Building the Future: Trends, Metatrends, and the Horizon Report

Ruben R. Puentedura, Ph.D.

NMC

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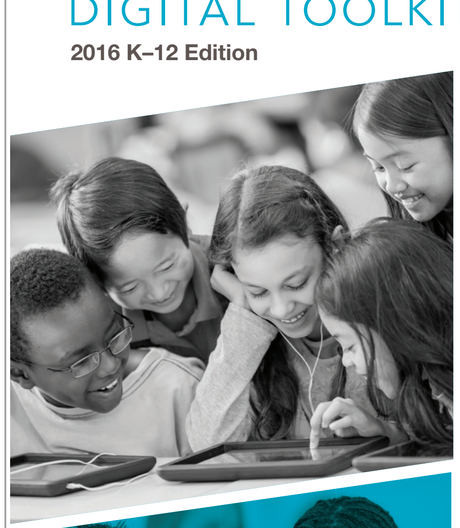
NMC/CoSN Horizon Report > 2016 K-12 Edition

HORIZON REPORT
DIGITAL TOOLKIT
2016 K–12 Edition



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Key Trends Driving Ed Tech Adoption

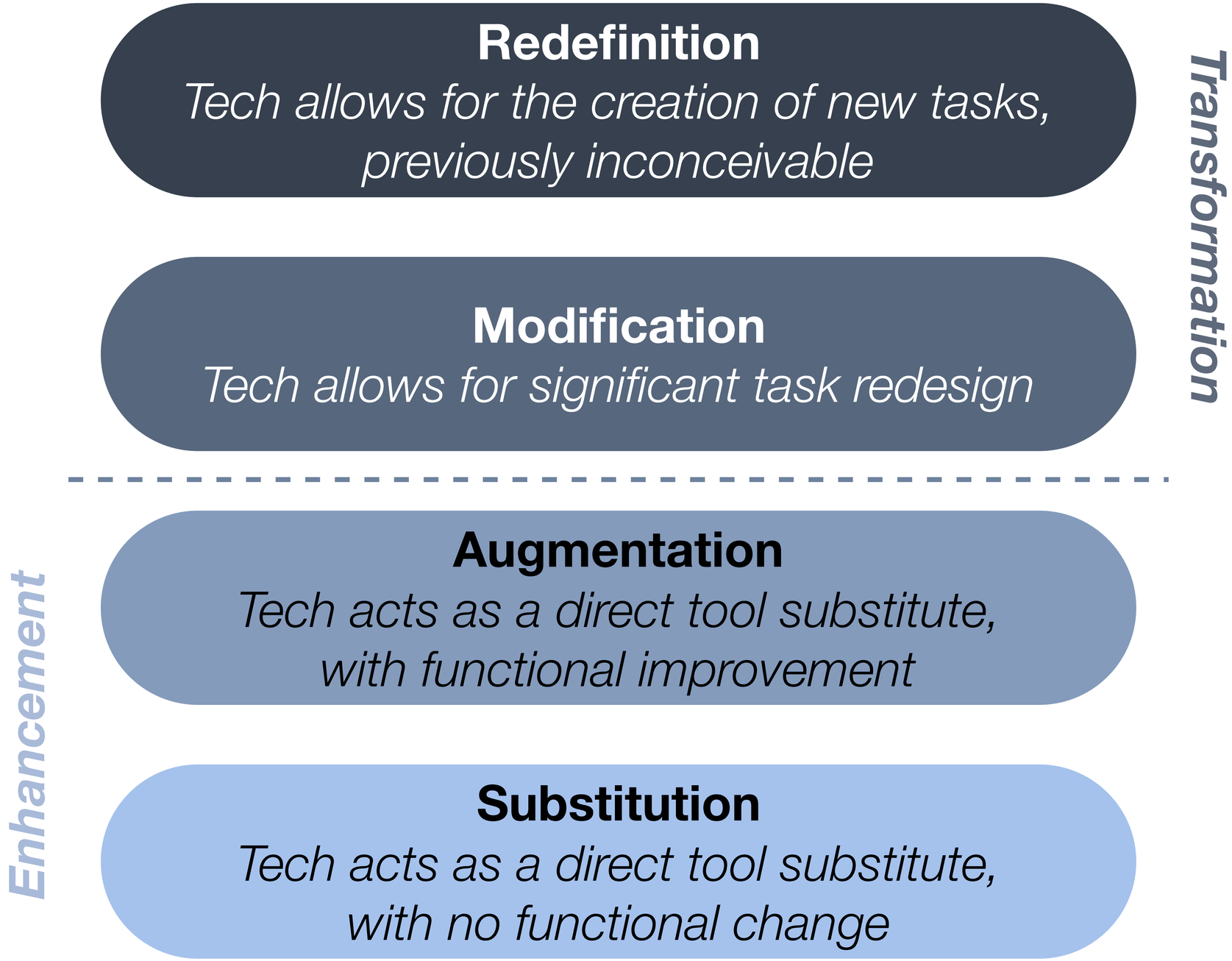
Fast (1-2 yrs.)	Coding as a Literacy Students as Creators
Mid-Range (3-5 yrs.)	Collaborative Learning Deeper Learning Approaches
Long-Range (5+ yrs.)	Redesigning Learning Spaces Rethinking How Schools Work

Important Ed Tech Developments

Adoption: 1 yr. or less	Makerspaces Online Learning
Adoption: 2-3 yrs.	Robotics Virtual Reality
Adoption: 4-5 yrs.	Artificial Intelligence Wearable Technology

Significant Challenges Impeding Ed Tech Adoption

Solvable *understand and know how to solve*	Difficult *understand but solutions are elusive*	Wicked *complex to define, much less address*
Authentic Learning Opportunities Rethinking the Roles of Teachers	Advancing Digital Equity Scaling Teaching Innovations	Achievement Gap Personalizing Learning



Ruben R. Puentedura, *As We May Teach: Educational Technology, From Theory Into Practice*. (2009)

Redefinition

Tech allows for the creation of new tasks, previously inconceivable

Modification

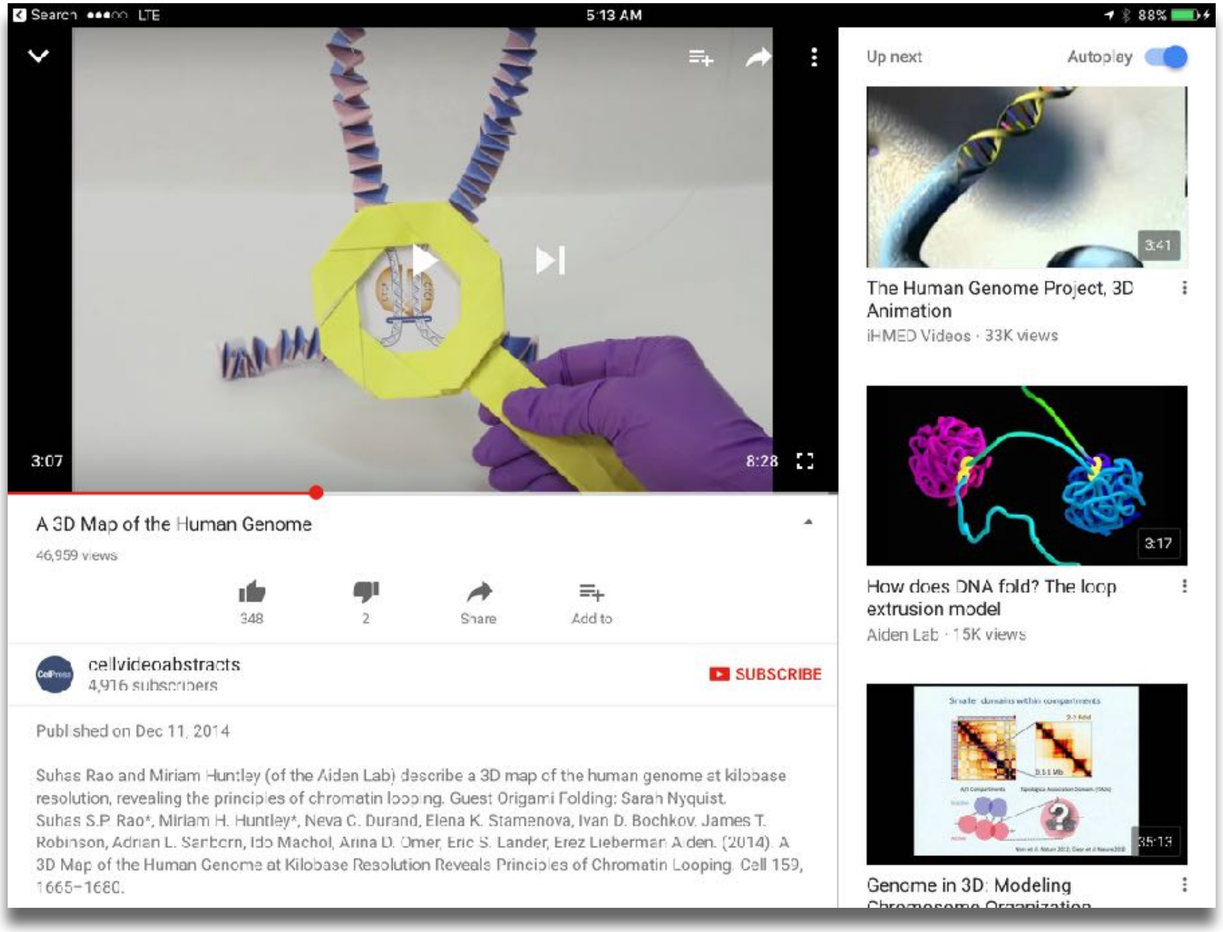
Tech allows for significant task redesign

