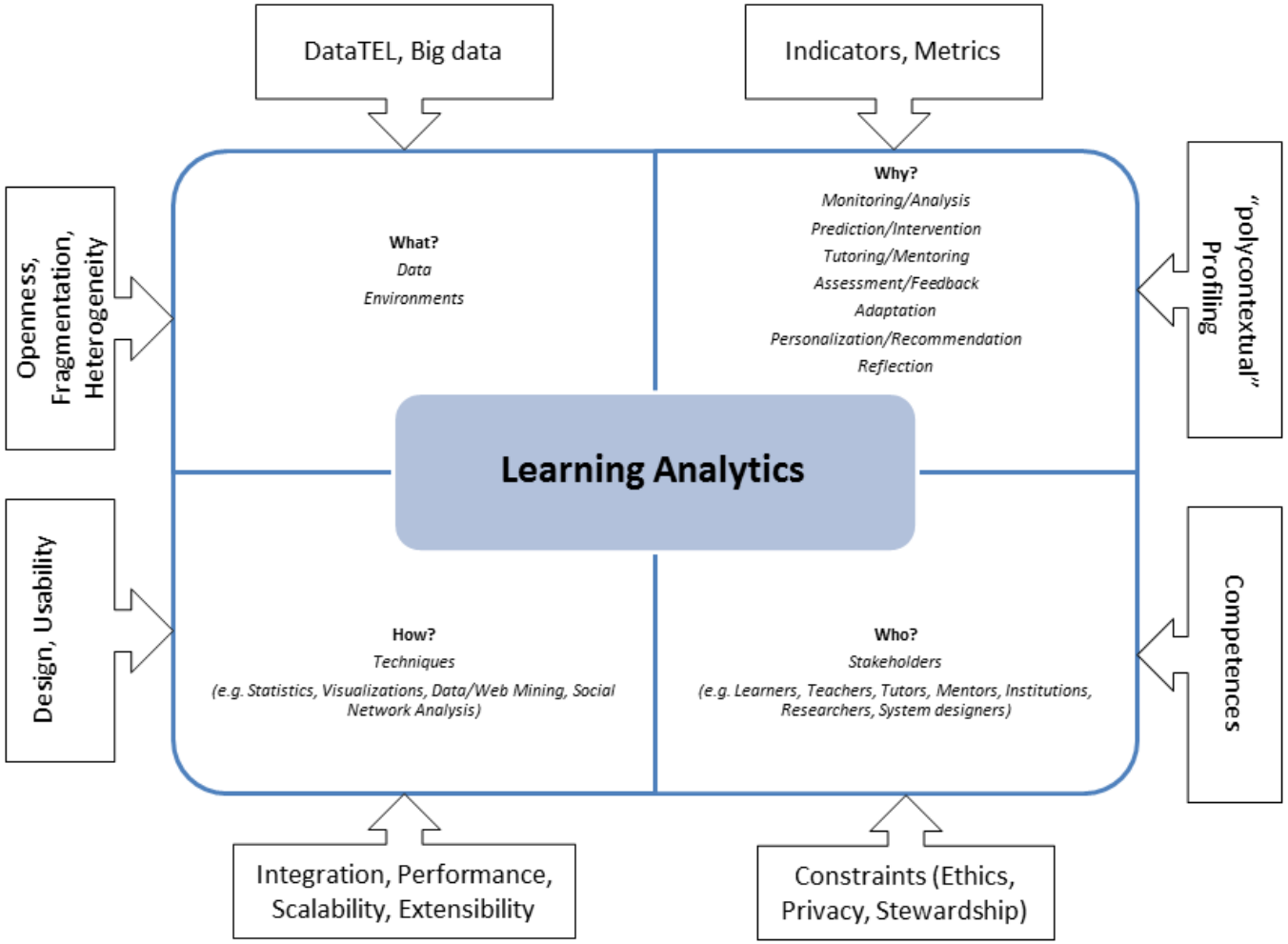
Levels of Learning Analytics (Buckingham Shum)

- From individualized services to nationwide policy making



Reference Model (Chatti et al.)

