SLAM MICHIGAN

STUDENT LEARNING AND ANALYTICS AT MICHIGAN

March 15, 2013:

OMG! The Future of Teaching

Vince Kellen, Senior Vice Provost for
Academic Planning, Analytics and Technologies
University of Kentucky, Lexington, KY

THIS WORK IS LICENSED UNDER A
CREATIVE COMMONS ATTRIBUTION-NONCOMMERCIAL-SHAREALIKE 3.0 UNITED STATES LICENSE.
Copyright © 2013, the Regents of the University of Michigan

STUDENT LEARNING AND ANALYTICS AT MICHIGAN

www.crlt.umich.edu/slam

OMG! The Future of Teaching

MOOCs, eLearning, Disruption and Higher Education

Vince Kellen, Ph.D.
Senior Vice Provost
Academic Planning, Analytics and Technologies
University of Kentucky

Vince.Kellen@uky.edu

March, 2013

This is a living document subject to substantial revision.

Unbundling

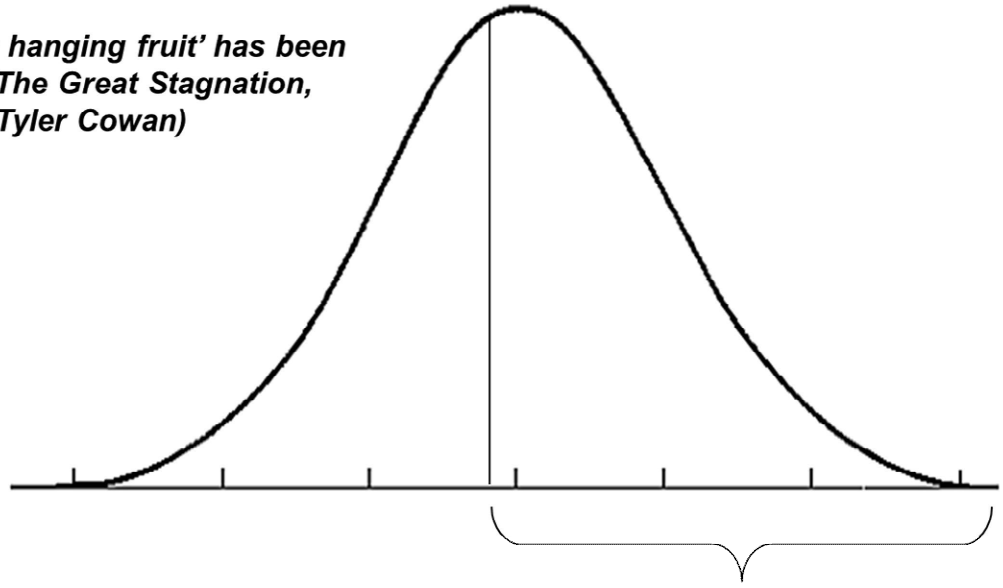
- Whether to bundle or unbundle is a recurring problem in many industries. Bundling ensures lock-in (e.g., Apple). Unbundling supports scale (e.g., Google)

- What can be bundled together or sold separately?
  - 'Destination resort' services, physical facilities, course content, course delivery, athletics, degree/certification, accreditation, community management (alumni development, etc.), government aid (financial aid, state support)
  - Institutions have been providing different combinations of bundling/unbundling resulting in the mix of providers today
  - The critical bundle: government aid, degree/certification, accreditation
  - The critical unbundling questions:
    - What happens if aid can be given for non-degreed or non-accredited education of any kind?

Higher education has a ‘last mile’ problem

- Education in any form is struggling to address families and communities with economic and other readiness problems
- Free or low-cost educational content does not easily solve readiness problems which have a multitude of factors
- For profit models rightfully struggle with ‘last-mile’ problems. Public policy matters!

All the ‘low hanging fruit’ has been picked. (The Great Stagnation, Tyler Cowan)



In 1900, 0.25% went to college (1 in 400).
In 2009, 40% of 18-24 year-olds were enrolled in college,
70% of all high school graduates were enrolled in college
(Tyler Cowan & NY Times)

Those that have the social, economic, cognitive capabilities are in the higher education system

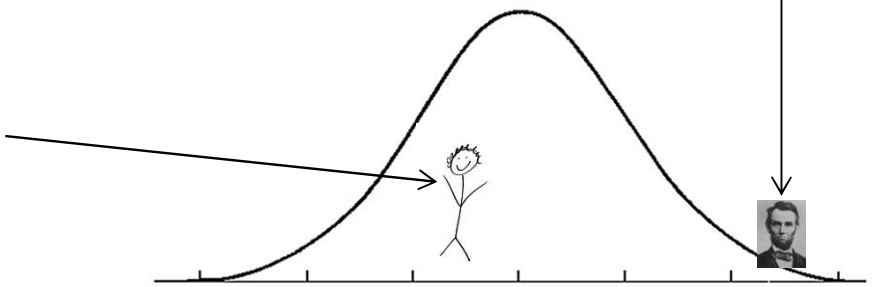
What would Abraham Lincoln think of a MOOC?

Abraham Lincoln

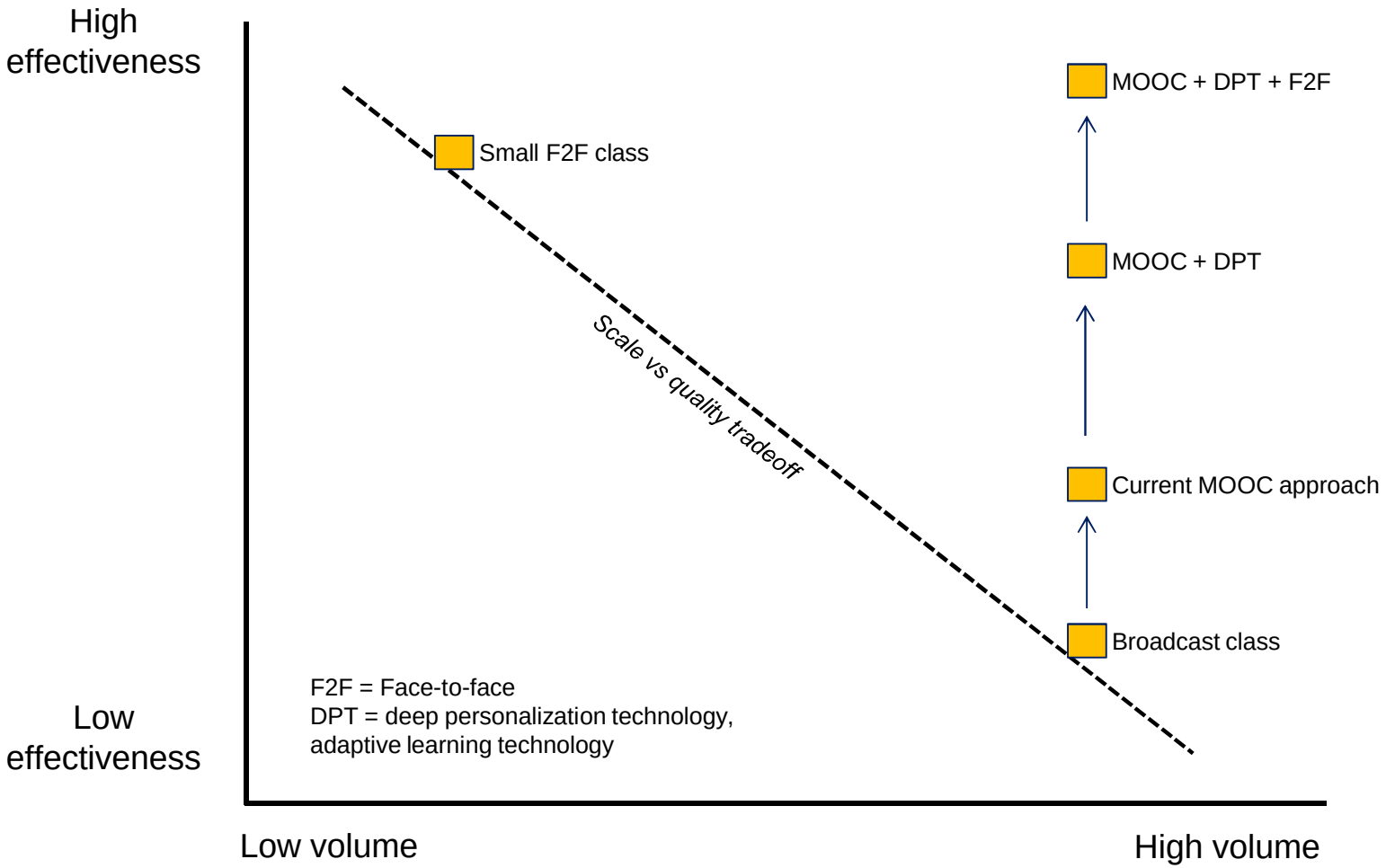
- Autodidactic
- Books, books, books
- Became a skilled military strategist
- Penchant for poetry, Shakespeare, politics and history

My nephew

- Not an autodidact
- Good worker, smart kid, but…
- It takes a village
- After a few low-security colleges and much money borrowed
- He has found an intellectual home

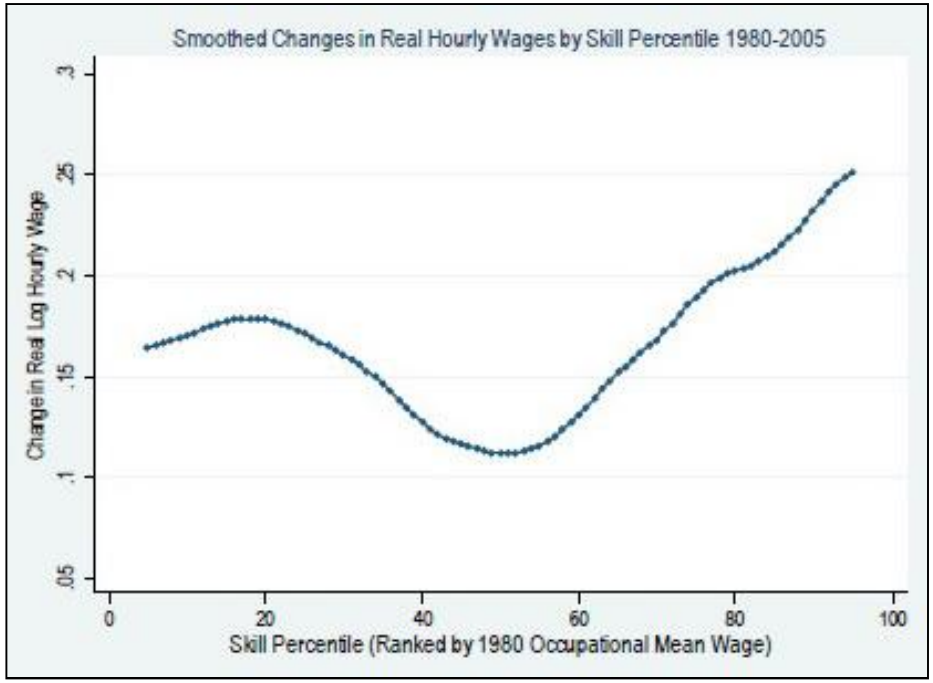


How technology can affect cost and quality

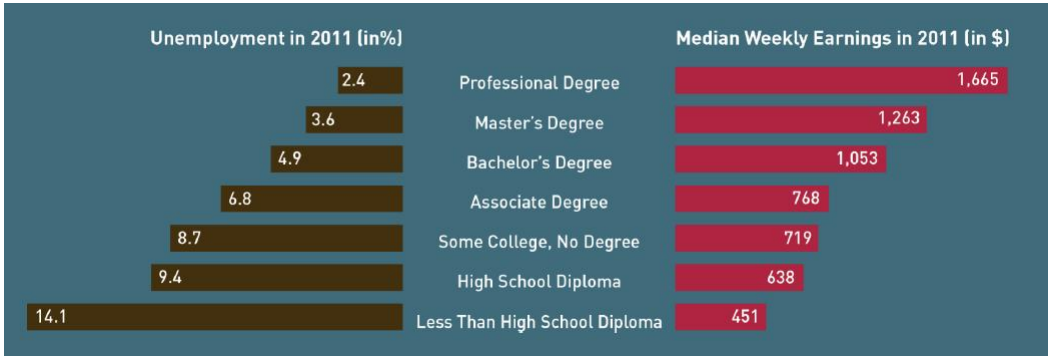


Future job demands

- Middle skill jobs have received little wage growth and job growth since 1980
- High skilled jobs, especially those with advanced degrees, have experienced the best wage and job growth
- The work force middle is getting ‘hollowed out’
- The recession may have accelerated the trend
- The demand for masters level and above education is likely to increase. e-Learning is likely to play a role in filling these gaps