Augmentation

Tech acts as a direct tool substitute, with functional improvement

Substitution

Tech acts as a direct tool substitute, with no functional change



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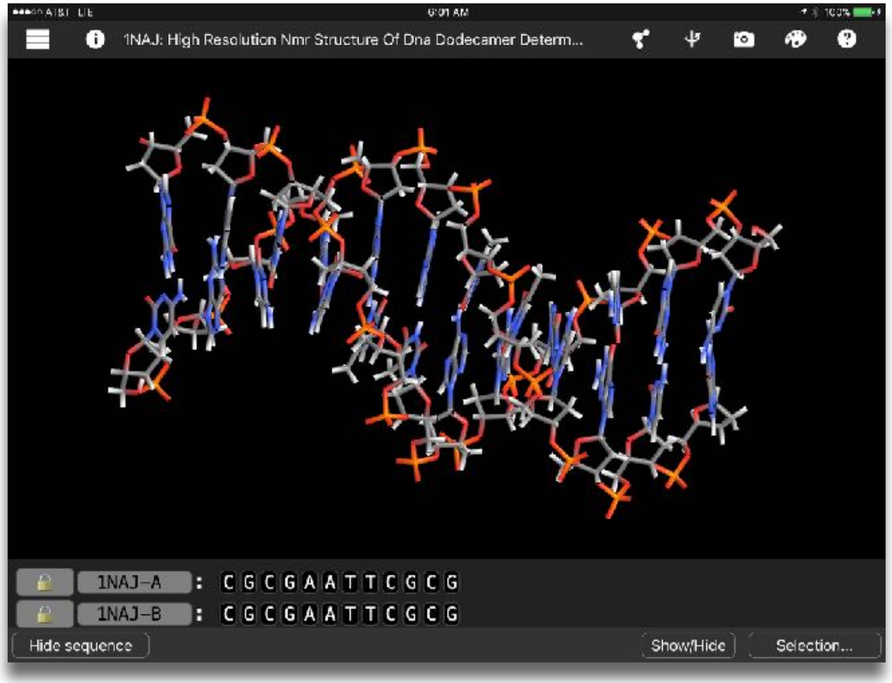

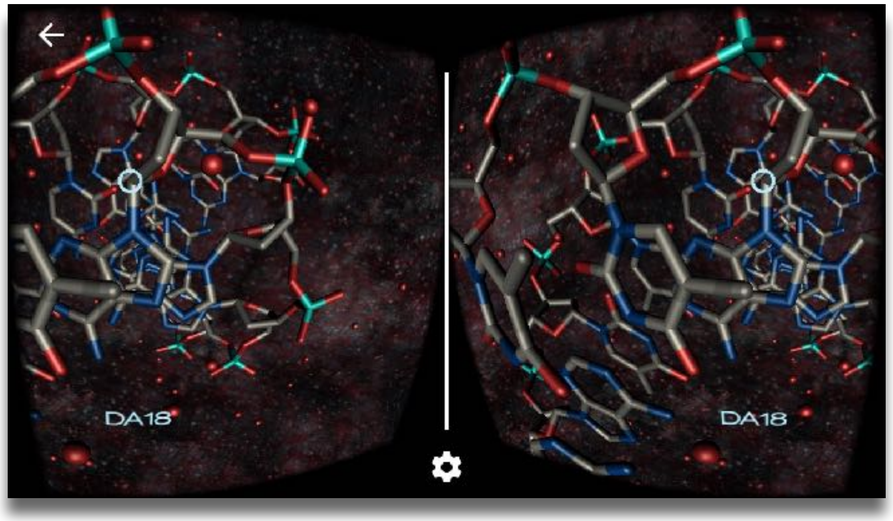

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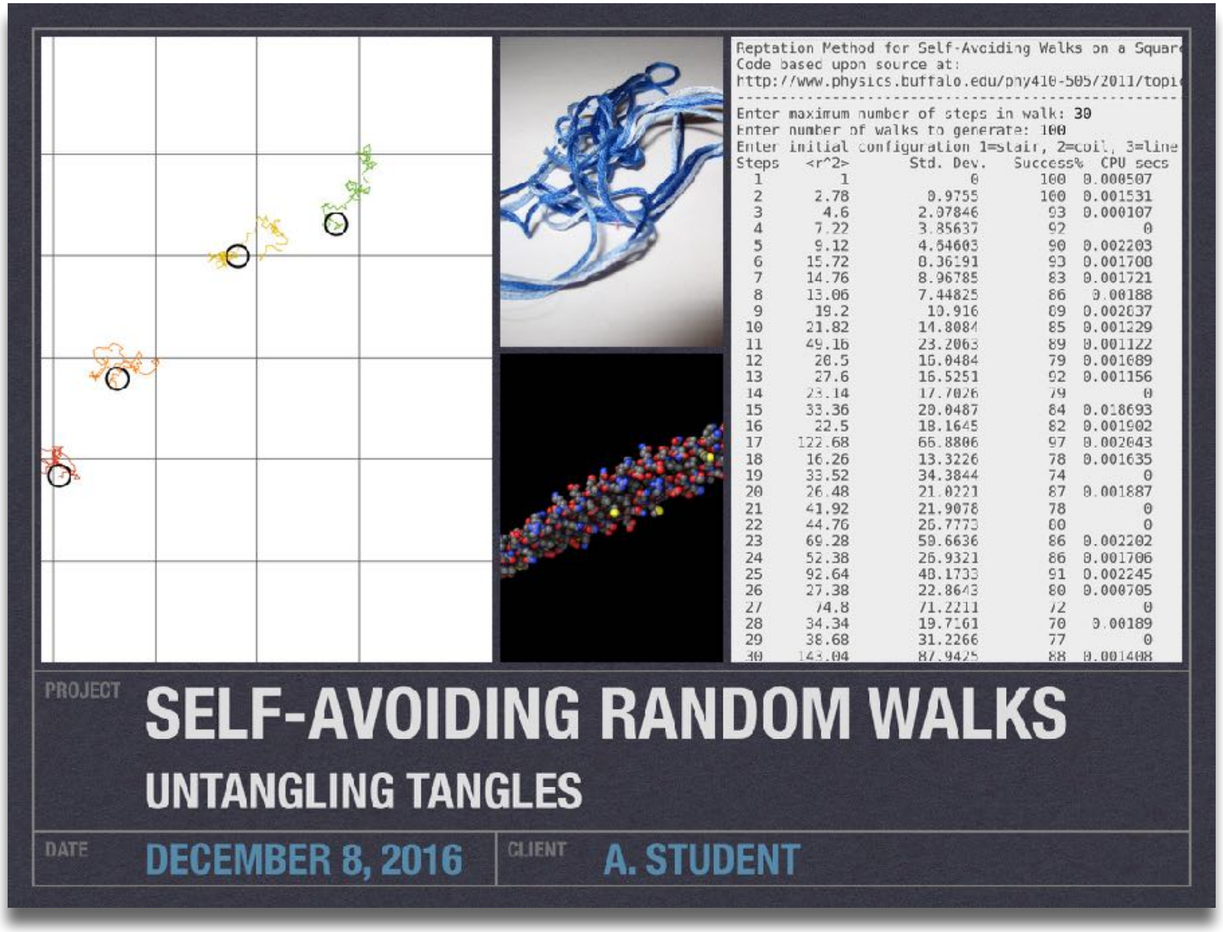

