



SLATE

Centre for the Science
of Learning & Technology

When Artificial Intelligence and Learning Analytics Meet

Professor Barbara Wasson, Director

Digital transformasjon av samfunnet: utfordringer og kunnskapsbehov

29 April 2019



ARTIFICIAL INTELLIGENCE

Artificial intelligence (AI), the ability of a digital computer or computer-controlled robot to perform tasks commonly associated with intelligent beings.

ENCYCLOPÆDIA BRITANNICA

Artificial intelligence (AI), the ability of a digital computer or computer-controlled robot to perform tasks commonly associated with intelligent beings.

LEARNING

REASONING

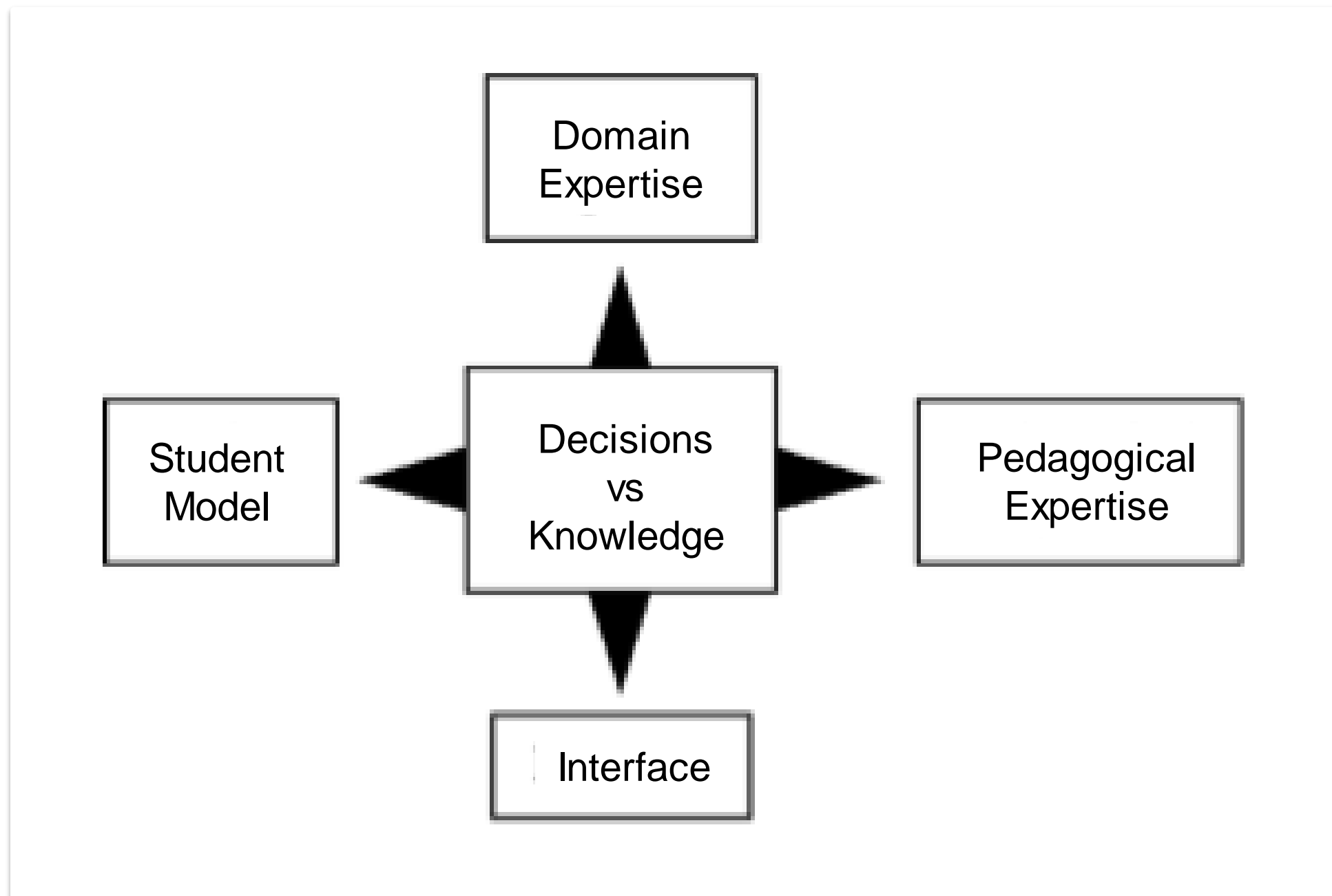
PROBLEM-SOLVING

PERCEPTION