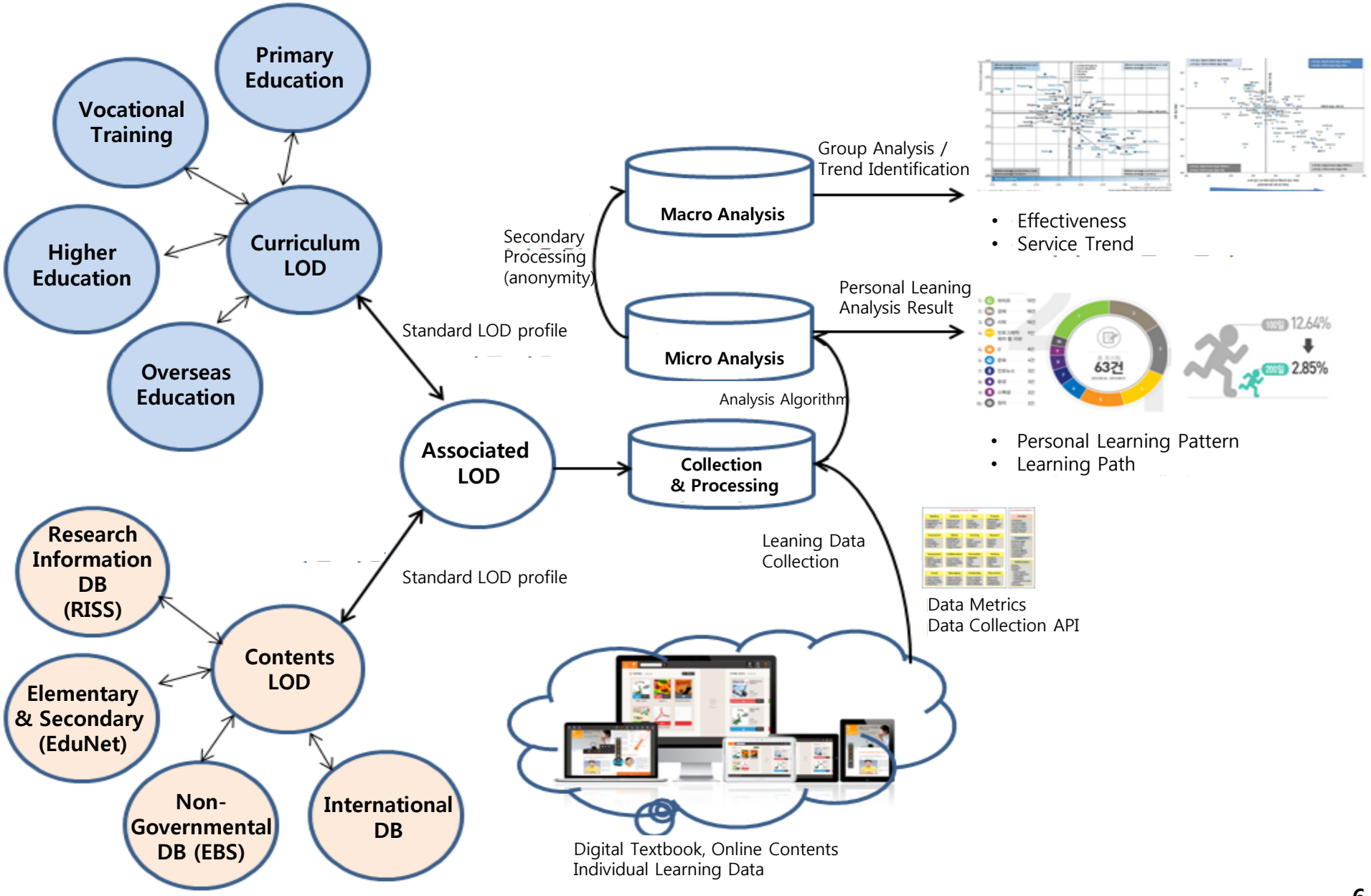
- 4 dimensions: data and environments (what?), stakeholders (who?), objectives (why?), and methods (how?)



Expected Benefits (Christopher Pappas)

- Helps to predict learners' performance
- Provides learners with a personalized eLearning experience
- Increased learners' retention rates
- Helps to improve future learning courses
- Boost in cost efficiency

Overview


Primary Education
Vocational Training
Higher Education
Curriculum LOD
Overseas Education
Standard LOD profile
Associated LOD
Research Information DB (RISS)
Elementary & Secondary (EduNet)
Contents LOD
Non-Governmental DB (EBS)
International DB
Standard LOD profile
Secondary Processing (anonymity)
Macro Analysis
Micro Analysis
Group Analysis / Trend Identification
Personal Leaning Analysis Result
Analysis Algorithm
Collection & Processing
Leaning Data Collection
Data Metrics
Data Collection API
Digital Textbook, Online Contents
Individual Learning Data
• Effectiveness
• Service Trend
• Personal Learning Pattern
• Learning Path
63건
12.64%
2.85%

Scope

1. Development of a standard reference model for collection, processing, analysis, and visualization of learning data defined in standard metrics.
    - Specification of metrics for education
    - Specification of the APIs for collection and processing of non-structured curriculum data.
    - Specification of workflows for personalized learning analytics
    - Development of an open-source reference system
2. Development of a profile for the linked data for the optimized learning path and learning resources.
    - Guidelines for the profiling of the public digital resources including the EduNet