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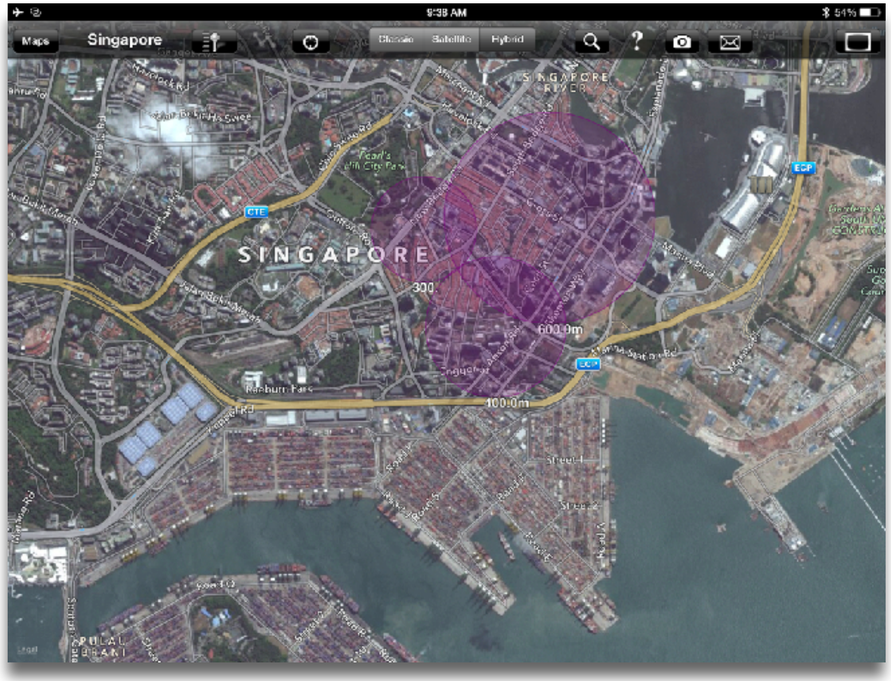

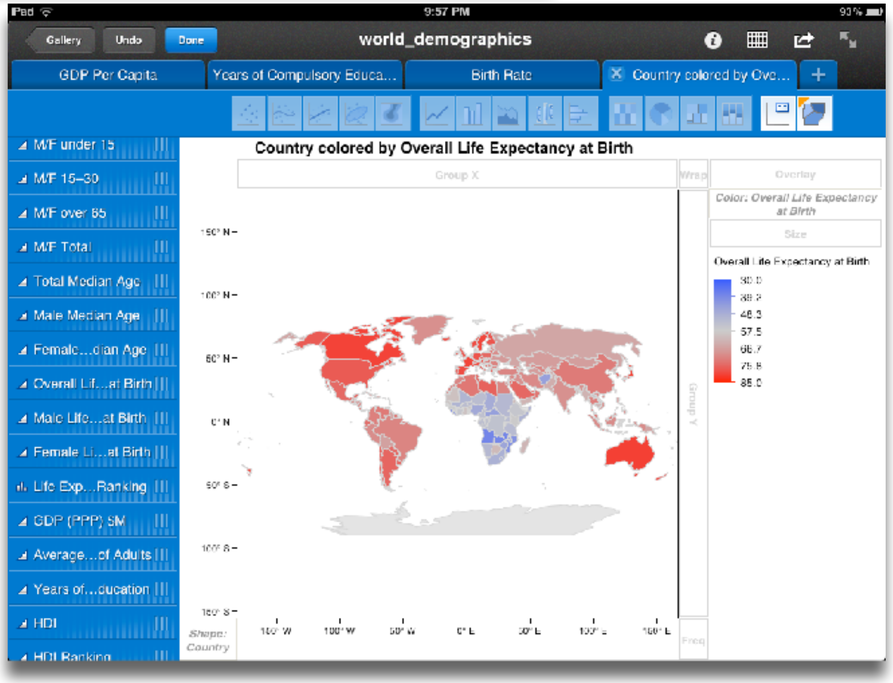

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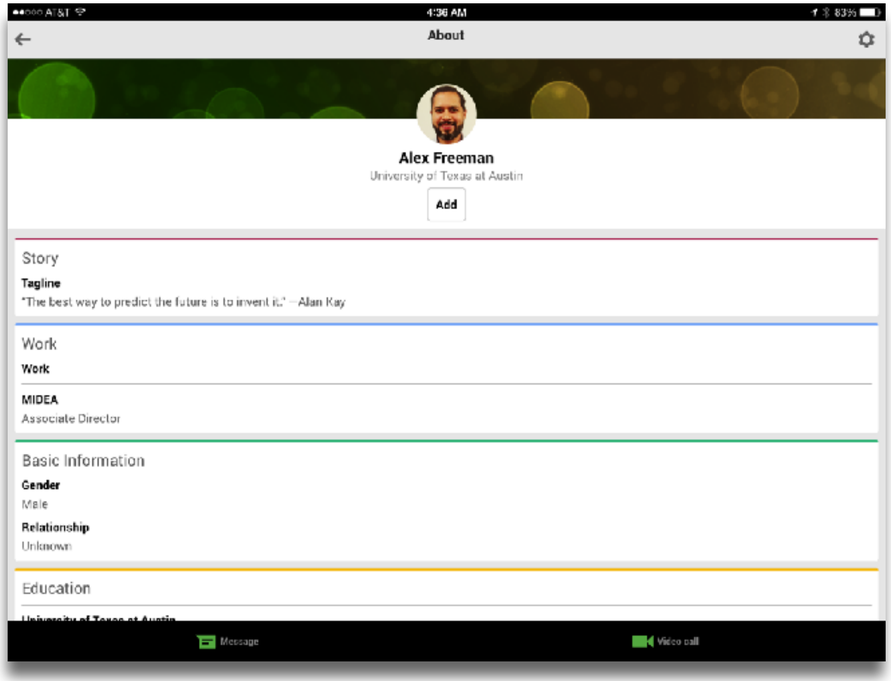