The Growth of Low Skill Service Jobs and the Polarization of the U.S. Labor Market. David Autor and David Dorn. NBER Working Paper 15150. http://www.nber.org/papers/w15150



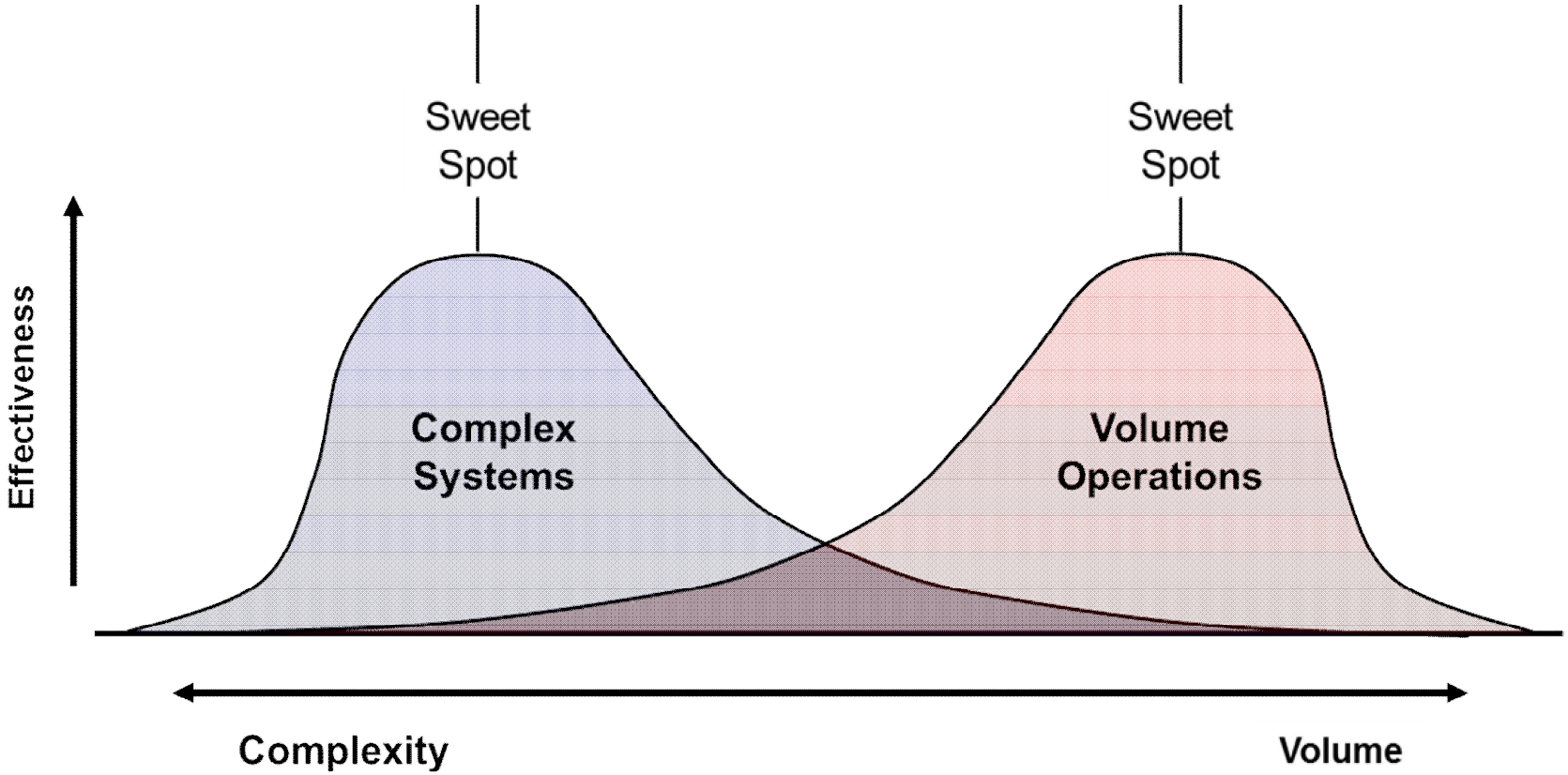
Bill and Melinda Gates Foundation: Is College Worth It?
http://www.scribd.com/doc/113360662/Is-College-Worth-It

The hidden gem: deep personalization technology

- In all this noise, I am seeing a significant trend towards adaptive learning technology with different approaches taken by emerging vendors (e.g., Knewton, LoudCloud)
- Other personalization techniques (e.g., text mining, neural networks) that incorporate other forms of student data (e.g., cognitive, non-cognitive, personality tests) can be brought to bear in this problem of matching educational content and interactions to learners
- The industry is moving to development of technology that relies of more data about the learner that delivers deeply personalized experiences that know how to alter text, images, pace and content to my abilities.
- This kind of technology could have a profound impact on what goes in and outside of a classroom

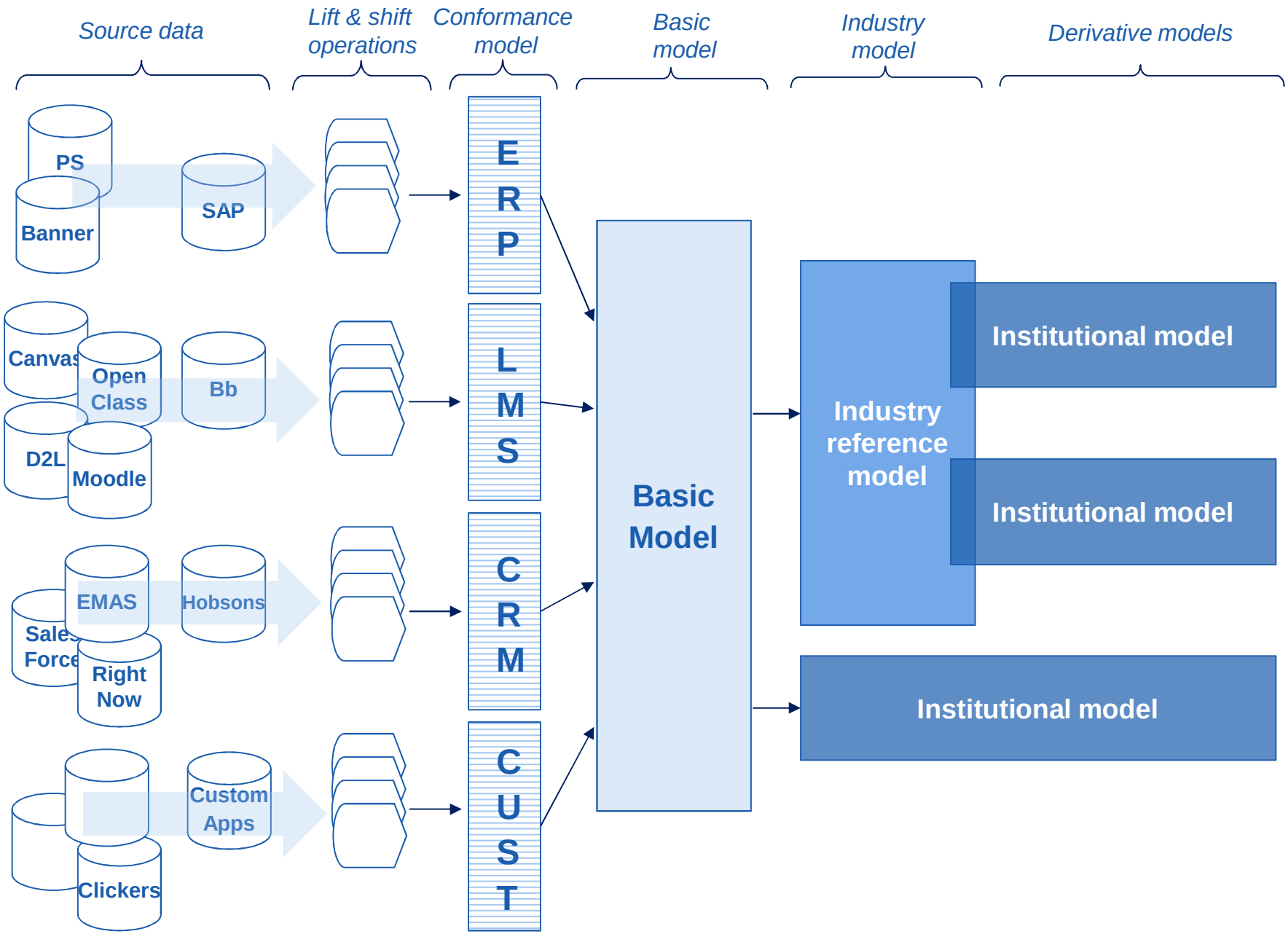
Volume operations versus complex systems

- Excluding the late 20th century, universities have been largely complex systems, delivering niche and customizable interactions F2F settings. Large lectures were added to increase output while reducing costs
- Deep personalization technology and e-Learning approaches can begin to handle both high-volume and specialty classes