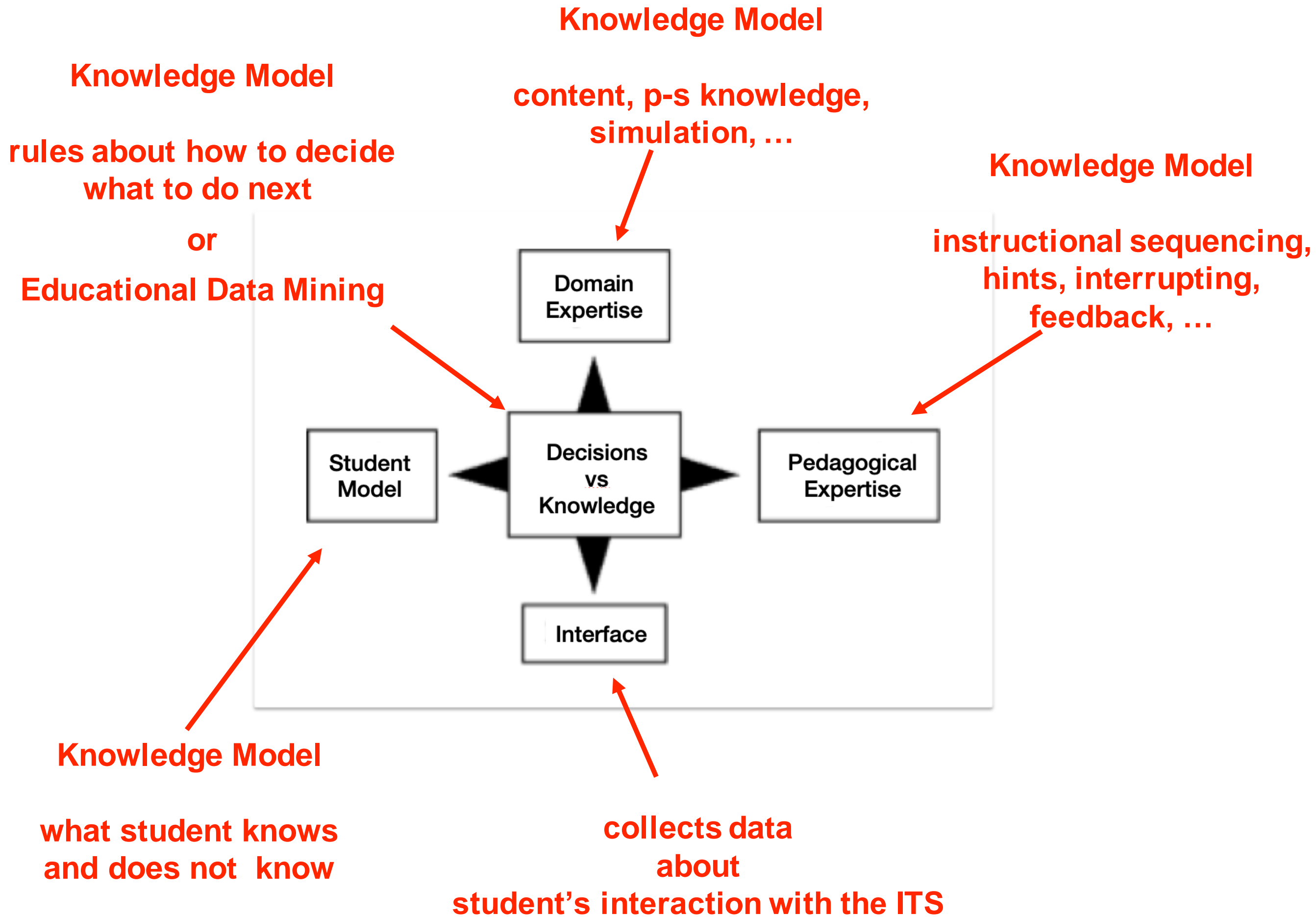
LANGUAGE

ARTIFICIAL INTELLIGENCE IN EDUCATION

INTELLIGENT TUTORING SYSTEMS



*individualise learning &
interact with the student based on a
deep understanding of the students behaviour*



track the “mental steps” of the learner during problem-solving

diagnose misconceptions

estimate the learner’s understanding of the domain

provide timely guidance, feedback, and explanations

***promote productive learning behaviours
(self-regulation, self-monitoring, and self-explanation)***

***prescribe learning activities at the level of difficulty
& with the content most appropriate for the learner***

GOAL

Determine how the mass of the sled impacts the force of the sled on the spring.