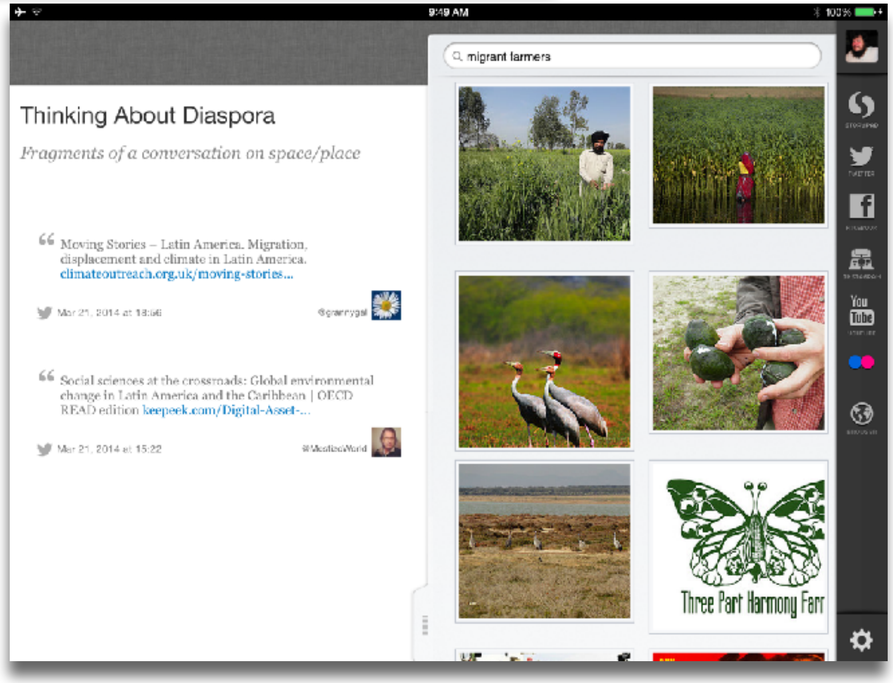

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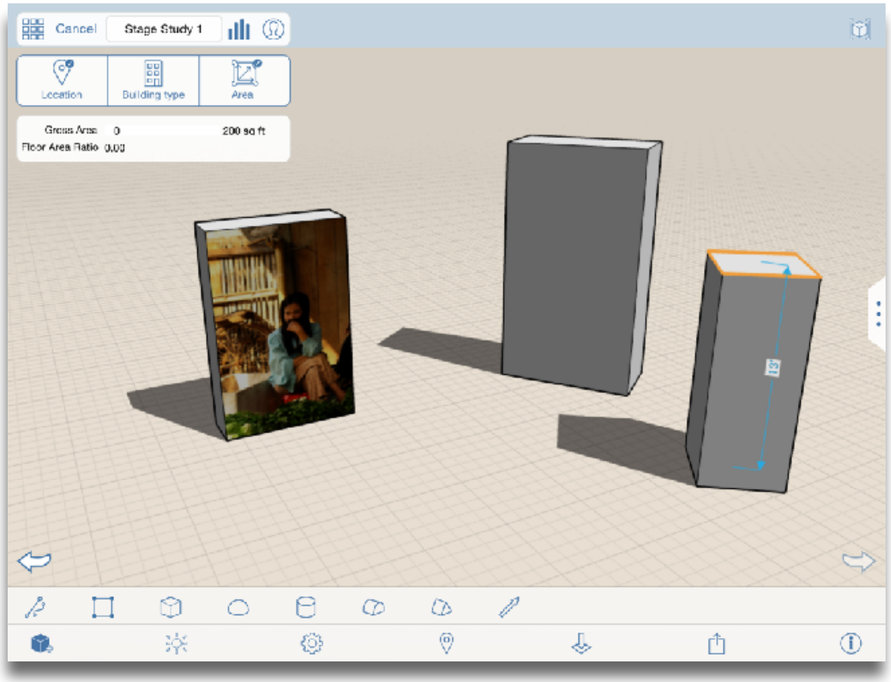

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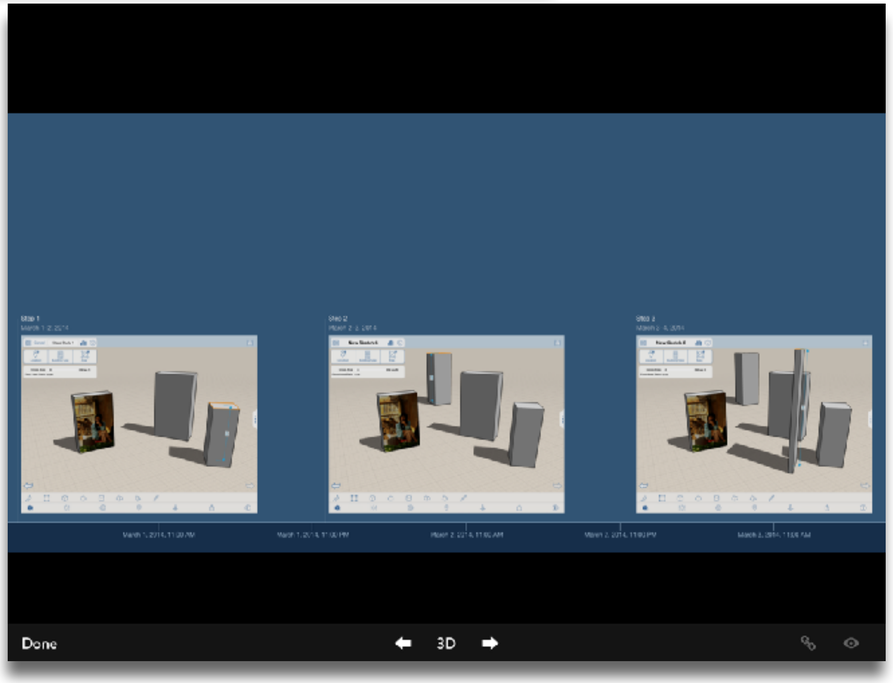

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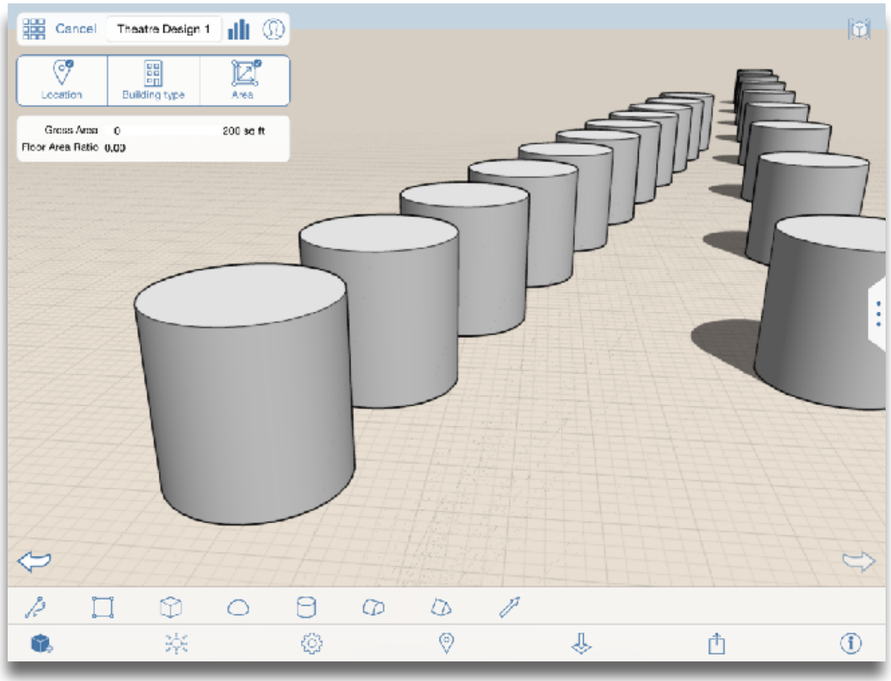

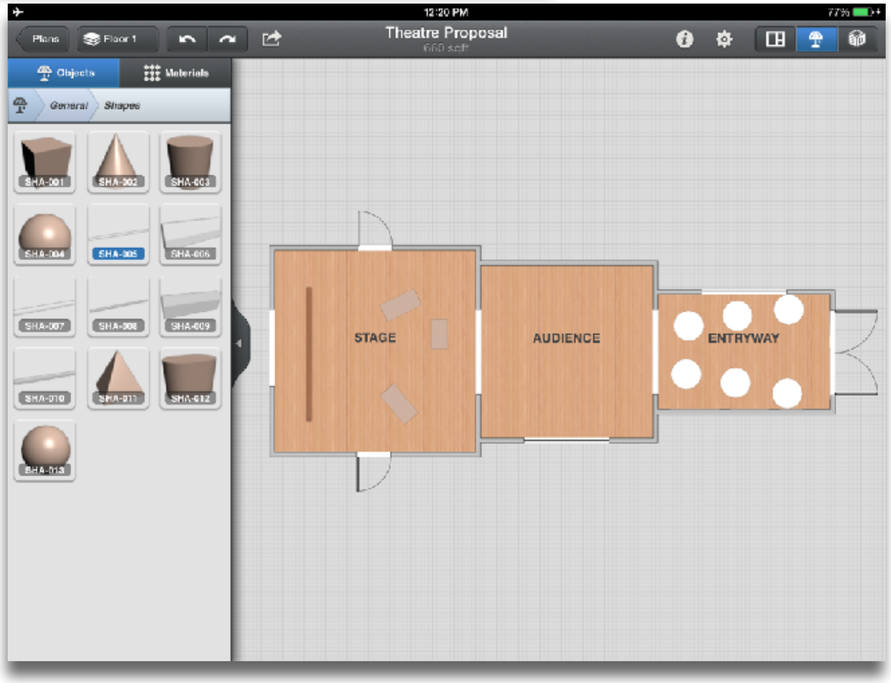

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Social	Mobility	Visualization	Storytelling	Gaming
200,000 years	70,000 years	40,000 years	17,000 years	8,000 years

Ruben R. Puentedura, “Technology In Education: The First 200,000 Years” *The NMC Perspective Series: Ideas that Matter*. NMC Summer Conference, 2012.