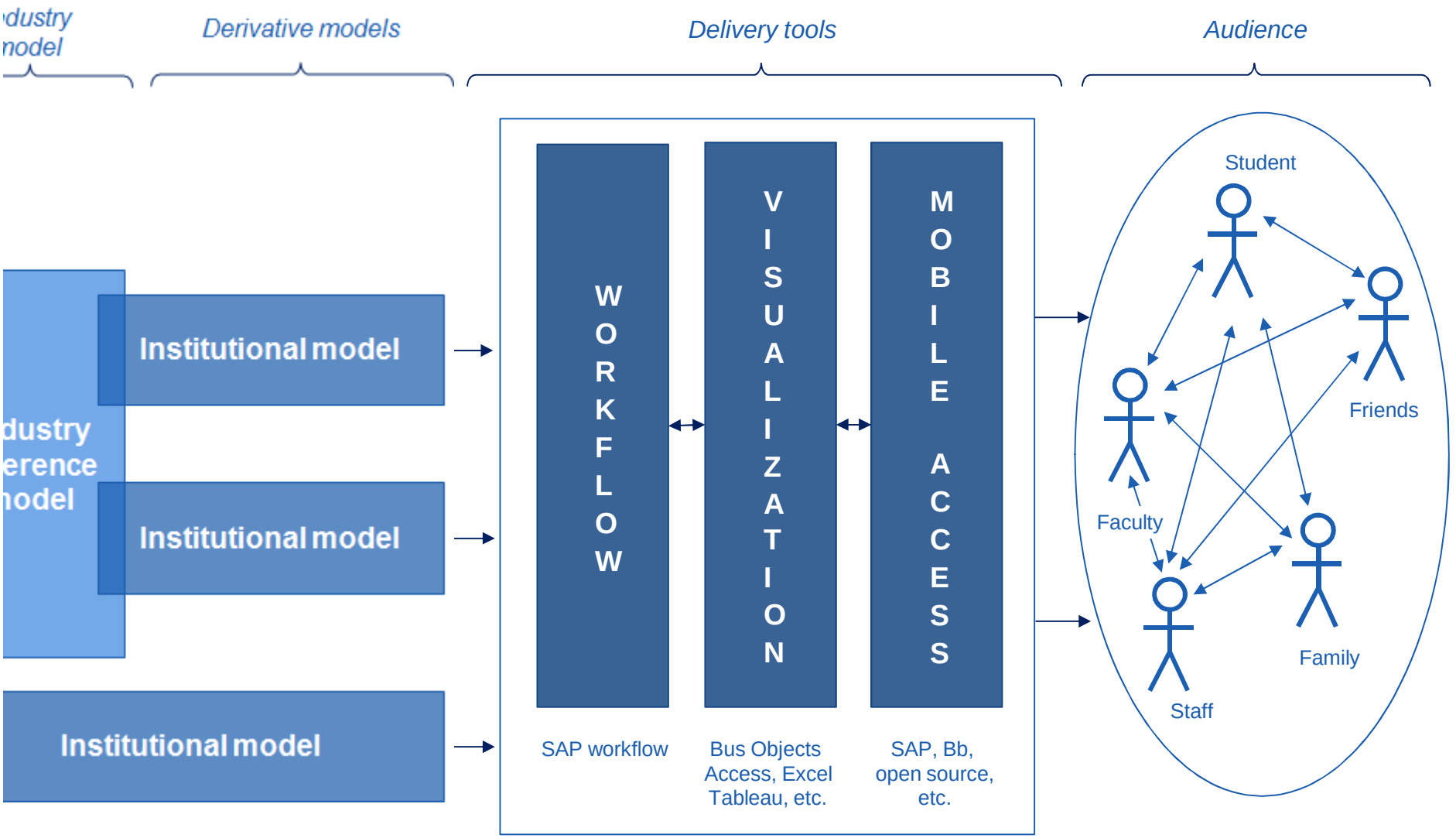


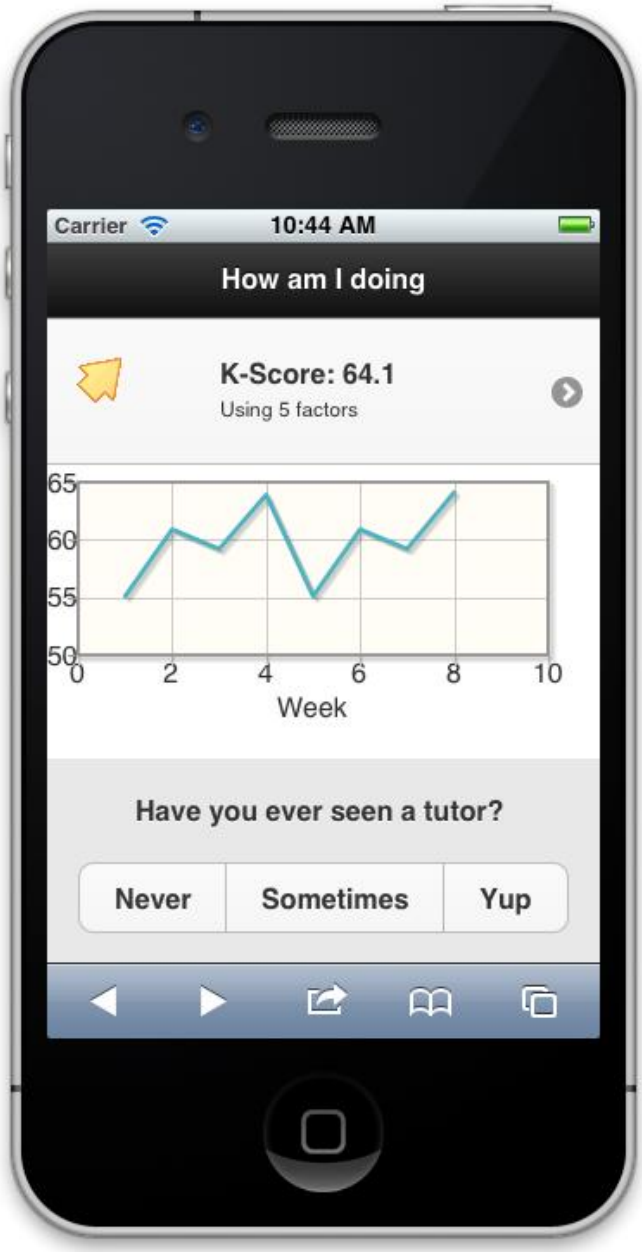
Geoffrey Moore (2005). Dealing With Darwin

Architectural model



Architectural model





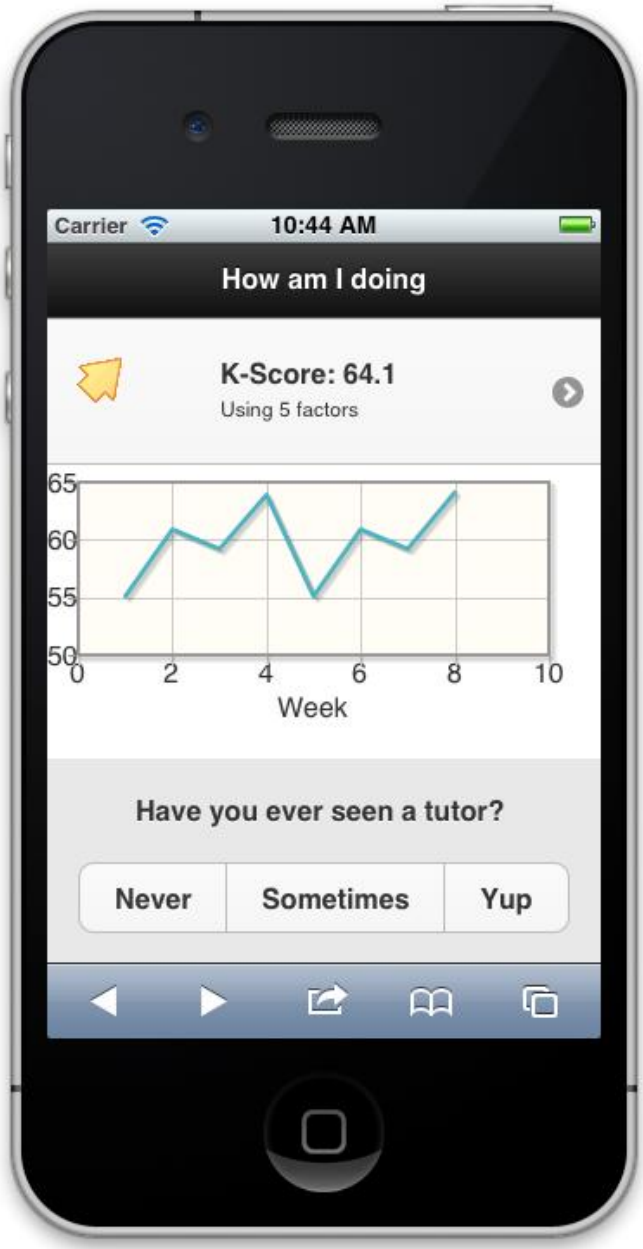
A K-Score is a prediction of success.

It's used to give students an understanding of how well they are doing over time.

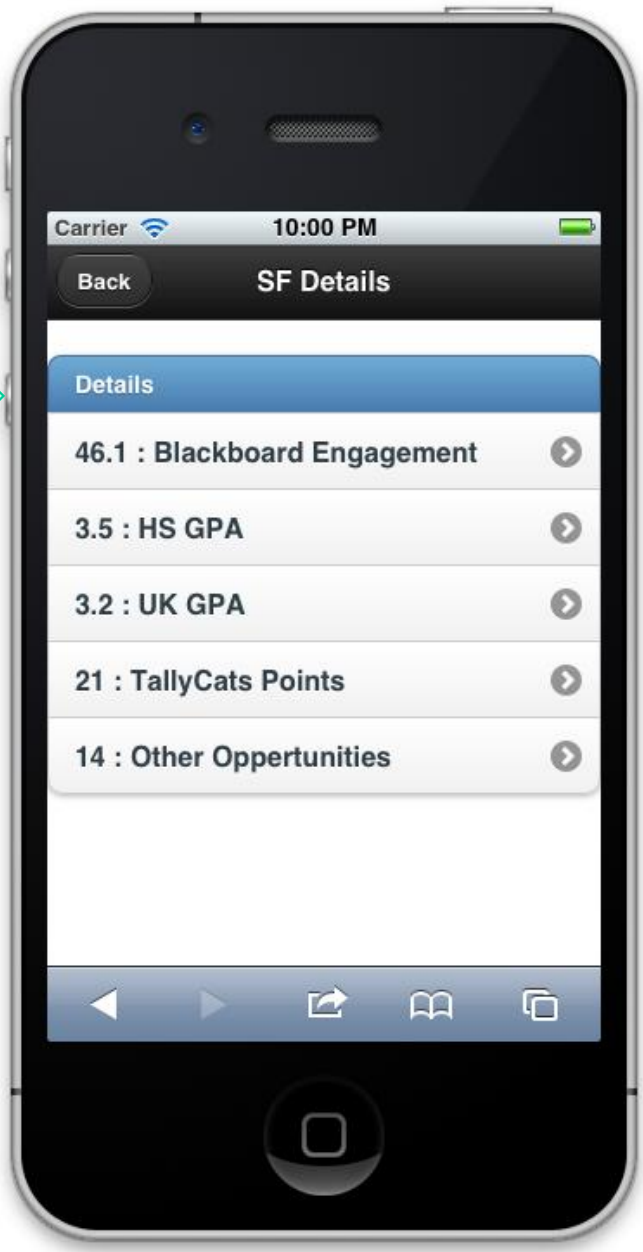
We use factors such as their academic work, how engaged they are in Blackboard and engagement in campus activities to generate a K-Score.