Activities

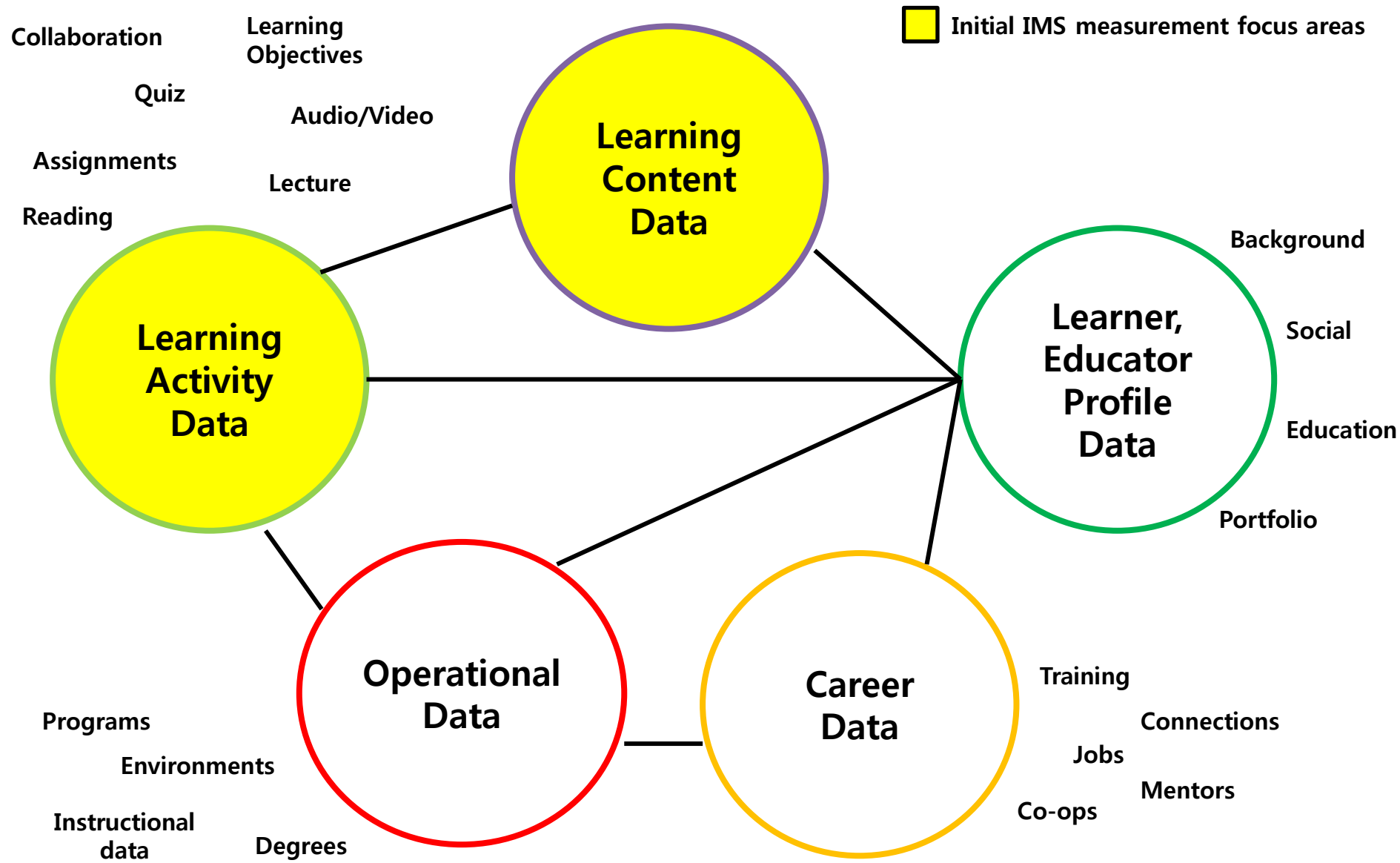
- ISO/IEC JTC 1/SC 36 AHG on Learning Analytics Interoperability

- IMS Global – IMS Caliper (Learning Measurement Framework)
  - IMS Learning Metric Profiles
  - IMS Learning Sensor API and Learning Events
  - IMS LTI/LIS/QTI

- Learning Analytics Initiative
  - Accelerate the operationalization of Learning Analytics software and frameworks, support the validation of analytics pilots across institutions, and work together to avoid duplication of efforts.