Social

Bookmarks

RSS Feeds

Discussions

Microblogging

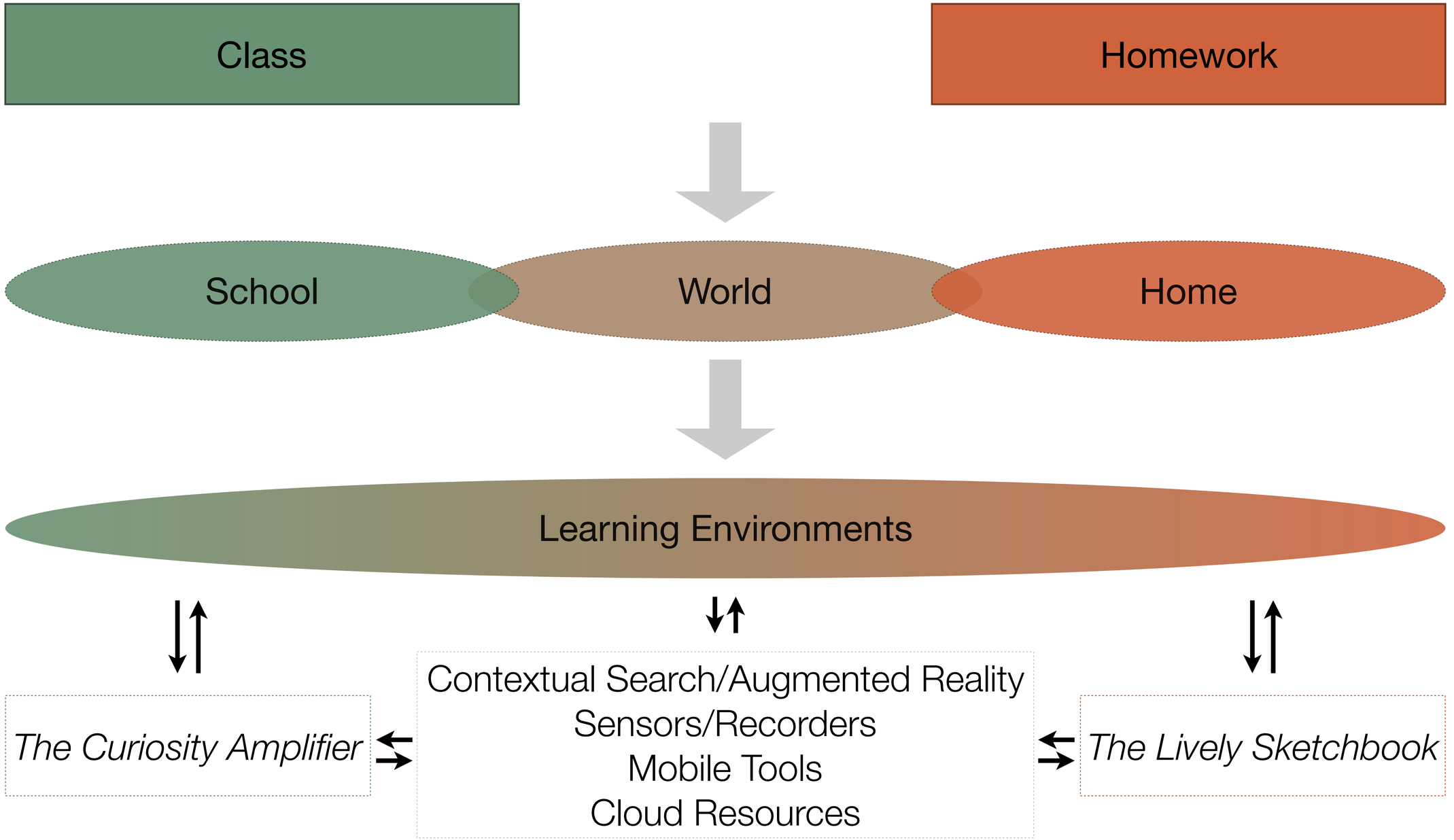
Blogging

Wikis

Telepresence

File Sharing

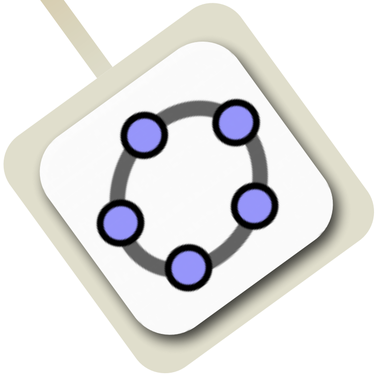
Mobility



John Seely Brown. “A New Culture of Learning”. *NMC Summer Conference, Closing Keynote*. (2010)

Ruben R. Puentedura, “The Lively Sketchbook”. *Hippasus Blog*. (2010)

Visualization



Storytelling

Narrative sources;
Narrative constraints

Pictorial vocabulary;
Narrative transitions;
Text/image integration

CDS Seven Elements;
Montage structures

Narrative structures;
Narrative flows

Ludic elements

Image Assembly → Sequential Art → Moving Image → Interactive Media → Interactive Fiction

TIME

PLACE

Infinite Canvas

CONNECTION

SOCIAL

Formal Definition of **Game** (Salen & Zimmerman)

"A game is a system in which players engage in an artificial conflict, defined by rules, that results in a quantifiable outcome."

Katie Salen and Eric Zimmerman. *Rules of Play: Game Design Fundamentals*. The MIT Press, 2003.

The EdTech Quintet – Associated Practices	
Social	Communication, Collaboration, Sharing
Mobility	Anytime, Anyplace Learning and Creation
Visualization	Making Abstract Concepts Tangible
Storytelling	Knowledge Integration and Transmission
Gaming	Feedback Loops and Formative Assessment

	Trends - 1	Trends - 2	Trends - 3	Trends - 4	Trends - 5	Trends - 6
2009	Technology continues to profoundly affect the way we work, collaborate, communicate, and succeed.	Technology is increasingly a means for empowering students, a method for communication and socializing, and a ubiquitous, transparent part of their lives.	The web is an increasingly personal experience.	The way we think of learning environments is changing.	The perceived value of innovation and creativity is increasing.	
2010	Technology is increasingly a means for empowering students, a method for communication and socializing, and a ubiquitous, transparent part of their lives.	Technology continues to profoundly affect the way we work, collaborate, communicate, and succeed.	The perceived value of innovation and creativity is increasing.	There is increasing interest in just-in-time, alternate, or non-formal avenues of education, such as online learning, mentoring, and independent study.	The way we think of learning environments is changing.	
2011	The abundance of resources and relationships made easily accessible via the Internet is increasingly challenging us to revisit our roles as educators.	As IT support becomes more and more decentralized, the technologies we use are increasingly based not on school servers, but in the cloud.	Technology continues to profoundly affect the way we work, collaborate, communicate, and succeed.	People expect to be able to work, learn, and study whenever and wherever they want to.	The perceived value of innovation and creativity is increasing.	
2012	Education paradigms are shifting to include online learning, hybrid learning and collaborative models.	The abundance of resources and relationships made easily accessible via the Internet is increasingly challenging us to revisit our roles as educators.	As the cost of technology drops and school districts revise and open up their access policies, it is becoming increasingly common for students to bring their own mobile devices.	People expect to be able to work, learn, and study whenever and wherever they want.	Technology continues to profoundly affect the way we work, collaborate, communicate, and succeed.	There is a new emphasis in the classroom on more challenge-based, active learning.
2013	Education paradigms are shifting to include online learning, hybrid learning, and collaborative models.	Social media is changing the way people interact, present ideas and information, and communicate.	Openness — concepts like open content, open data, and open resources, along with notions of transparency and easy access to data and information — is becoming a value.	As the cost of technology drops and school districts revise and open up their access policies, it is becoming more common for students to bring their own mobile devices.	The abundance of resources and relationships made easily accessible via the Internet is challenging us to revisit our roles as educators.	
	Trends - S	**Trends - S**	**Trends - M**	**Trends - M**	**Trends - L**	**Trends - L**
2014	Rethinking the Roles of Teachers	Shift to Deeper Learning Approaches	Increasing Focus on Open Educational Resources	Increasing Use of Hybrid Learning Designs	Rapid Acceleration of Intuitive Technology	Rethinking How Schools Work
2015	Rise of STEAM Learning	Increasing Use of Blended Learning	Shift from Students as Consumers to Creators	Increasing Use of Collaborative Learning Approaches	Shift to Deeper Learning Approaches	Rethinking How Schools Work
2016	Coding as a Literacy	Students as Creators	Deeper Learning Approaches	Collaborative Learning	Redesigning Learning Spaces	Rethinking How Schools Work