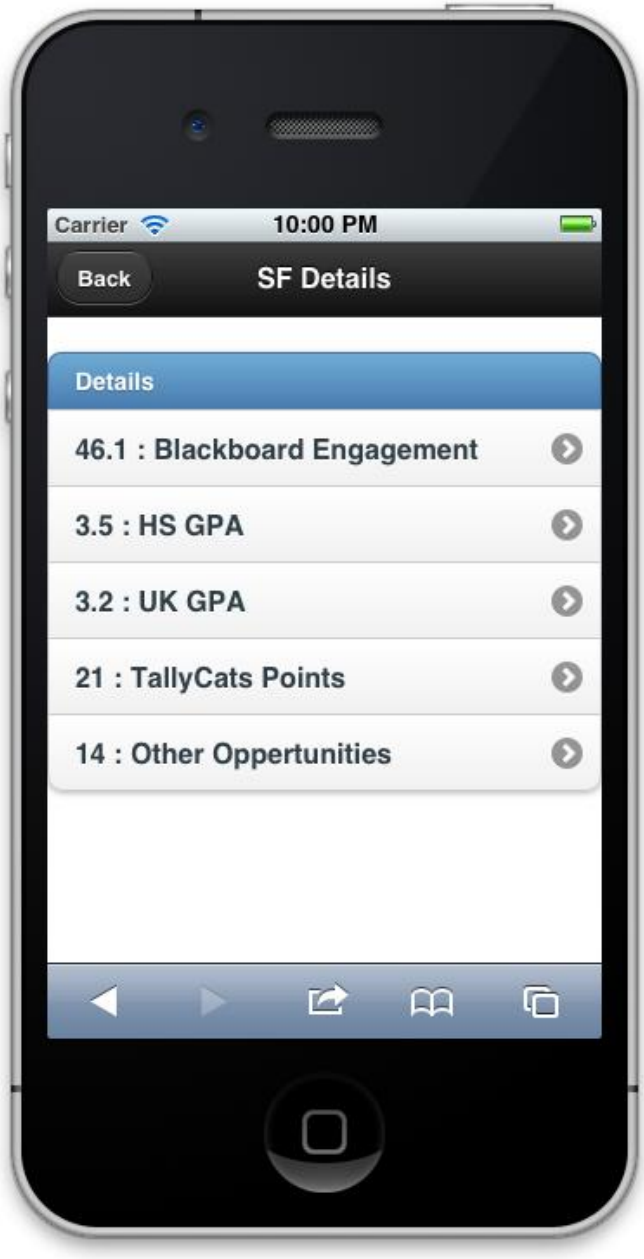
Over time, we'll add more factors to improve the accuracy of this score.

We also rely on traditional, non-evasive survey techniques to help round out the student performance statistic.

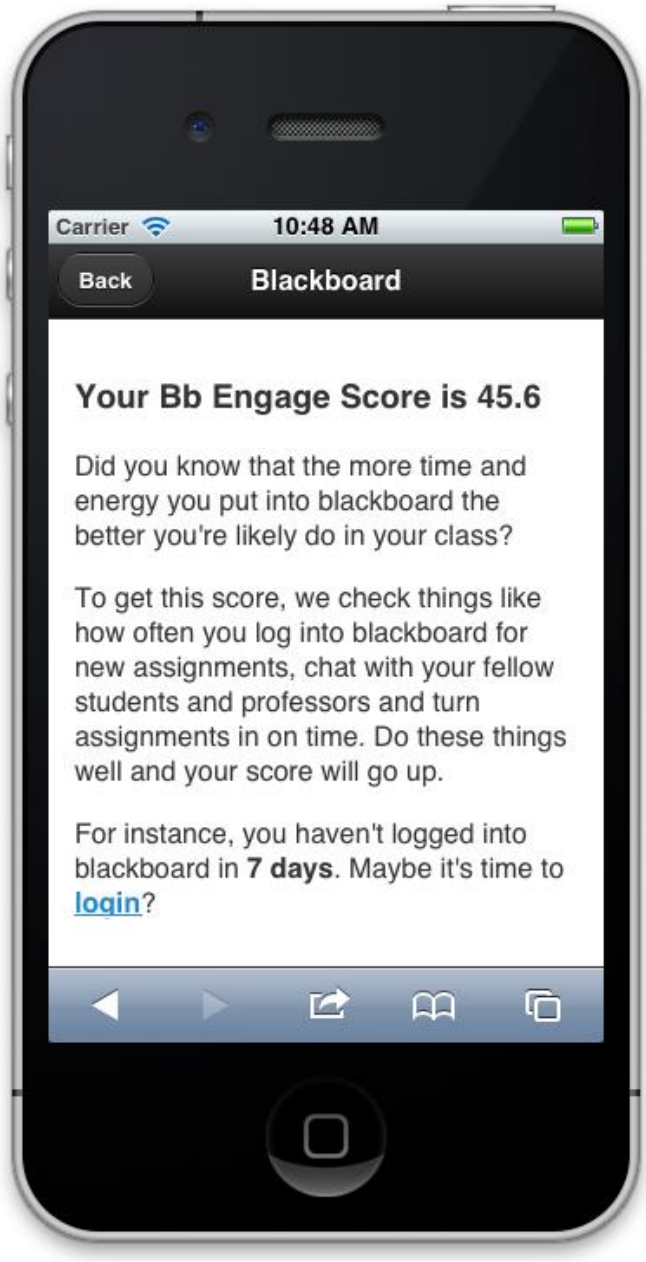


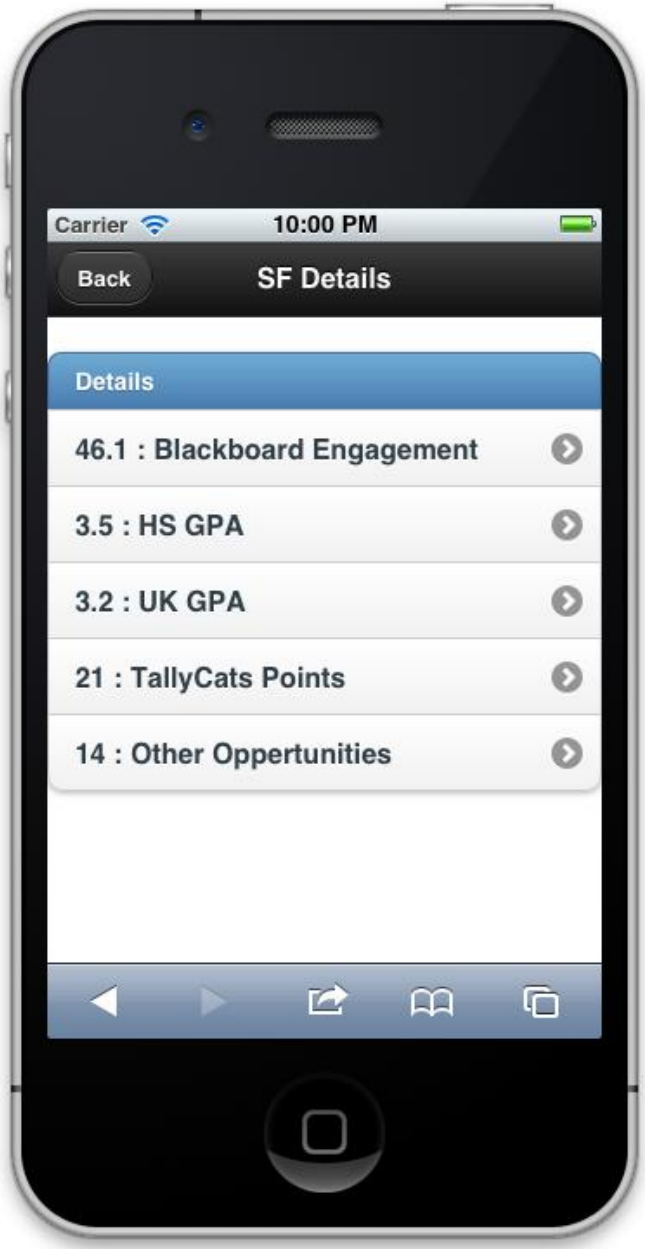
To understand what is used to generate my K-Score