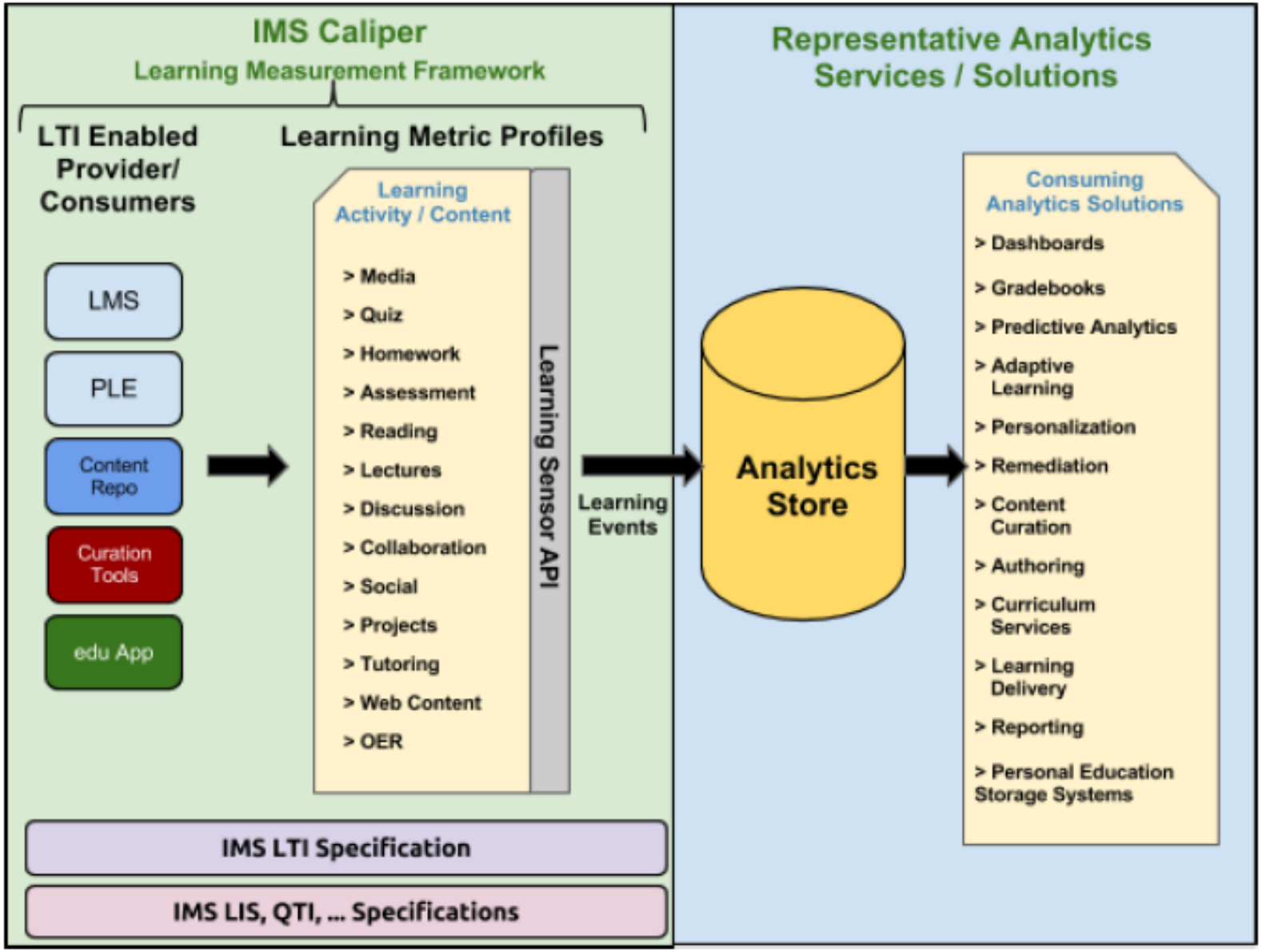
- Learning Analytics Applications
  - For the learner
    - tracking learning activities and progression
    - tracking emotion, motivation, and learning-readiness
    - early detection of learner's personal needs and preferences
    - improved feedback from analyzing activities and assessments
    - early detection of learner nonperformance
    - personalized learning path and/or resources (recommendation)
  - For the teacher
    - tracking learners/group activities and progression
    - adaptive teacher response to observed learner's needs and behavior
    - early detection of learner disengagement (mobilizing relevant support actions)
    - increasing the range of activities that can be used for assessing performance
    - visualization of learning outcome for individuals and groups
    - providing evidence to help teacher improve the design of the learning experience and resources
  - For the institution
    - tracking class/group activities and results
    - quality assurance monitoring
    - providing evidence to support the design of the learning environment
    - providing evidence to support improved retention strategies
    - support for course planning

IMS Global - “edu graph”