5	Technology (esp. social media) continues to profoundly affect the way we work, interact, present ideas and information, collaborate, communicate, and succeed.
3	The perceived value of innovation and creativity is increasing.
3	The abundance of resources and relationships made easily accessible via the Internet is increasingly challenging us to revisit our roles as educators.
3	Education paradigms are shifting to include challenge-based, active learning and collaborative models, as well as just-in-time, alternate, or non-formal avenues of education, such as online learning, hybrid learning, mentoring, and independent study.
2	The way we think of learning environments is changing.
2	Technology is increasingly a means for empowering students, a method for communication and socializing, and a ubiquitous, transparent part of their lives.
2	People expect to be able to work, learn, and study whenever and wherever they want to.
2	As the cost of technology drops and school districts revise and open up their access policies, it is becoming increasingly common for students to bring their own mobile devices.
1	The web is an increasingly personal experience.
1	As IT support becomes more and more decentralized, the technologies we use are increasingly based not on school servers, but in the cloud.
1	Openness — concepts like open content, open data, and open resources, along with notions of transparency and easy access to data and information — is becoming a value.
LLL	Rethinking How Schools Work
SLM	Shift to Deeper Learning Approaches
MMM	Increasing Use of Hybrid Learning Designs/Collaborative Learning Approaches
MS	Shift from Students as Consumers to Creators
MS	Increasing Use of Hybrid Learning Designs/Blended Learning Approaches
S	Rethinking the Roles of Teachers
S	Rise of STEAM Learning
S	Coding as a Literacy
M	Increasing Focus on Open Educational Resources
L	Rapid Acceleration of Intuitive Technology
L	Redesigning Learning Spaces

Short	Shift from Students as Consumers to Creators
Short	Increasing Use of Hybrid Learning Designs/Blended Learning Approaches
Short	Rethinking the Roles of Teachers
Short	Rise of STEAM Learning
Short	Coding as a Literacy
Medium	Shift to Deeper Learning Approaches
Medium	Increasing Use of Hybrid Learning Designs/Collaborative Learning Approaches
Medium	Increasing Focus on Open Educational Resources
Long	Rethinking How Schools Work
Long	Rapid Acceleration of Intuitive Technology
Long	Redesigning Learning Spaces

	Challenges - 1	Challenges - 2	Challenges - 3	Challenges - 4	Challenges - 5	Challenges - 6
2009	There is a growing need for formal instruction in key new skills, including information literacy, visual literacy, and technological literacy.	Students are different, but educational practice and the material that supports it is changing only slowly.	Learning that incorporates real life experiences is not occurring enough and is undervalued when it does take place.	There is a growing recognition that new technologies must be adopted and used as an everyday part of classroom activities, but effecting this change is difficult.	A key challenge is the fundamental structure of the K-12 education establishment.	
2010	Digital media literacy continues its rise in importance as a key skill in every discipline and profession.	Students are different, but educational practice and the materials that support it are changing only slowly.	Many policy makers and educators believe that deep reform is needed, but at the same time, there is little agreement as to what a new model of education might look like.	A key challenge is the fundamental structure of the K-12 education establishment.	Many activities related to learning and education take place outside the walls of the classroom — but these experiences are often undervalued or unacknowledged.	
2011	Digital media literacy continues its rise in importance as a key skill in every discipline and profession.	Economic pressures and new models of education are presenting unprecedented competition to traditional models of schools.	The demand for personalized learning is not adequately supported by current technology or practices.	A key challenge is the fundamental structure of the K-12 education establishment — aka “the system.”	Many activities related to learning and education take place outside the walls of the classroom and thus are not part of our learning metrics.	
2012	Digital media literacy continues its rise in importance as a key skill in every discipline and profession, especially teaching.	K-12 must address the increased blending of formal and informal learning.	The demand for personalized learning is not adequately supported by current technology or practices.	Institutional barriers present formidable challenges to moving forward in a constructive way with emerging technologies.	Learning that incorporates real life experiences is not occurring enough and is undervalued when it does take place.	Many activities related to learning and education take place outside the walls of the classroom and thus are not part of traditional learning metrics.
2013	Ongoing professional development needs to be valued and integrated into the culture of the schools.	Too often it is education’s own practices that limit broader uptake of new technologies.	New models of education are bringing unprecedented competition to traditional models of schooling.	K-12 must address the increased blending of formal and informal learning.	The demand for personalized learning is not adequately supported by current technology or practices.	
	Challenges - S	**Challenges - S**	**Challenges - D**	**Challenges - D**	**Challenges - W**	**Challenges - W**
2014	Creating Authentic Learning Opportunities	Integrating Personalized Learning	Complex Thinking and Communication	Safety of Student Data	Competition from New Models of Education	Keeping Formal Education Relevant
2015	Creating Authentic Learning Opportunities	Integrating Technology in Teacher Education	Personalizing Learning	Rethinking the Roles of Teachers	Scaling Teaching Innovations	Teaching Complex Thinking
2016	Authentic Learning Experiences	Rethinking the Roles of Teachers	Advancing Digital Equity	Scaling Teaching Innovations	Achievement Gap	Personalizing Learning

5	A key challenge is presented by the fundamental structures and practices of the K-12 education establishment ("the system"), which limit moving forward in a constructive way with emerging technologies.
4	There is a growing and important need for formal instruction in digital media literacies in every discipline and profession (esp. teaching) including information literacy, visual literacy, and technological literacy.
4	Many activities related to learning and education take place outside the walls of the classroom and thus are not part of traditional learning metrics, while learning that incorporates real life experiences is not occurring enough and is undervalued when it does take place.
3	The demand for personalized learning is not adequately supported by current technology or practices.
2	Students are different, but educational practice and the material that supports it is changing only slowly.
2	Economic pressures and new models of education are presenting unprecedented competition to traditional models of schools.
2	K-12 must address the increased blending of formal and informal learning.
1	There is a growing recognition that new technologies must be adopted and used as an everyday part of classroom activities, but effecting this change is difficult.
1	Many policy makers and educators believe that deep reform is needed, but at the same time, there is little agreement as to what a new model of education might look like.
1	Ongoing professional development needs to be valued and integrated into the culture of the schools.
SSS	Creating Authentic Learning Opportunities and Experiences
SDW	Integrating Personalized Learning
DW	Teaching Complex Thinking and Communication
DS	Rethinking the Roles of Teachers
WD	Scaling Teaching Innovations
S	Integrating Technology in Teacher Education
D	Safety of Student Data
D	Advancing Digital Equity
W	Competition from New Models of Education
W	Keeping Formal Education Relevant
W	Achievement Gap

Solvable	Creating Authentic Learning Opportunities and Experiences
Solvable	Rethinking the Roles of Teachers
Solvable	Integrating Technology in Teacher Education
Difficult	Scaling Teaching Innovations
Difficult	Safety of Student Data
Difficult	Advancing Digital Equity
Wicked	Integrating Personalized Learning
Wicked	Teaching Complex Thinking and Communication
Wicked	Competition from New Models of Education
Wicked	Keeping Formal Education Relevant
Wicked	Achievement Gap