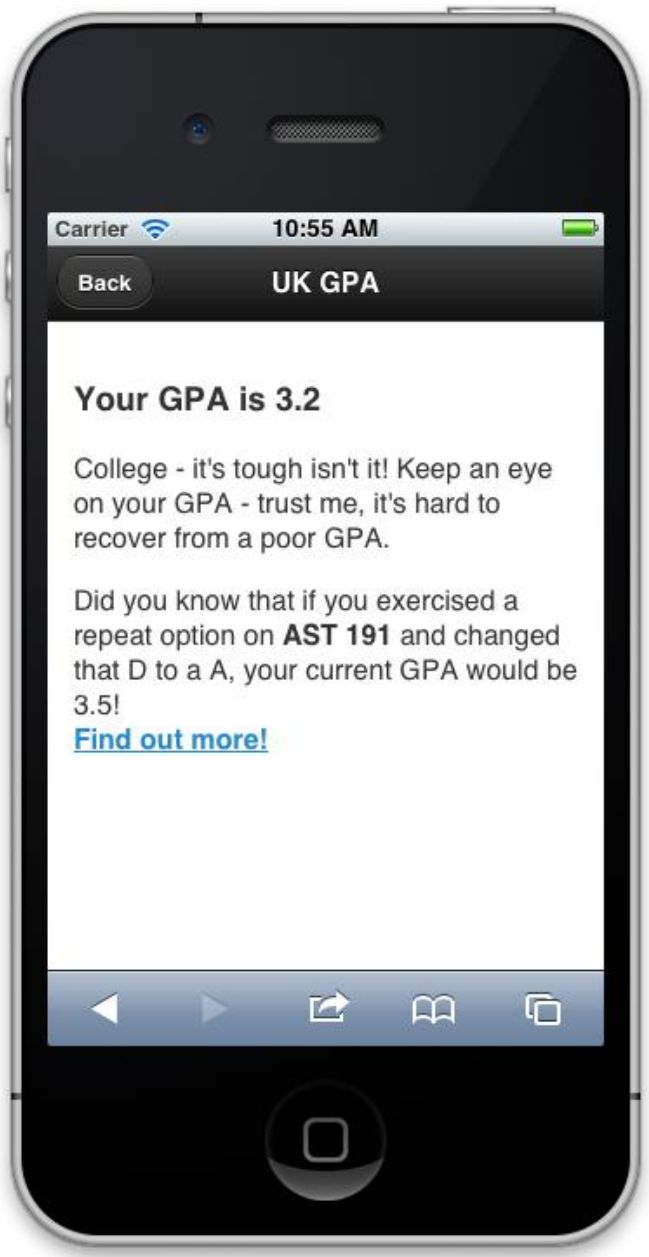


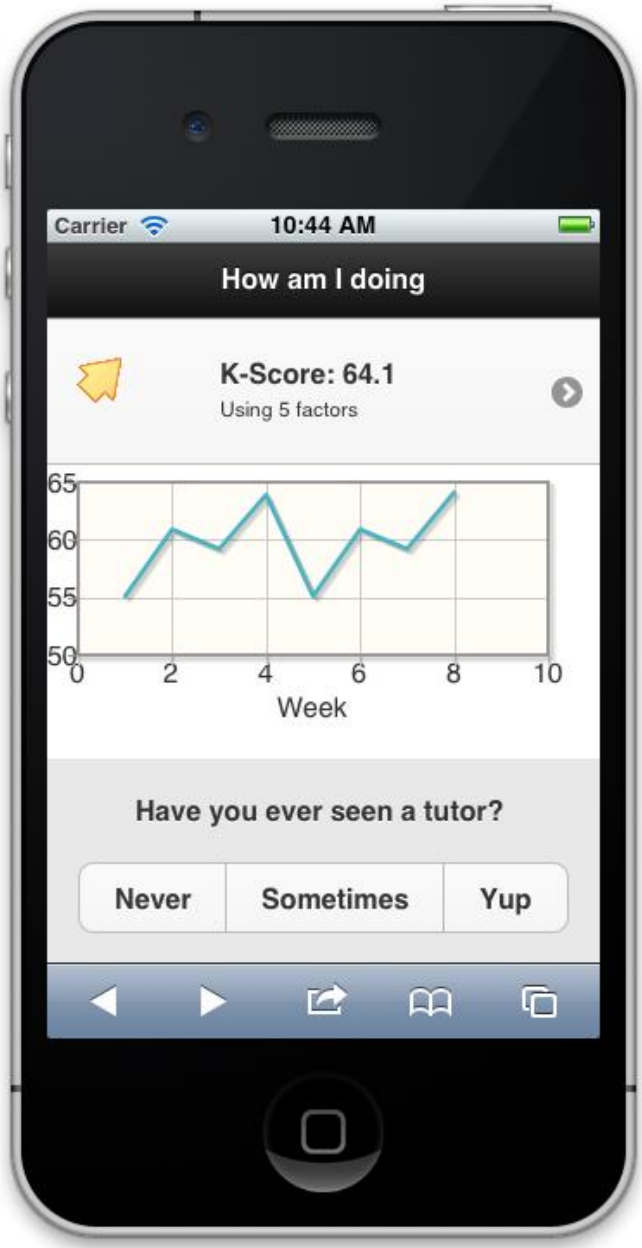
How to improve the Blackboard portion of your K-Score



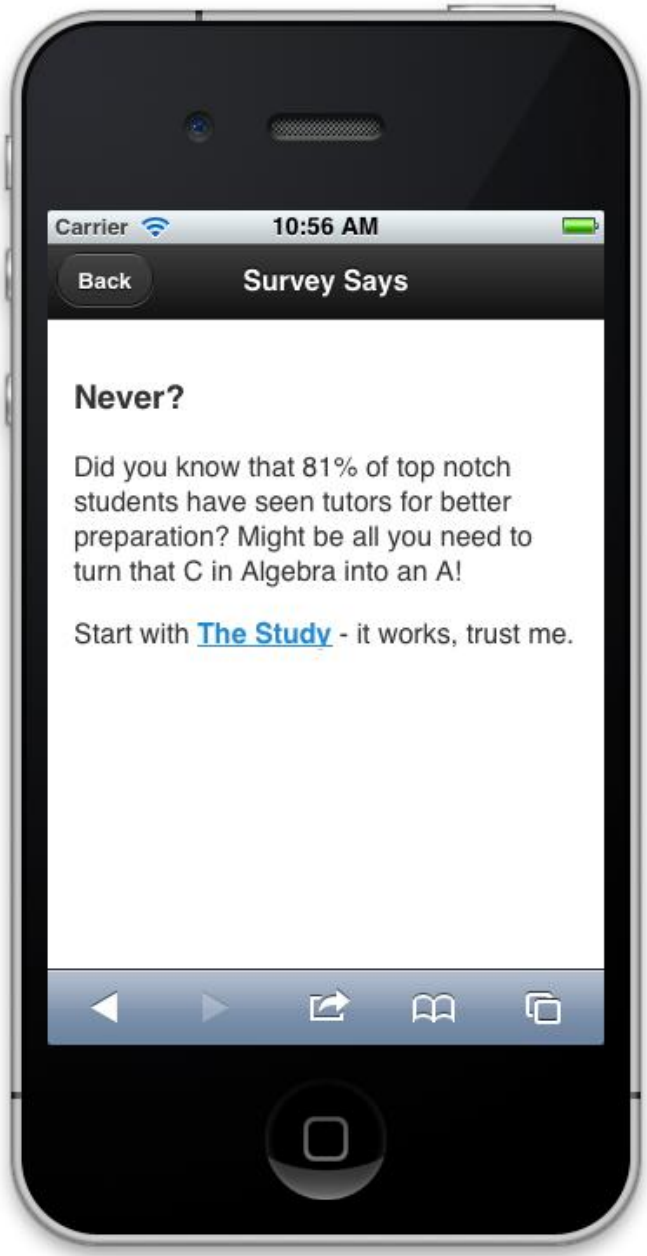


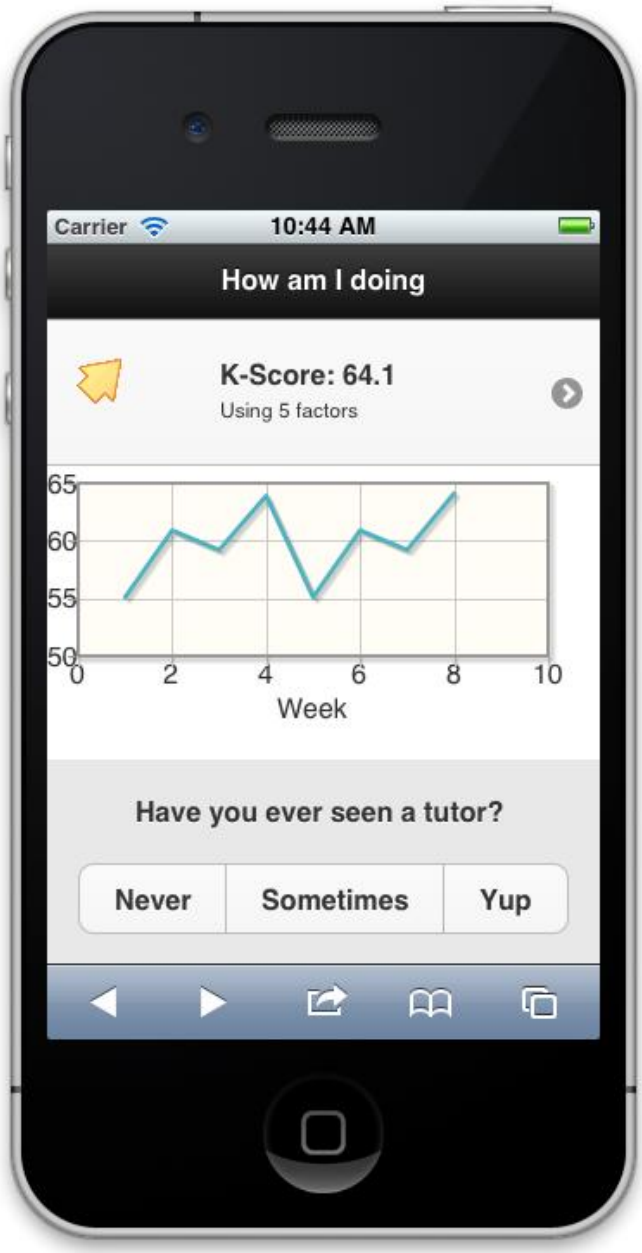
How to improve the GPA portion of my K-Score





Even the survey responses lead to overall improvement advice.





Future versions of the student self service apps will include:

- Reminder Services
- Planning & Recommendation Services
- Advisor Communication and Appointments
- Continual, quarterly improvements
- *And more! Stay tuned!*

Taxonomy? Automatic metadata? Automatic atomic metadata?

- Let learners navigate an audio/visual stream
- Let the system learn what are top terms. Let the system map terms to concepts. Let instructional designers lightly ‘bump’ the taxonomy, post production
- Record student engagement with specific terms / concepts
- Deliver personalized messages to students

iPad
7:11 PM
Rate slide
Slides
Slide Notes
UNIVERSITY OF KENTUCKY
seeblue.
Architectural model
Source data
Lift & shift operations
Conformance model
Basic model
Industry model
Derivative models
PS
Banner
SAP
ERP
Canvas
Open Class
Bb
D2L
Moodle
LMS
EMAS
Hobsons
Sale Force
Right Now
CRM
Custom Apps
Clickers
CUST
Basic Model
Industry reference model
Institutional model
Institutional model
Institutional model
9
What is with all the data sources?
What are the protocols used in lift operations?
An industry reference model is shared across many organizations
This model represents codified knowledge within the I-Space framework. It can be more easily spread or diffused
Share note
I-Space
(2:26) Boisot's I-Space framework…
(9:01) high codification in the I-Space
(12:08) the I-Space concept starts…
(12:20) movement within the I-Space…
(13:05) I-Space codification and abstract
(15:49) the test for the I-Space diffusion
(20:10) corporate culture and I-Space…
(22:13) diffusion within the I-Space net…
(23:27) models depend on I-Space for…
(32:58) diffusion and the I-Space is…
Slides
Audio
Trending
Concept Map
COM 591
Strategy
RBV & DVA
5 Forces
Incrementalism
Information
Emergence
I-Space framework
Knowledge management
Technology
TOGAF framework
Service management
Disruptive technology
Search for concept
Test your knowledge
Rate concept
Recommendations
Help: It looks like you are having difficulty with the concept 'I-Space'. For more information on I-Space click here.
We have tutors who can help you with I-Space. To talk to or text with a 7x24 tutor, click here.
Your stats are:
Engagement:
Mastery:
Lecture K-Score: 65 out of 100

I-Space

(2:26) Boisot's I-Space framework...
(9:01) high codification in the I-Space
(12:08) the I-Space concept starts...
(12:20) movement within the I-Space...
(13:05) I-Space codification and abstract
(15:49) the test for the I-Space diffusion
(20:10) corporate culture and I-Space...
(22:13) diffusion within the I-Space net...
(23:27) models depend on I-Space for...
(32:58) diffusion and the I-Space is...

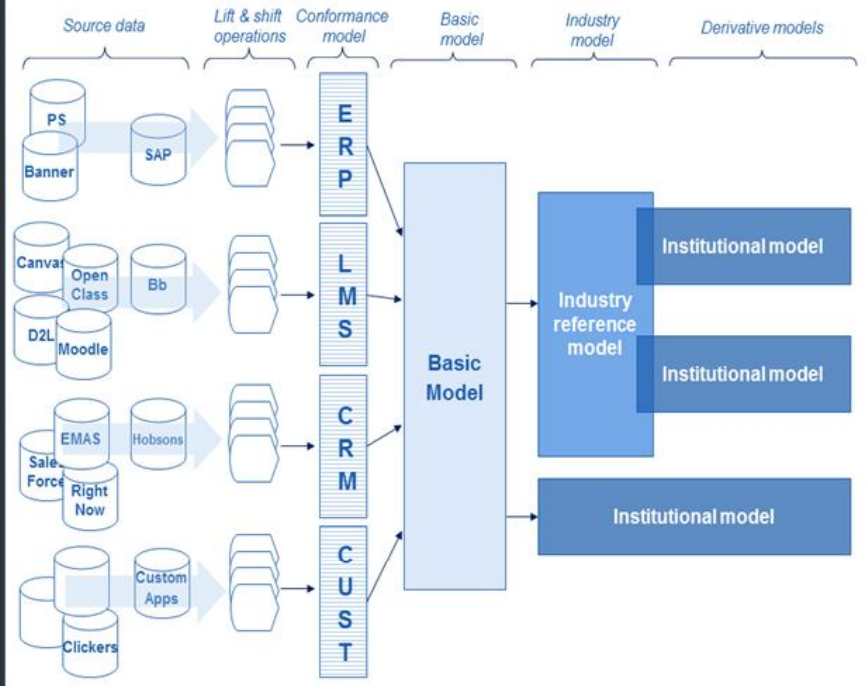
Slides | Audio | Trending

Rate slide

Slides

UNIVERSITY OF KENTUCKY seeblue.