<Source: Learning Measurement for Analytics Whitepaper, IMS Global (2013)>

IMS Caliper – Learning Measurement Framework



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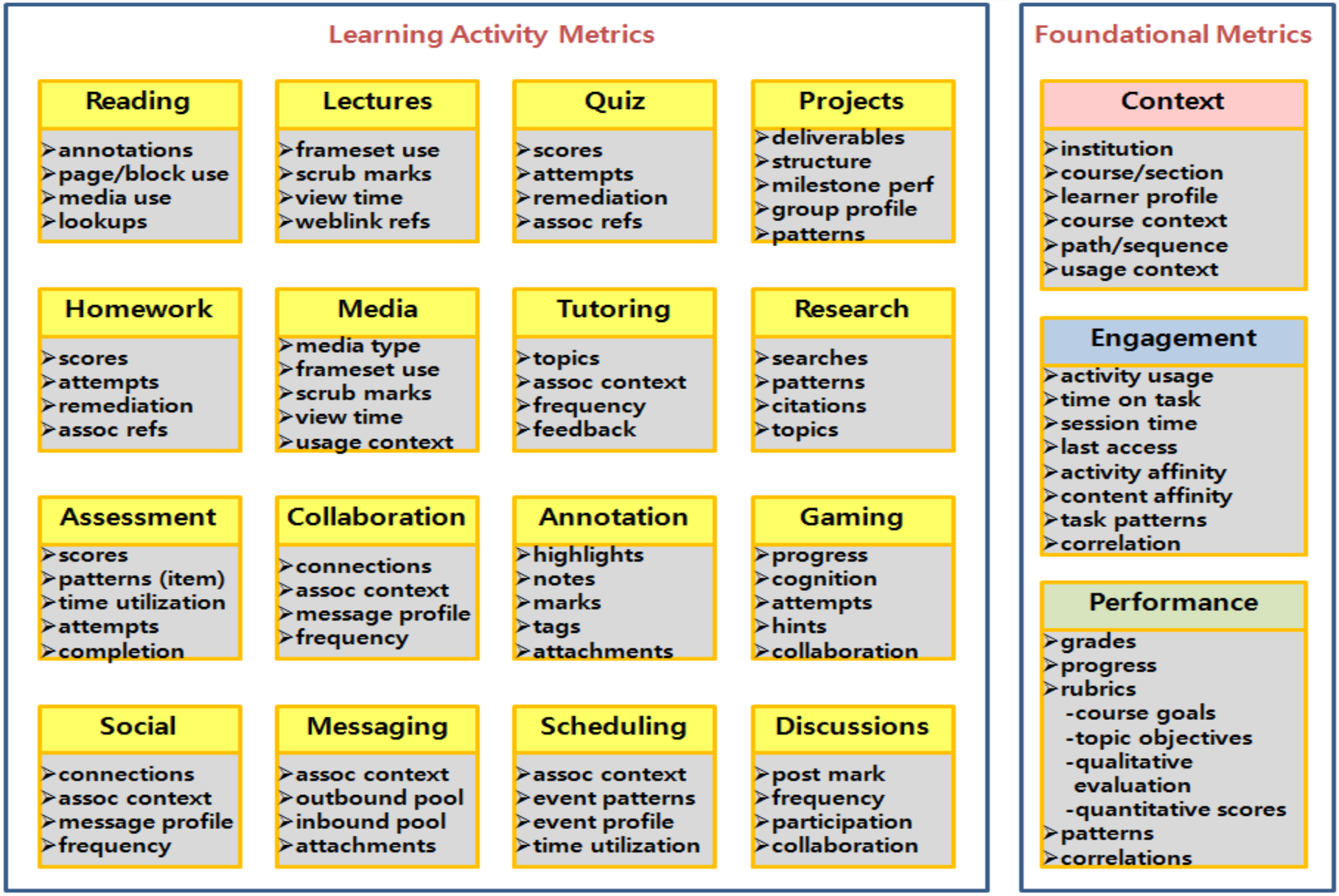
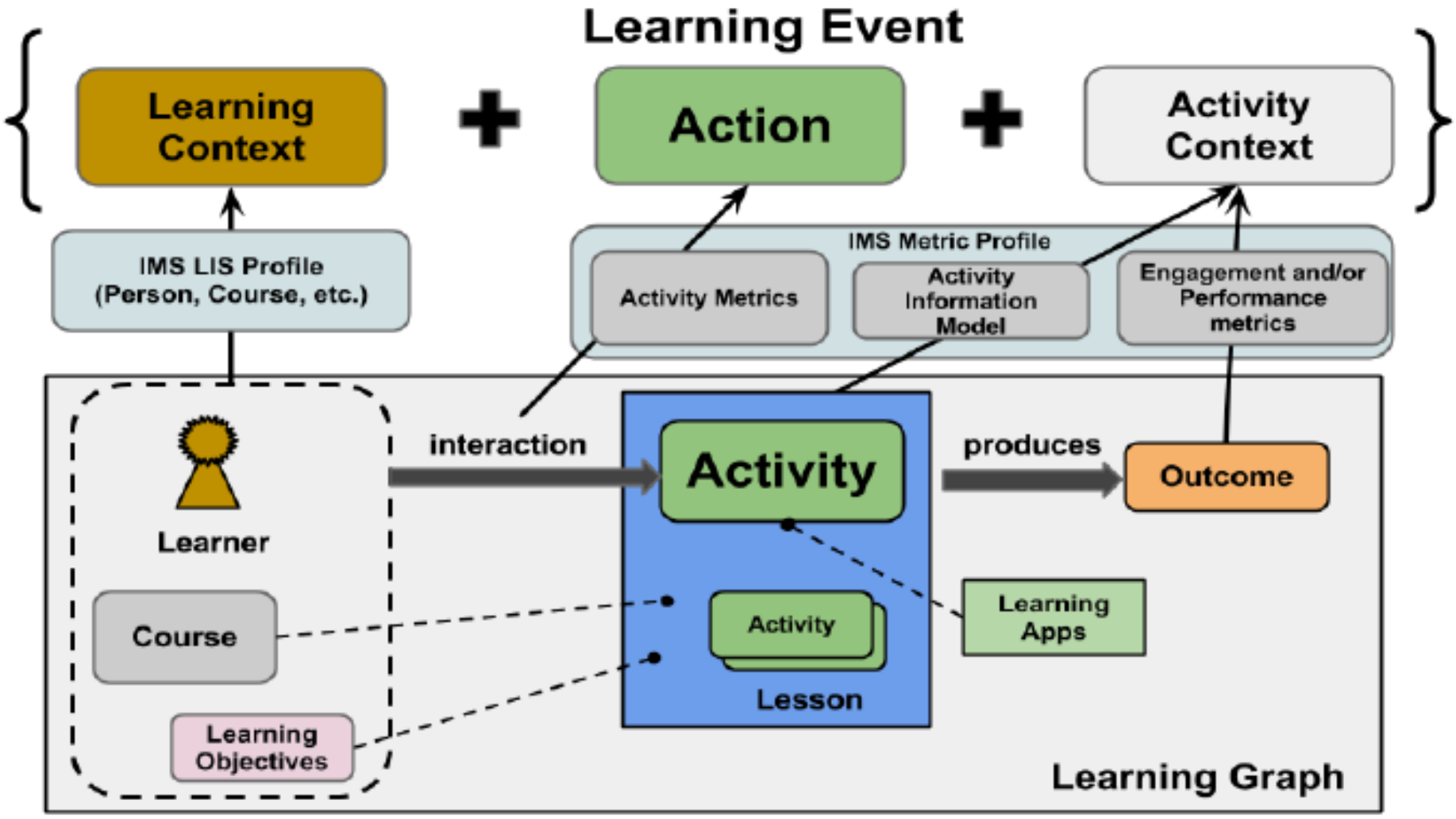
IMS Metrics Profile