Six Metacategories (Horizon Report 2017 – Higher Education Edition)

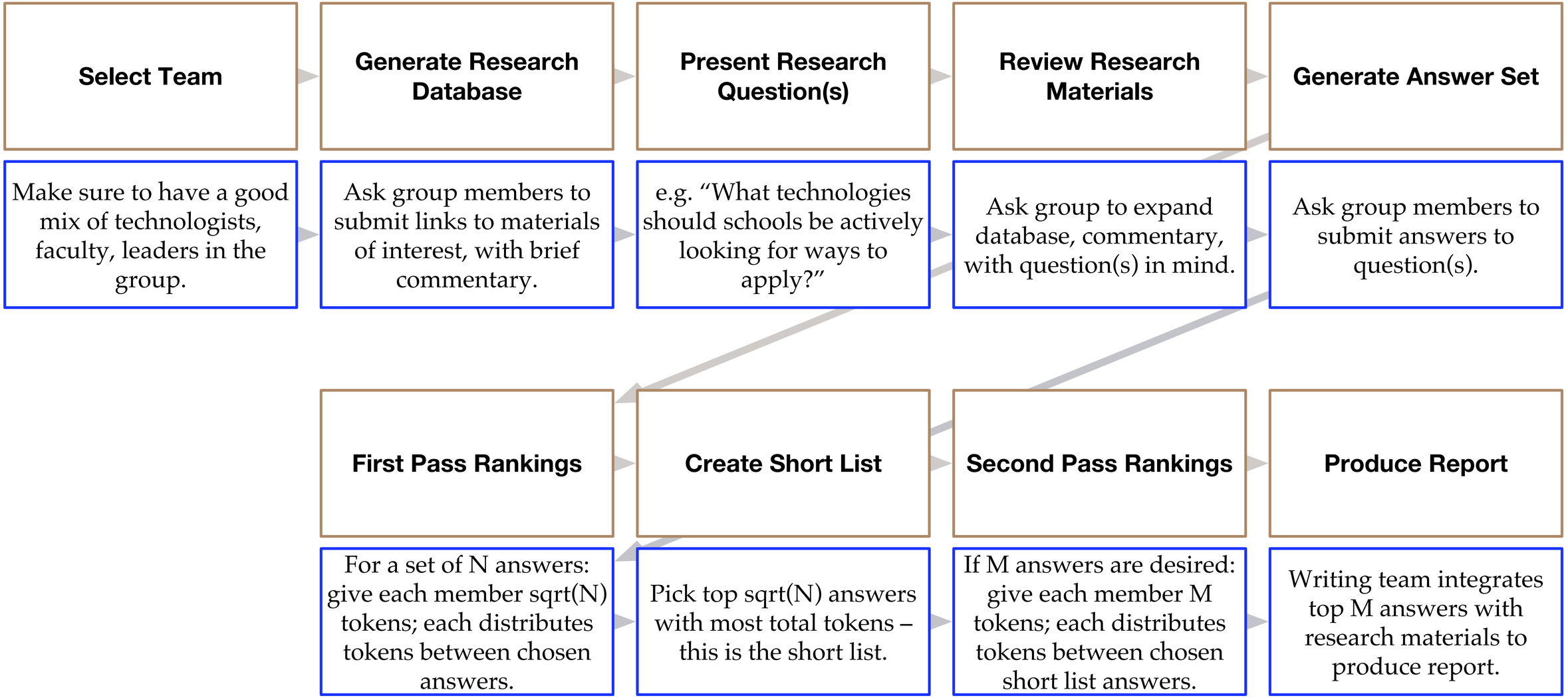
- Expanding Access and Convenience
- Spurring Innovation
- Fostering Authentic Learning
- Tracking and Evaluating Evidence
- Improving the Teaching Profession
- Spreading Digital Fluency

The Process

The Steps

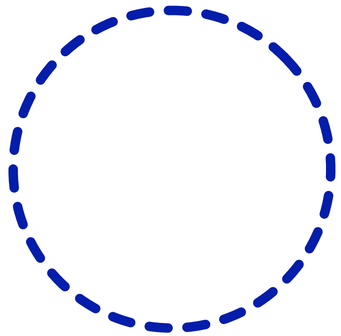

Wiki Orientations
Press Clippings
Research Questions
Review of Past Reports
1st Pass Rankings
Review Short List
2nd Pass Rankings
Produce Report
Current Focus