Architectural model



9

Slide Notes

What is with all the data sources?

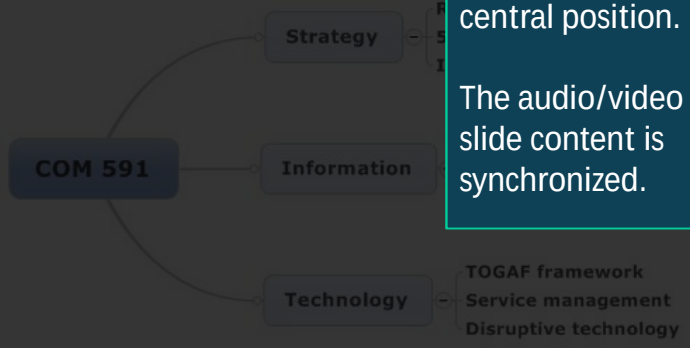
What are the protocols used in lift operations?

An industry reference model is shared across many organizations

This model represents codified knowledge within the I-Space framework. It can be more easily spread or diffused

Share note

Concept Map



Search for concept | Test your knowledge | Rate concept

Class slides take a central position.

The audio/video and slide content is synchronized.

Recommendations

Help: It looks like you are having difficulty with the concept 'I-Space'. For more information on I-Space click here.

We have tutors who can help you with I-Space. To talk to or text with a 7x24 tutor, click here.

Your stats are:

Engagement: ★★★☆☆

Mastery: ★★★☆☆

Lecture K-Score: 65 out of 100

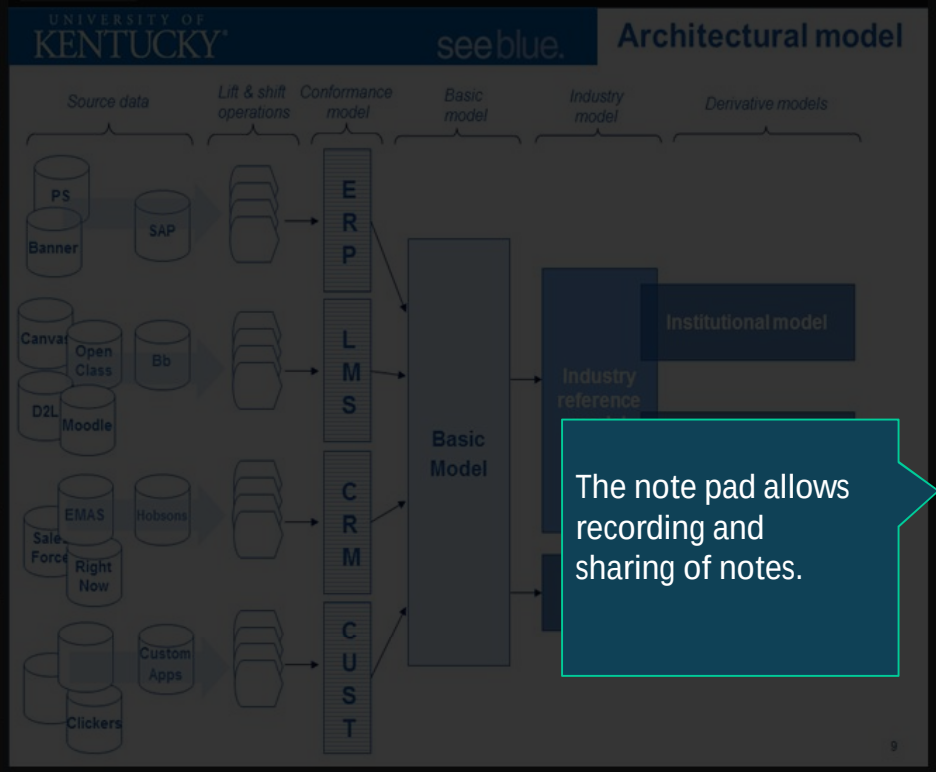
I-Space

(2:26) Boisot's I-Space framework...
(9:01) high codification in the I-Space
(12:08) the I-Space concept starts...
(12:20) movement within the I-Space...
(13:05) I-Space codification and abstract
(15:49) the test for the I-Space diffusion
(20:10) corporate culture and I-Space...
(22:13) diffusion within the I-Space net...
(23:27) models depend on I-Space for...
(32:58) diffusion and the I-Space is...

Slides | Audio | Trending

Rate slide

Slides



Slide Notes

What is with all the data sources?

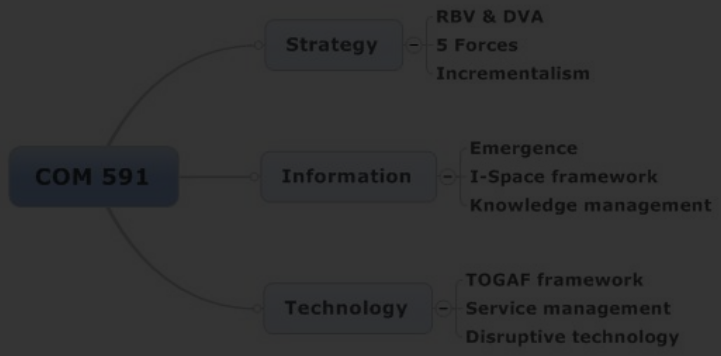
What are the protocols used in lift operations?

An industry reference model is shared across many organizations

This model represents codified knowledge within the I-Space framework. It can be more easily spread or diffused

Share note

Concept Map



Search for concept | Test your knowledge | Rate concept

Recommendations

Help: It looks like you are having difficulty with the concept 'I-Space'. For more information on I-Space click here.

We have tutors who can help you with I-Space. To talk to or text with a 7x24 tutor, click here.

Your stats are:

Engagement: ★★★☆☆

Mastery: ★★★☆☆

Lecture K-Score: 65 out of 100

iPad 7:11 PM

I-Space

(2:26) Boisot's I-Space framework...
(9:01) high codification in the I-Space
(12:08) the I-Space concept starts...
(12:20) movement within the I-Space...
(13:05) I-Space codification and abstract
(15:49) the test for the I-Space diffusion
(20:10) corporate culture and I-Space...
(22:13) diffusion within the I-Space net...
(23:27) models depend on I-Space for...
(32:58) diffusion and the I-Space is...

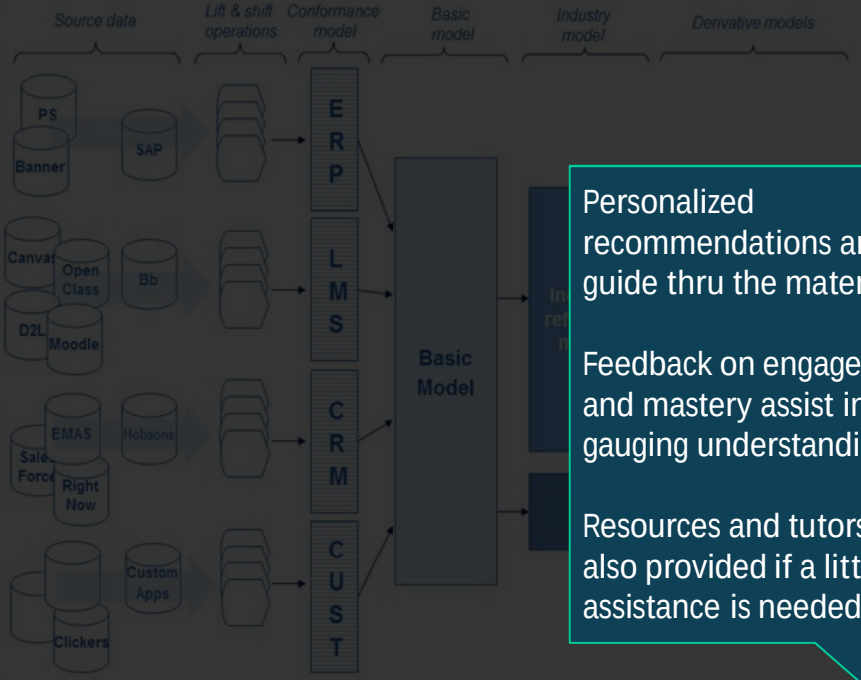
Slides | Audio | Trending

Rate slide

Slides

UNIVERSITY OF KENTUCKY seeblue.

Architectural model



Personalized recommendations are a guide thru the material.

Feedback on engagement and mastery assist in gauging understanding.

Resources and tutors are also provided if a little assistance is needed.

Slide Notes

What is with all the data sources?

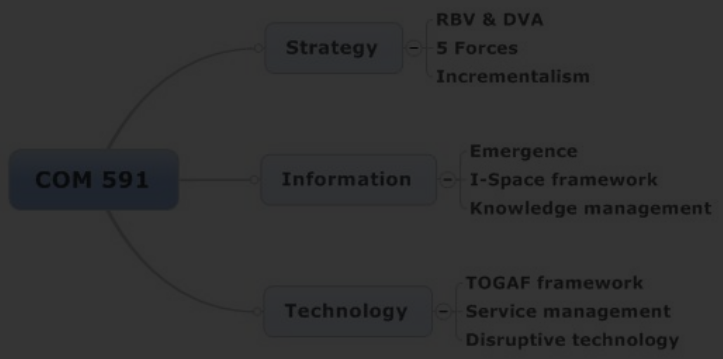
What are the protocols used in lift operations?

An industry reference model is shared across many ...izations

...model represents ...ed knowledge within ...Space framework. It ...e more easily spread ...fused

Share note

Concept Map



Search for concept | Test your knowledge | Rate concept

Recommendations

Help: It looks like you are having difficulty with the concept 'I-Space'. For more information on I-Space click here.

We have tutors who can help you with I-Space. To talk to or text with a 7x24 tutor, click here.