MY HYPOTHESIS

If I increase the gravity of the planetary body, then the gravity of the planetary body will decrease.

height of the tower

2m	2.5m	3m	3.5m
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mass of the sled

1kg	5kg	10kg	20kg
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roughness of the ramp

0	.5	2	.25
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gravity of the planetary body

Moon	Mars	Earth	Venus
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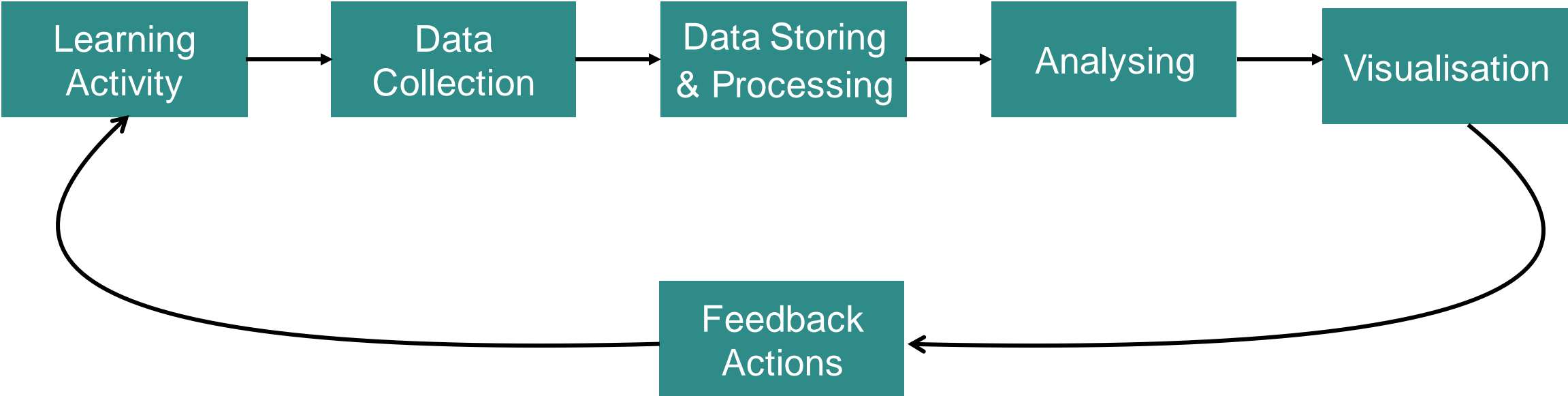


Run Trial

LEARNING ANALYTICS

“**LEARNING ANALYTICS** is 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”

1st International Conference on Learning Analytics & Knowledge, 2011



EDUCATIONAL DATA

- ▶ **input data** (student characteristics, demographic data, etc)
- ▶ **process data** (generated during teaching, learning, assessment such as click data streams, sensor, eye tracking, etc)
- ▶ **content data** (curriculum, learning outcomes, resources, etc)
- ▶ **outcome data** (achievement data from tests, assessments, etc)