<Source: Learning Measurement for Analytics Whitepaper, IMS Global (2013)>

IMS Sensor API – Learning Event



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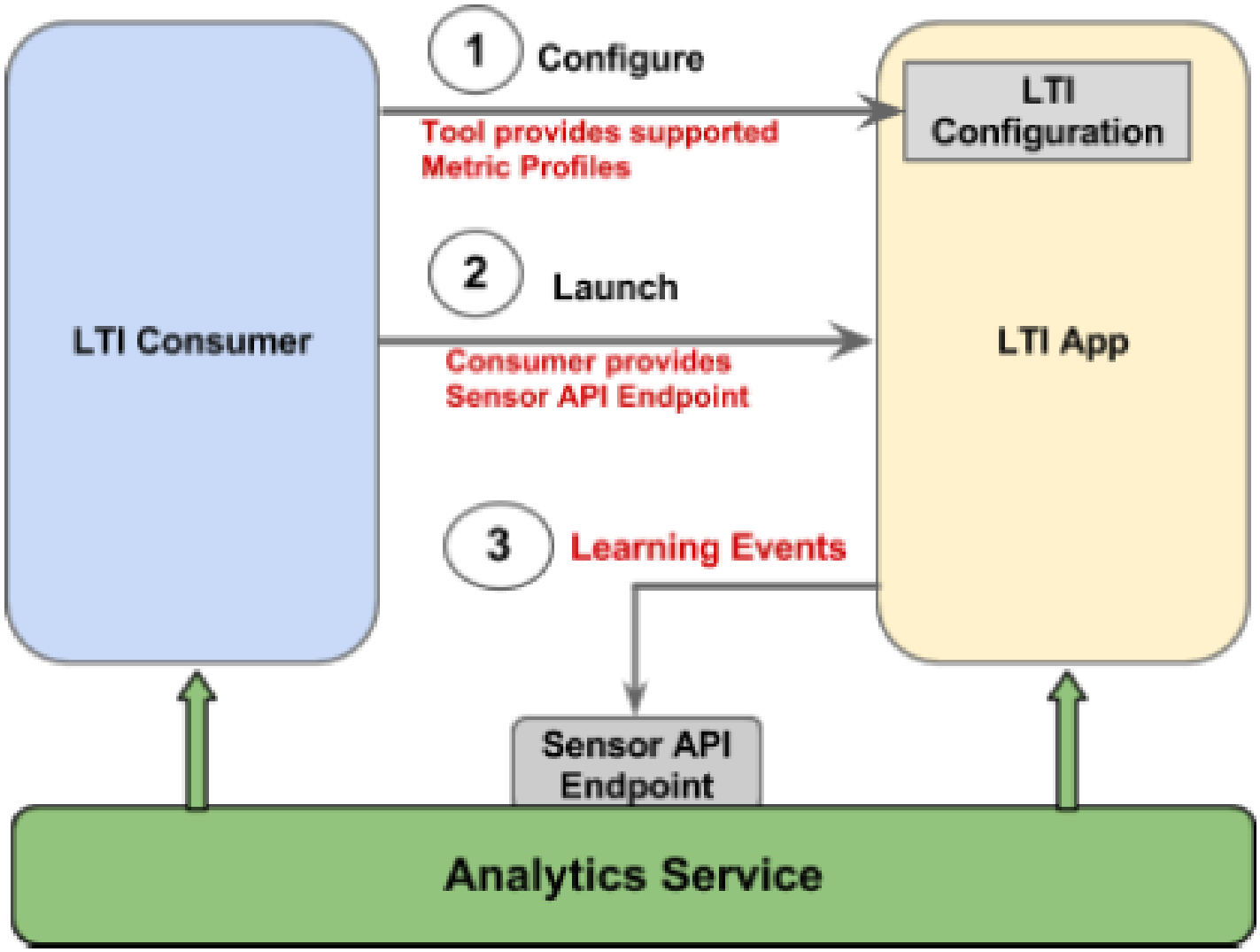
IMS LTI Extensions to support Measure Framework