Your stats are:

Engagement: ★★★☆☆

Mastery: ★★★☆☆

Lecture K-Score: 65 out of 100

iPad 7:11 PM

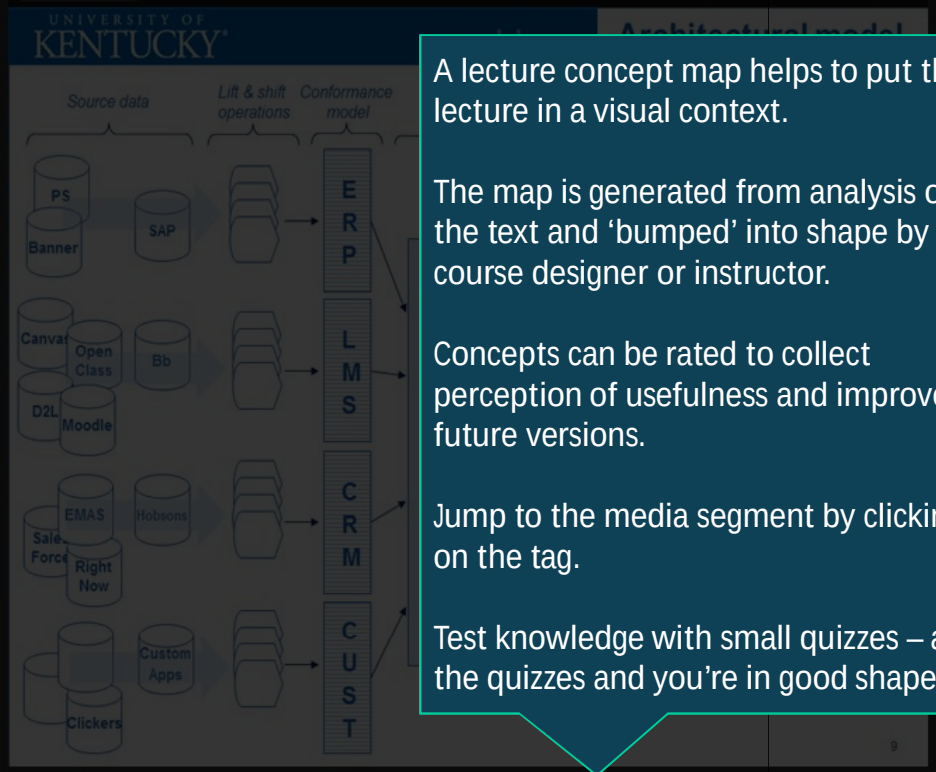
I-Space

(2:26) Boisot's I-Space framework...
(9:01) high codification in the I-Space
(12:08) the I-Space concept starts...
(12:20) movement within the I-Space...
(13:05) I-Space codification and abstract
(15:49) the test for the I-Space diffusion
(20:10) corporate culture and I-Space...
(22:13) diffusion within the I-Space net...
(23:27) models depend on I-Space for...
(32:58) diffusion and the I-Space is...

Slides | Audio | Trending

Rate slide

Slides



A lecture concept map helps to put the lecture in a visual context.

The map is generated from analysis of the text and 'bumped' into shape by a course designer or instructor.

Concepts can be rated to collect perception of usefulness and improve future versions.

Jump to the media segment by clicking on the tag.

Test knowledge with small quizzes – ace the quizzes and you're in good shape!

Slide Notes

...s with all the data ...s?

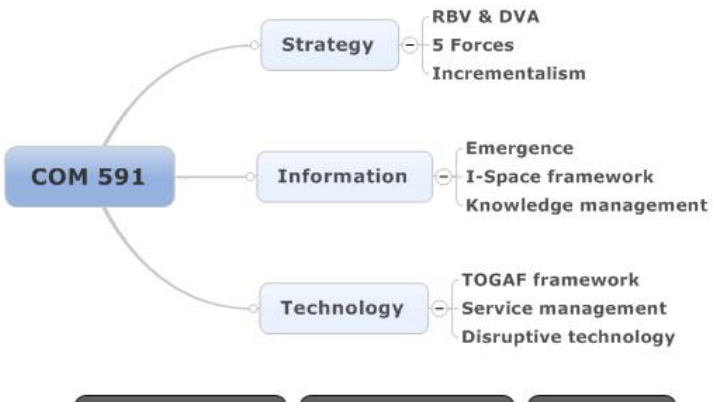
...are the protocols used ...perations?

...ustry reference model ...ed across many ...zations

...odel represents ...d knowledge within ...pace framework. It ...e more easily spread ...sed

Share note

Concept Map



Search for concept | Test your knowledge | Rate concept

Recommendations

Help: It looks like you are having difficulty with the concept 'I-Space'. For more information on I-Space click here.

We have tutors who can help you with I-Space. To talk to or text with a 7x24 tutor, click here.

Your stats are:

Engagement: ☆☆☆☆☆

Mastery: ☆☆☆☆☆

Lecture K-Score: 65 out of 100

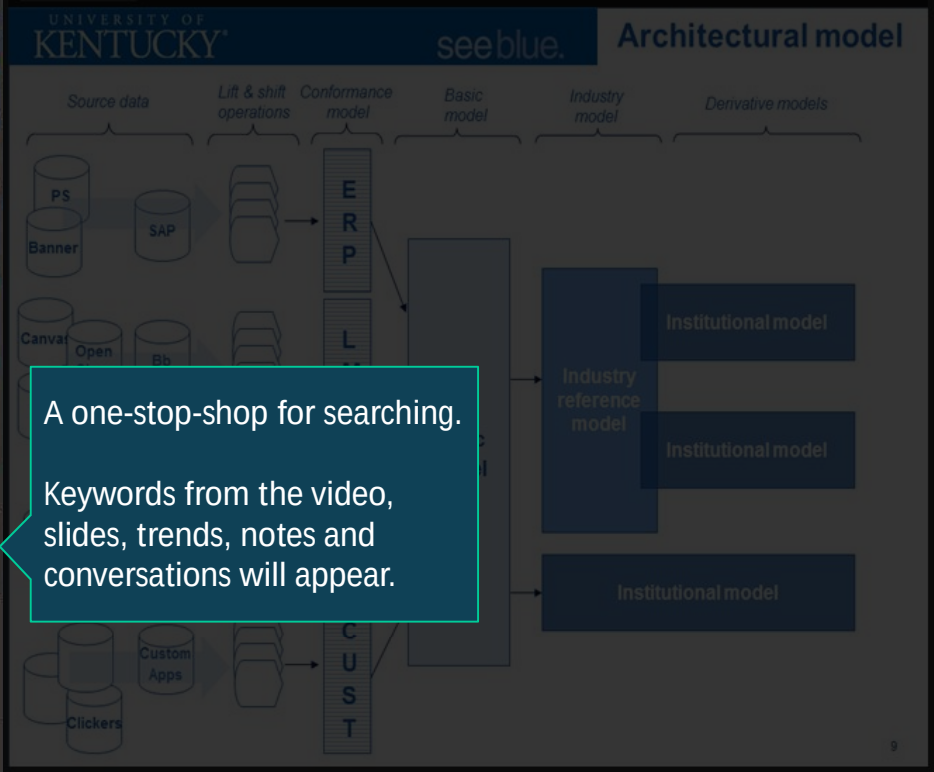
I-Space

(2:26) Boisot's I-Space framework...
(9:01) high codification in the I-Space
(12:08) the I-Space concept starts...
(12:20) movement within the I-Space...
(13:05) I-Space codification and abstract
(15:49) the test for the I-Space diffusion
(20:10) corporate culture and I-Space...
(22:13) diffusion within the I-Space net...
(23:27) models depend on I-Space for...
(32:58) diffusion and the I-Space is...

Slides | Audio | Trending

Rate slide

Slides



A one-stop-shop for searching.

Keywords from the video, slides, trends, notes and conversations will appear.

Slide Notes

What is with all the data sources?

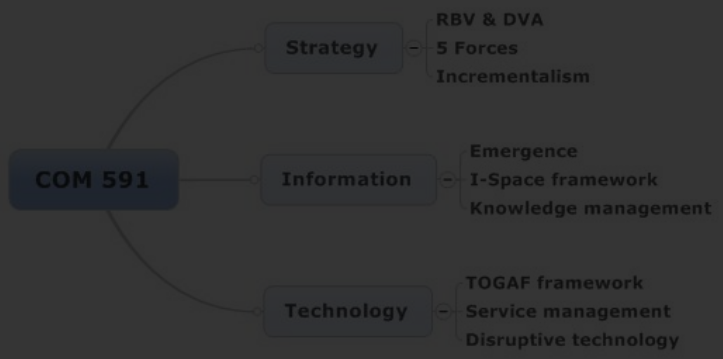
What are the protocols used in lift operations?

An industry reference model is shared across many organizations

This model represents codified knowledge within the I-Space framework. It can be more easily spread or diffused

Share note

Concept Map



Search for concept | Test your knowledge | Rate concept

Recommendations

Help: It looks like you are having difficulty with the concept 'I-Space'. For more information on I-Space click here.

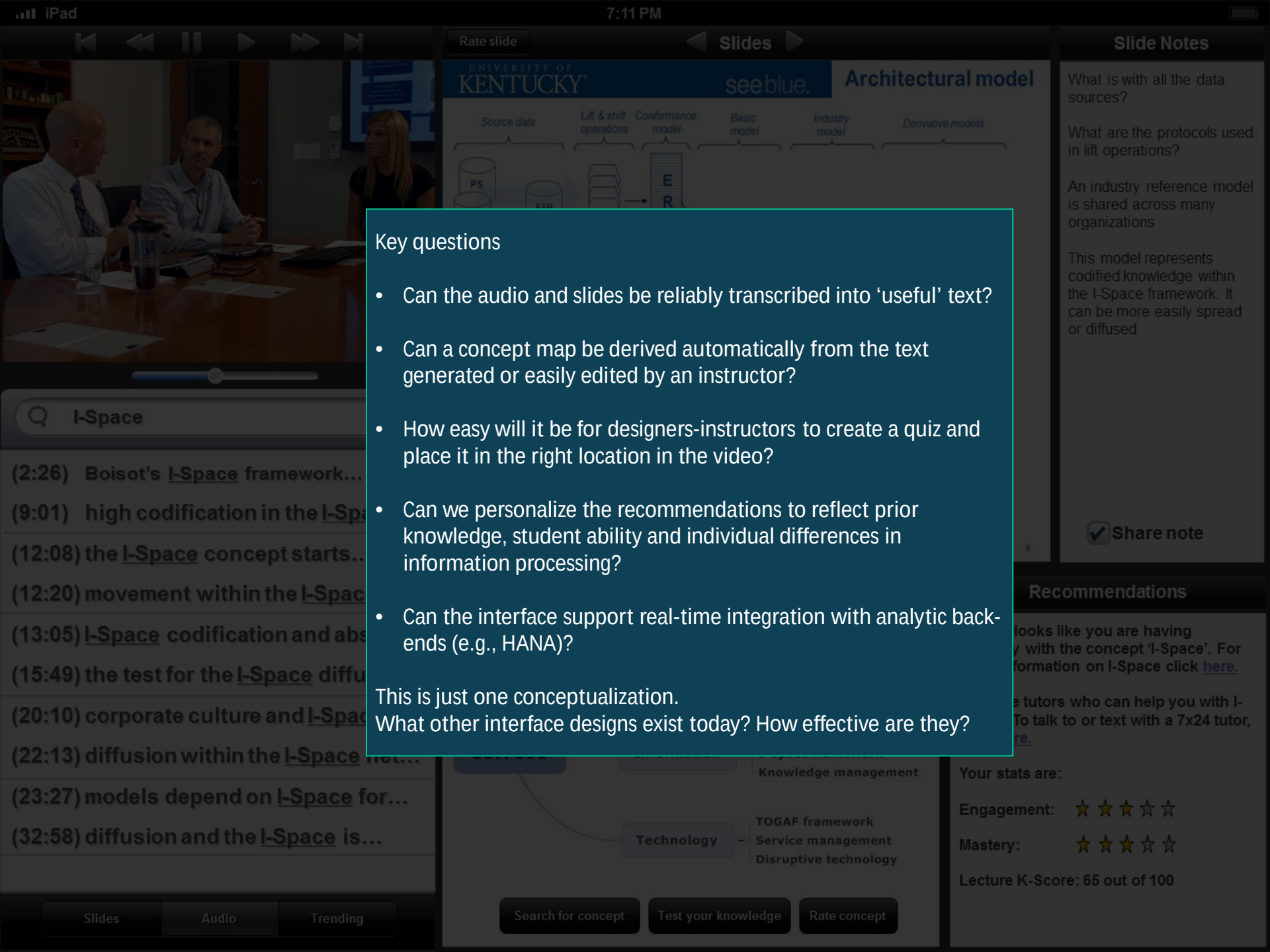
We have tutors who can help you with I-Space. To talk to or text with a 7x24 tutor, click here.