USES

Patterns

- Insight into trends
- Informed feedback
- Learning trajectories

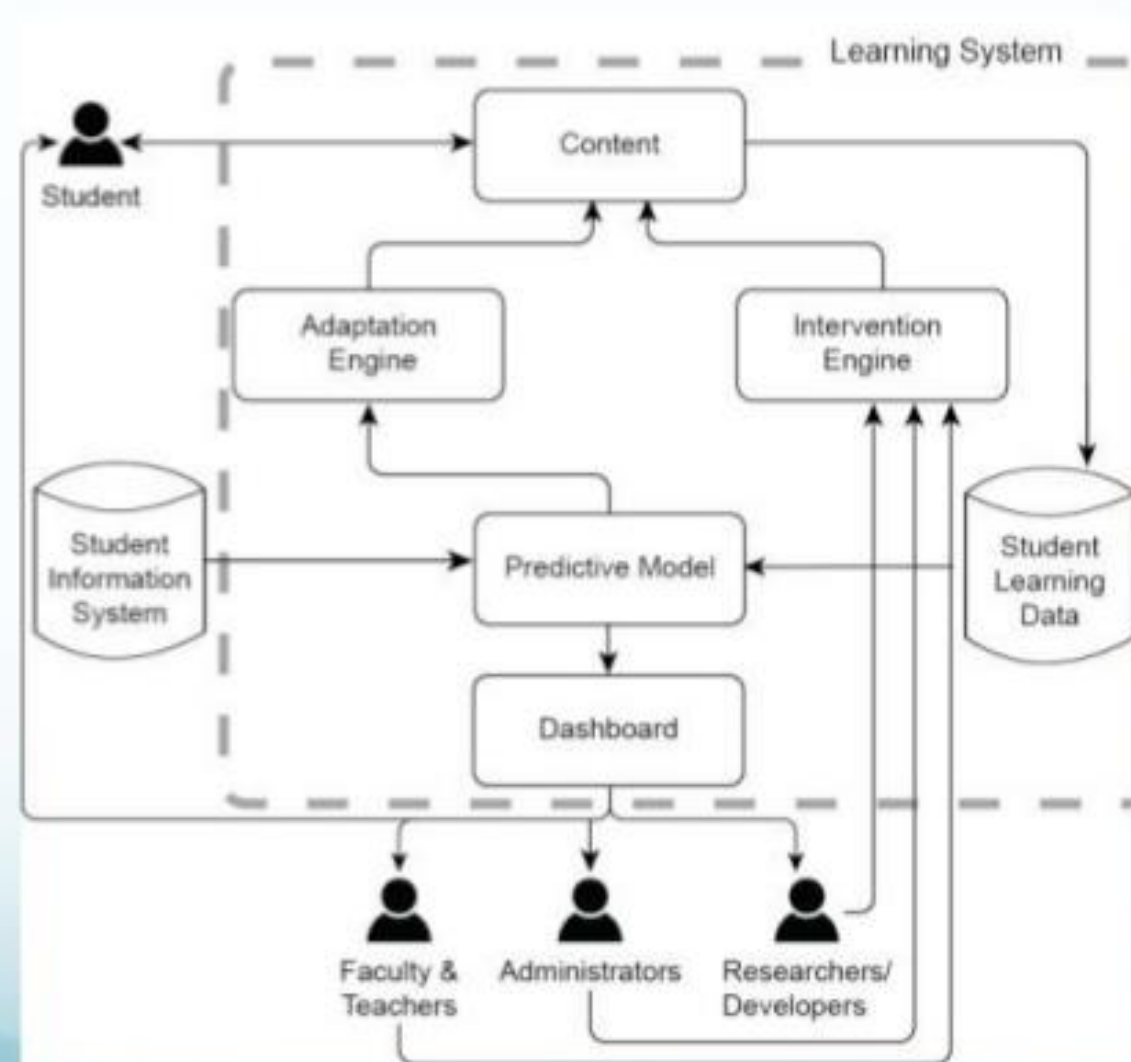
Prediction

- Predict trends
- Early intervention

Recommendations

- Learning and teaching actions
- Pedagogical resources and activities

EDM/LA Enables Adaptive Learning Systems

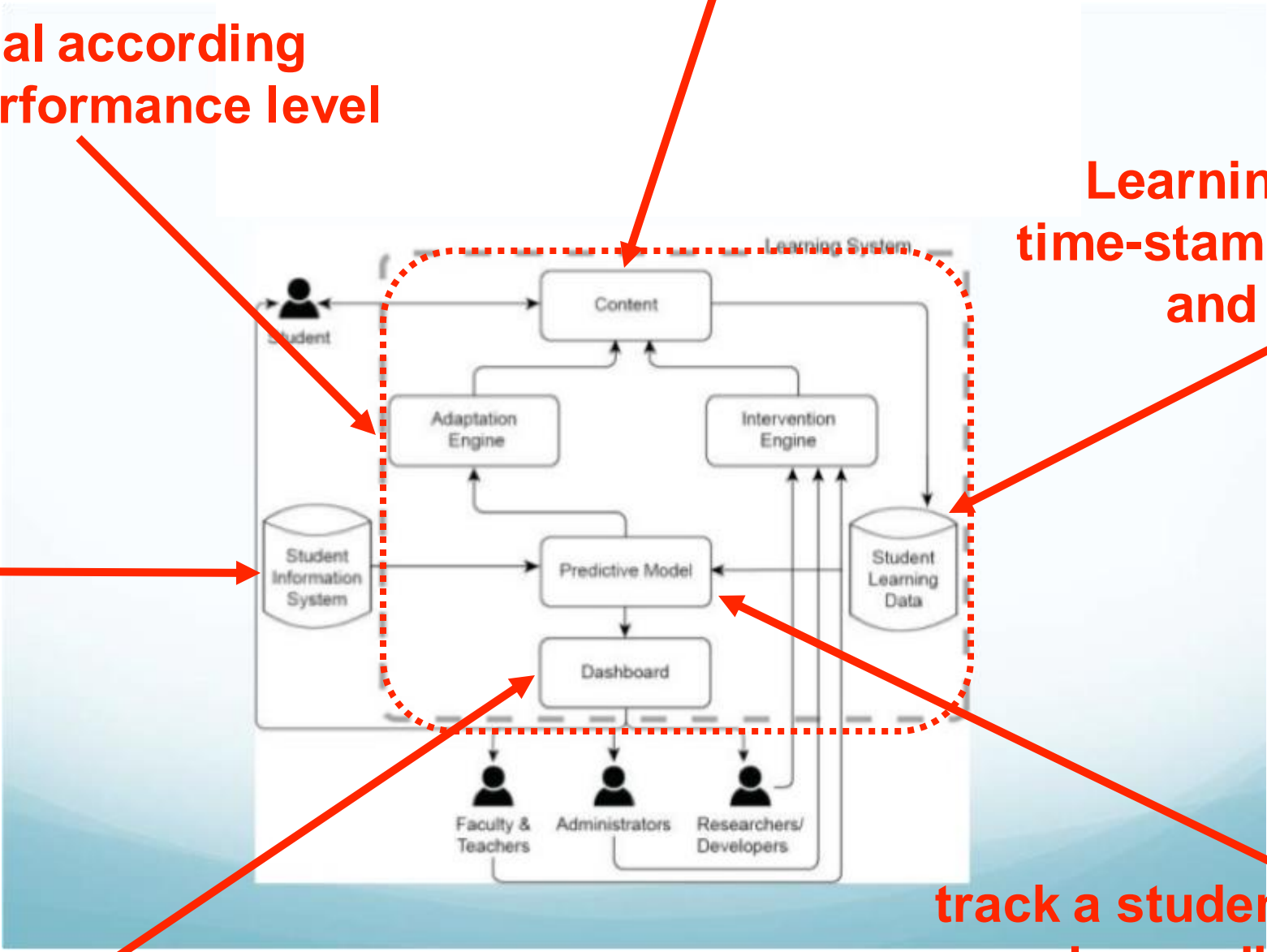


**content management, maintenance,
and delivery**

**deliver material according
to a student's performance level**

**Learning Record Store
time-stamped student input
and behaviours**

**demographic
data**



**track a student's progress &
make predictions about
future behaviours or performance
(data mining & analytics)**

**visible feedback
for various users
(reporting service using
output of predictive model)**

ALMat - STUDYING ADAPTIVE LEARNING IN SCHOOLS

GYLDENDAL'S MULTI-SMART ØVING



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ARTIFICIAL INTELLIGENCE & LEARNING ANALYTICS

AI: STUDENT MODEL
(KNOWLEDGE MODEL)

VS

LA: PREDICTIVE MODEL BASED ON
BEHAVIOURS
(STATISTICAL MODEL)

CHALLENGES & KNOWLEDGE NEEDS

DATA: ACCESS, PRIVACY

DATA: CONTEXT, EXPLANATION,
REDUCTION

SCALEABILITY : INTEROPERABILITY,
ALGORITHMIC TRANSFER

ETHICS



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