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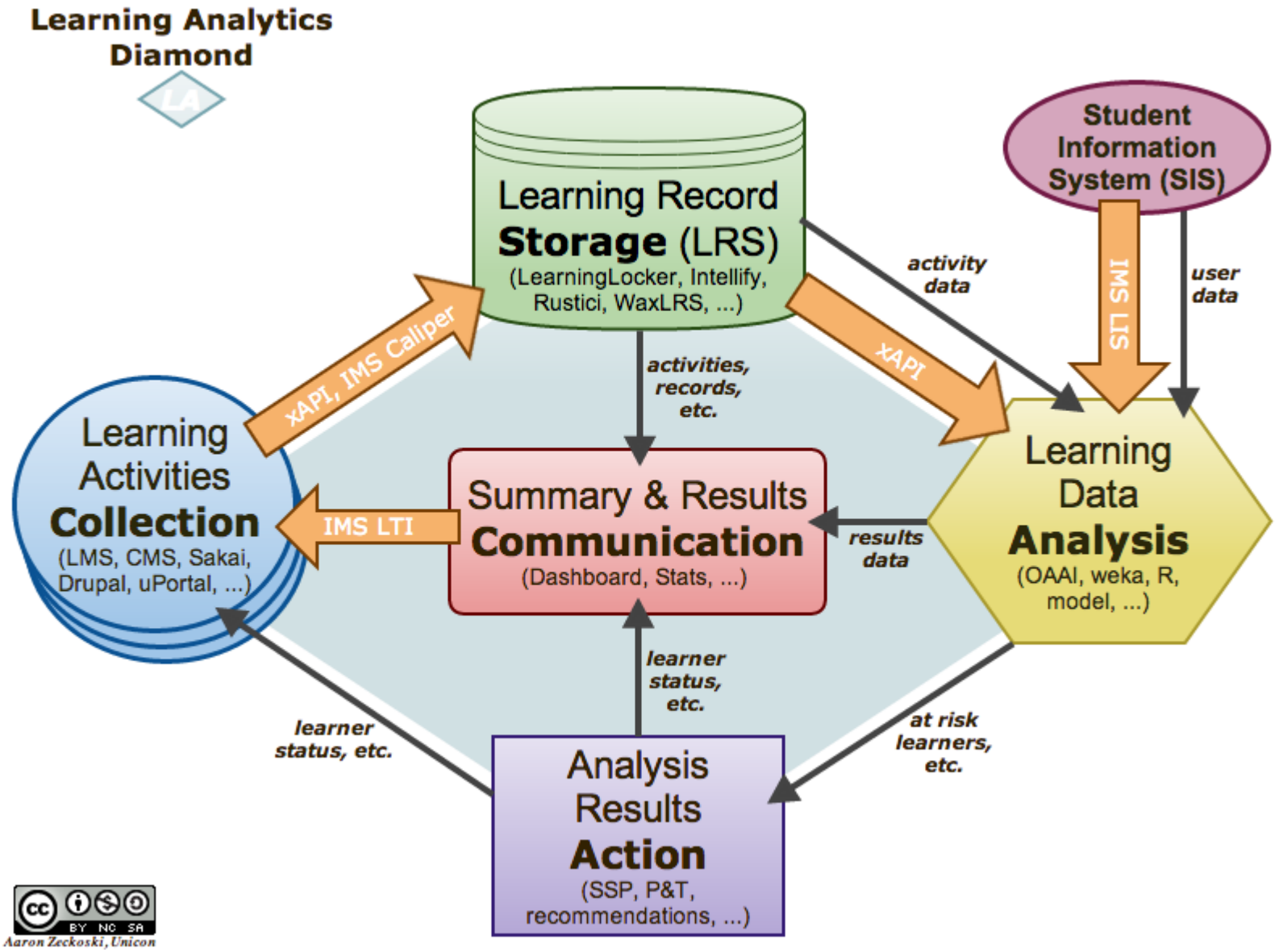
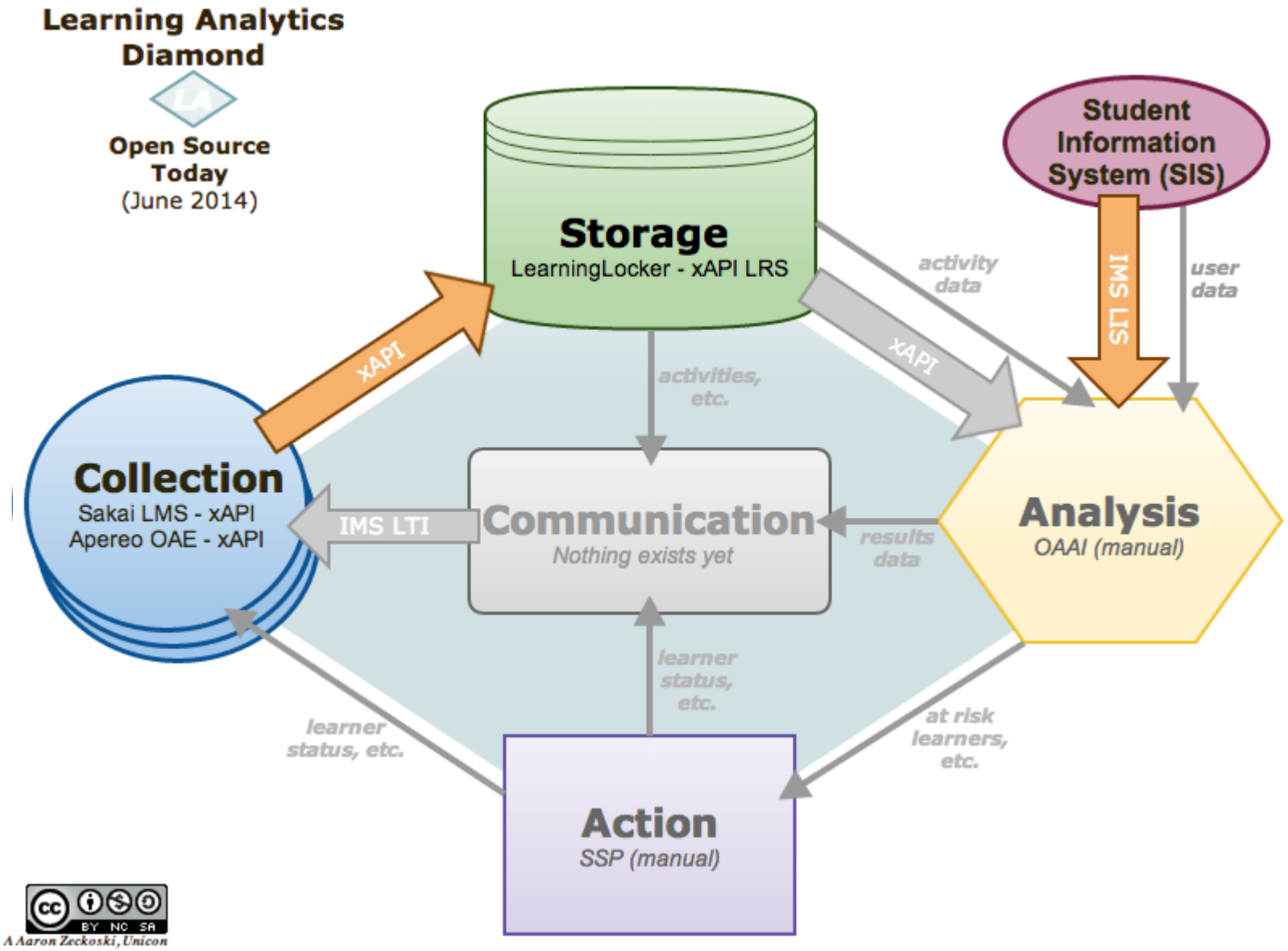
LAI: Five main aspects