Your stats are:

Engagement: ★★★☆☆

Mastery: ★★★☆☆

Lecture K-Score: 65 out of 100


iPad
7:11 PM
Rate slide
Slides
Slide Notes
Architectural model
Source data
Lift & shift operations
Conformance model
Basic model
Industry model
Derivative models
What is with all the data sources?
What are the protocols used in lift operations?
An industry reference model is shared across many organizations
This model represents codified knowledge within the I-Space framework. It can be more easily spread or diffused
Share note
I-Space
(2:26) Boisot's I-Space framework...
(9:01) high codification in the I-Sp
(12:08) the I-Space concept starts..
(12:20) movement within the I-Spac
(13:05) I-Space codification and abs
(15:49) the test for the I-Space diffu
(20:10) corporate culture and I-Spac
(22:13) diffusion within the I-Space
(23:27) models depend on I-Space for...
(32:58) diffusion and the I-Space is...
Slides
Audio
Trending
Key questions
• Can the audio and slides be reliably transcribed into 'useful' text?
• Can a concept map be derived automatically from the text generated or easily edited by an instructor?
• How easy will it be for designers-instructors to create a quiz and place it in the right location in the video?
• Can we personalize the recommendations to reflect prior knowledge, student ability and individual differences in information processing?
• Can the interface support real-time integration with analytic back-ends (e.g., HANA)?
This is just one conceptualization.
What other interface designs exist today? How effective are they?
Knowledge management
Technology
TOGAF framework
Service management
Disruptive technology
Search for concept
Test your knowledge
Rate concept
Recommendations
looks like you are having
with the concept 'I-Space'. For
formation on I-Space click here.
tutors who can help you with I-
To talk to or text with a 7x24 tutor,
re.
Your stats are:
Engagement:
Mastery:
Lecture K-Score: 65 out of 100

iPad
7:11 PM
Rate slide
Slides
Slide Notes
UNIVERSITY OF KENTUCKY
seeblue.
Architectural model
Source data
Lift & shift operations
Conformance model
Basic model
Industry model
Derivative models
PS
Banner
SAP
ERP
Canvas
Open Class
Bb
D2L
Moodle
LMS
EMAS
Hobsons
Sale Force
Right Now
CRM
Custom Apps
Clickers
CUST
Basic Model
Industry reference model
Institutional model
Institutional model
Institutional model
9
What is with all the data sources?
What are the protocols used in lift operations?
An industry reference model is shared across many organizations
This model represents codified knowledge within the I-Space framework. It can be more easily spread or diffused
Share note
I-Space
(2:26) Boisot's I-Space framework…
(9:01) high codification in the I-Space
(12:08) the I-Space concept starts…
(12:20) movement within the I-Space…
(13:05) I-Space codification and abstract
(15:49) the test for the I-Space diffusion
(20:10) corporate culture and I-Space…
(22:13) diffusion within the I-Space net…
(23:27) models depend on I-Space for…
(32:58) diffusion and the I-Space is…
Slides
Audio
Trending
Concept Map
COM 591
Strategy
RBV & DVA
5 Forces
Incrementalism
Information
Emergence
I-Space framework
Knowledge management
Technology
TOGAF framework
Service management
Disruptive technology
Search for concept
Test your knowledge
Rate concept
Recommendations
Help: It looks like you are having difficulty with the concept 'I-Space'. For more information on I-Space click here.
We have tutors who can help you with I-Space. To talk to or text with a 7x24 tutor, click here.
Your stats are:
Engagement:
Mastery:
Lecture K-Score: 65 out of 100

Deep personalization technology

- Real-time personalized interactions
  - Target on-demand peer tutoring based on student's profile
  - Deliver micro-surveys and assessments to capture additional information needed to improve personalization
  - Give students academic health indicators that tell students where they can improve in study, engagement, support, etc.
  - Let students opt their parents in to this information so the family can support the student
  - Tailor and target reminder services, avoid over messaging
- Allow for open adaptive learning
  - How content gets matched to students is psychologically complex
  - Several theories of how humans learn give many insights
  - Students differ in the following abilities and attributes: visual-object, visual-spatial, reasoning, cognitive reflection, need for sensation, need for cognition, various verbal abilities, confidence, persistence, prospective memory, etc.
  - We need an open architecture to promote rapid experimentation, testing and sharing of what works and what doesn't

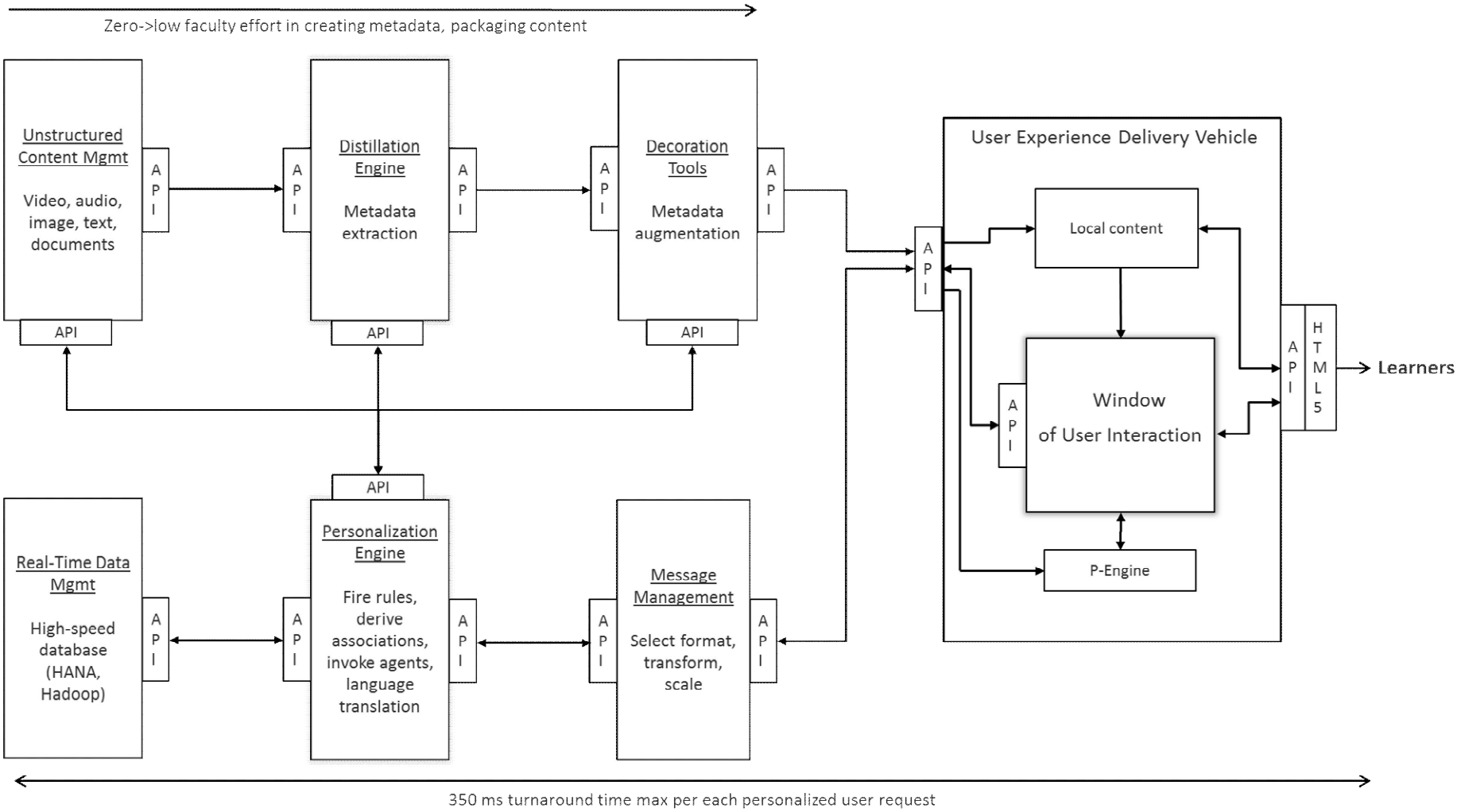
Metadata distillation
- Codification: image->text, audio->text, gesture->text
- Abstraction: text->concept->taxonomy

Metadata decoration
- Manual tagging (faculty, designer, student)
- Smart tagging recommendations
- Taxonomy construction
- Personalization rules

Metadata domains
- Source domain
  - Content (derived from structured/unstructured data)
  - Learner (derived from learner attributes)
  - Interactions (derived from learner interactions)
- Psychological domain
  - Concepts, procedures, skills, cognition, affect, behavior, personality, knowledge domain, personalization rules
- Business domain
  - Learning assessment, process value-add

Metadata domains: Interaction
- Navigation
  - Search, time, location/space (terms to address when/where do we put the content)
- Interaction type
  - click stream, mouse movement, search terms, back channel, polls, tests, eye movements (cues to help determine additional personalization)

Challenges
1. Distillation: Deriving usable concepts from a class corpus (body of text post-conversion); automatically classifying the class corpus
2. Personalization: Deriving new rules to match content to learner
3. Assessment: Matching tests to concepts to time/space; measuring personalization effectiveness, value-add



Future of teaching

- Three domains to master:
  - How do humans learn this material?
  - What is this material?
  - How do I connect the learner to a larger community?
- Transitions to make
  - How do I get ‘line of sight’ to the student in data?
  - How do I ‘e-poke’ a student successfully?
  - How do I ‘fly by wire?’
  - How do I network with and foster global learning communities?
  - How do I foster networking within and across different learning communities, including my class?
  - How do I orchestrate a learning environment with a ‘production crew?’
  - How do I master new tools of the trade?
- What is my role?
  - Raconteur? Domain expert? Facilitator? Actor-entertainer? Chief architect or director of the learning experience? Do-it-yourself-er? Air traffic controller? System configurator? Personal coach? Motivator? Diagnostician? Cognitive psychologist? Counselor?