- Collection, Storage, Analysis, Action, Communication

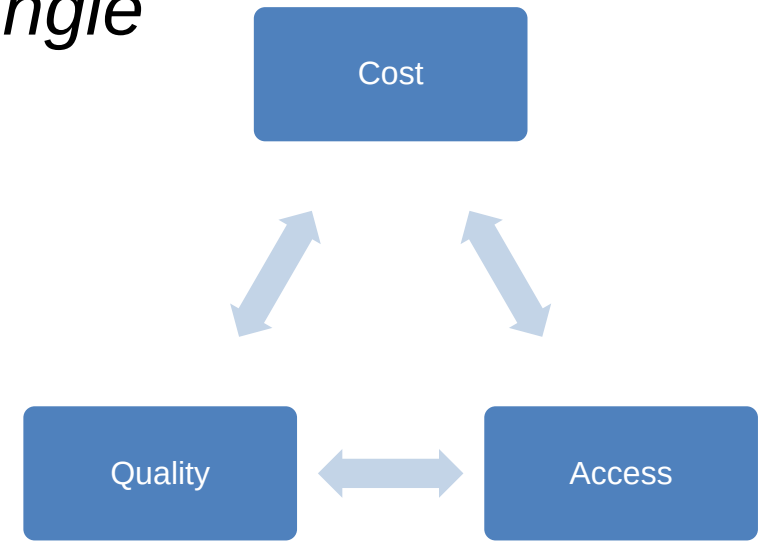


LAI: Open Source Learning Analytics today



LAI: Potential vs Challenges

- Learning Analytics holds the potential to "*break the higher education iron triangle*"
  - Academic Early Alert Systems
  - Adaptive Learning Systems
  - Dashboard/Data Visualization



- There are challenges…
  - Privacy/Ethical use of data
  - Learning Analytics (LA) tool and software silos
  - Limited coordination across LA landscape

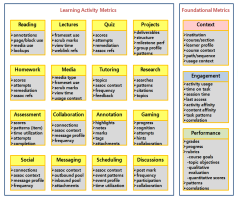
Approaches

- Twin Peaks Model
  - weaving together *specifications* and *architectures*
- Reference Software Architecture
  - Proof of concepts
  - Requirement analysis for standardization
  - Test Bench
- Open System
  - Open source, open metrics
  - Open interface for monitoring and testing

Requirements of the Reference Architecture

- **Open and extensible**: It should be open to incorporate new sensors or analytics functionality, desirably without interrupting the task being serviced. It also should ensure incorporation or modification of new workflows at the task level.
- **Distributed**: It should be able to handle multiple sources of data and functionalities distributed over multiple systems. It is also desired to be able to distribute data and to delegate functionality dynamically and transparently.
- **Interoperable:** It should provide compatibility for various learning platforms or VLE by providing interoperable interface to the data and operations.
- **Reusable and configurable**: The functional components and data interfaces should be modular and thus reused and configured for different tasks or more complex tasks as building blocks.
- **Real-time and predictable**: Learning analytics should be performed satisfying the real-time constraints and should be able to estimate the time to completion.
- **Usable:** It should acceptable user experience (UX) by providing appropriate data visualization and user interfaces for monitoring and tasking throughout the learning analytics process.
- **Secure and traceable:** It should protect personal user information to secure privacy and preserve confidential information. Some analytics functionality should be ensured not to be performed as required. Furthermore, the history of execution of analytics functions and access to data should be recorded, if needed, to ensure traceability.

Primitive Design



Data Collection & Processing

Asynchronous Message Service

Visualization

Visualization Interactive UI

Visualization Model Manager

DashBoard

Pattern Graph

Recommend

Analysis

Analysis Workflow Manager

Analysis Model Manager

Statistic

Pattern Rec.

Recommend

Learning Data Storage

Developer Interface

Monitoring

Model Managing API

Conclusion

- Need for Learning Analytics
- Need for Standards
- Need for Reference Architectures
- Need for Open Systems