Adapting the Process

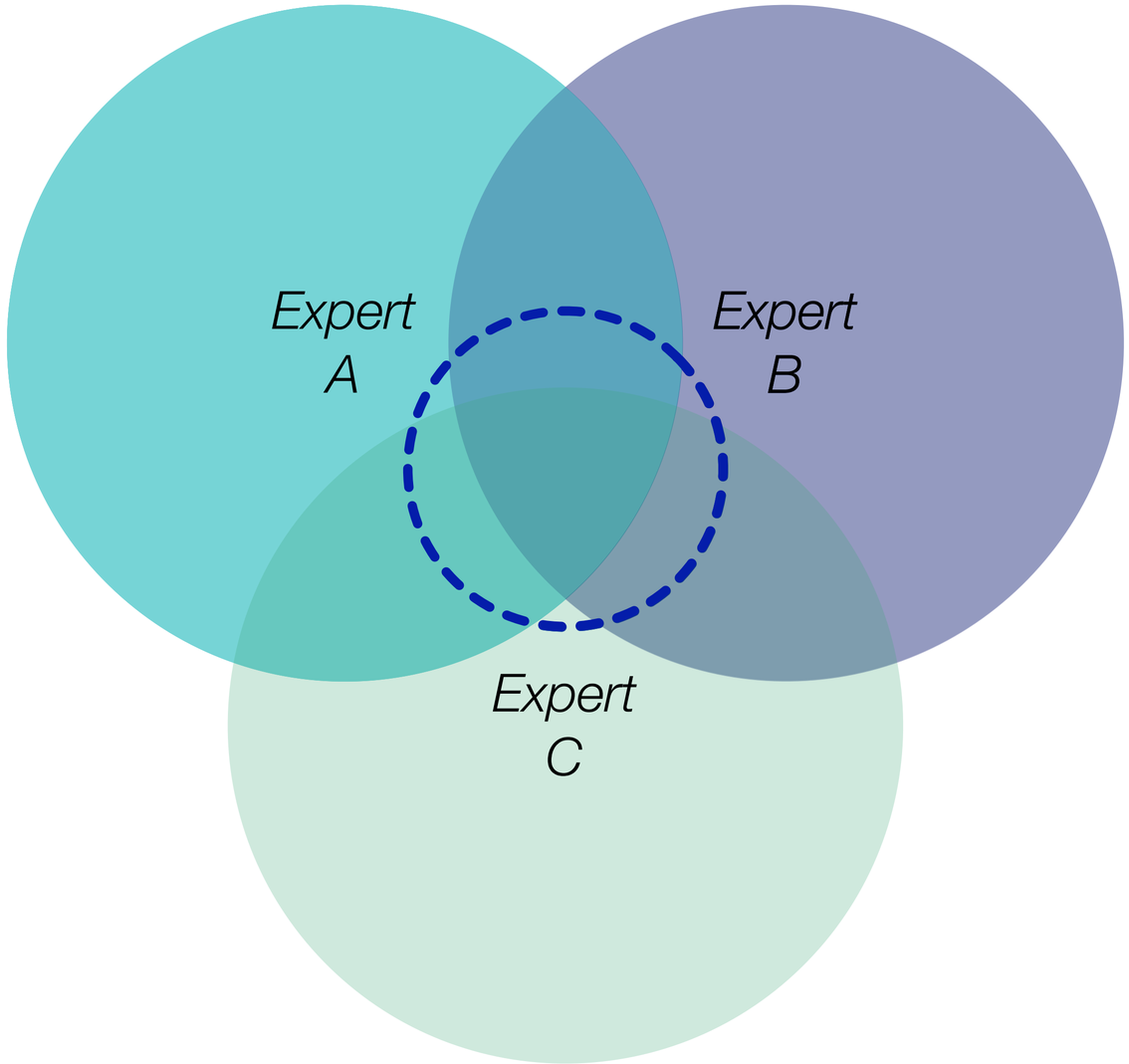


Informing Decision Making: the Delphi Method

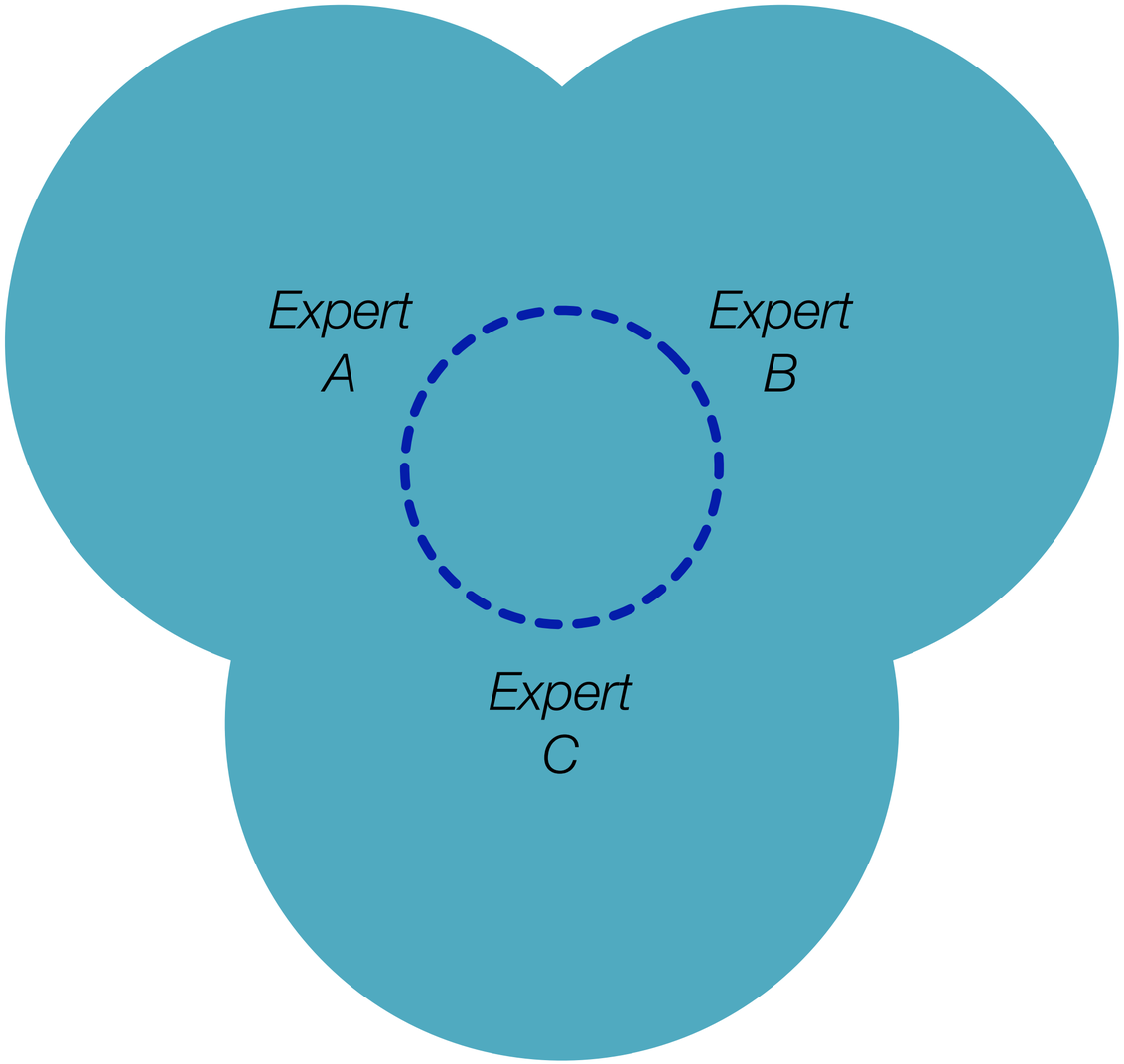
Wanted: the Relevant Information Space



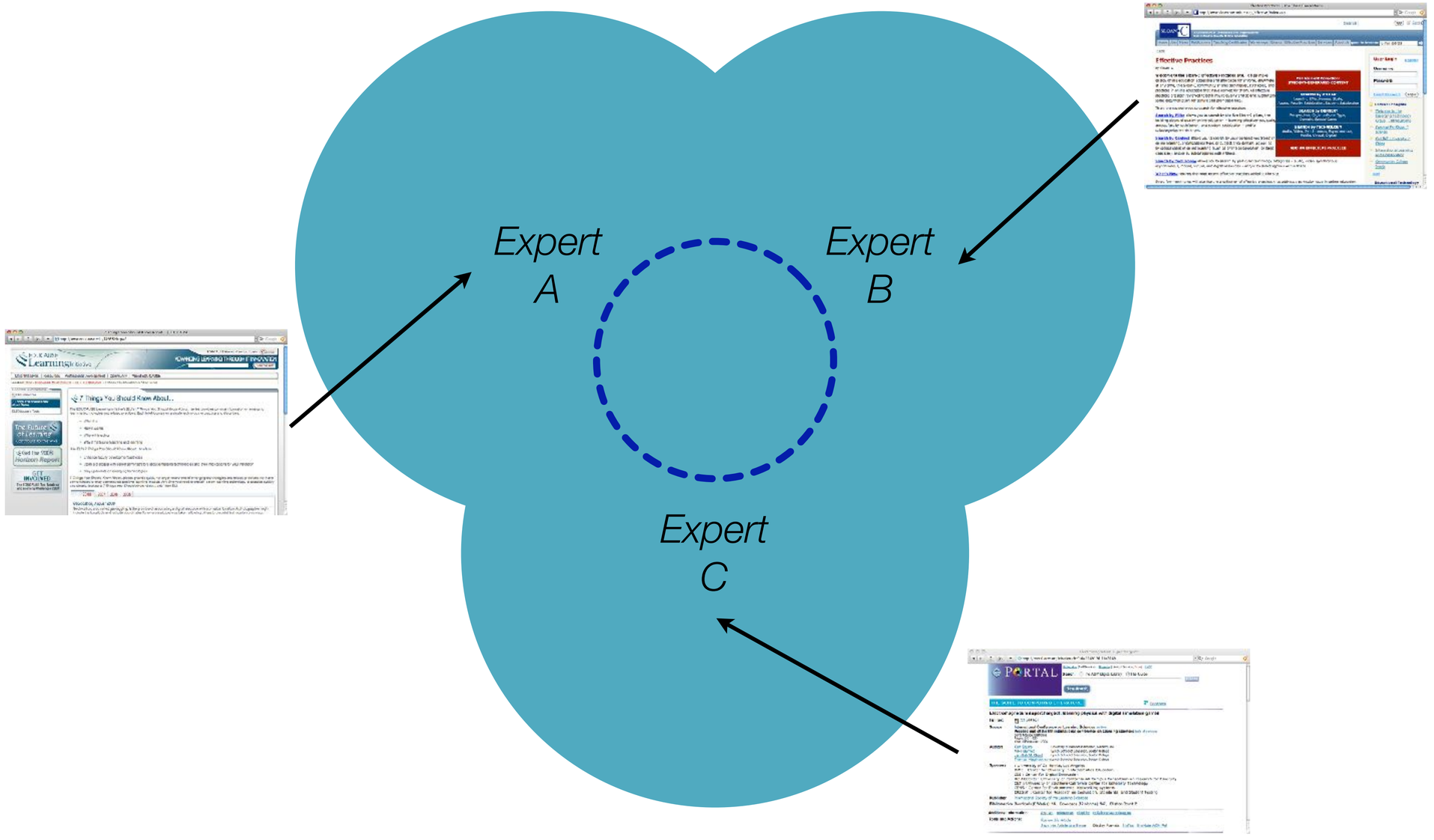
Stage 1: Bringing In the Experts



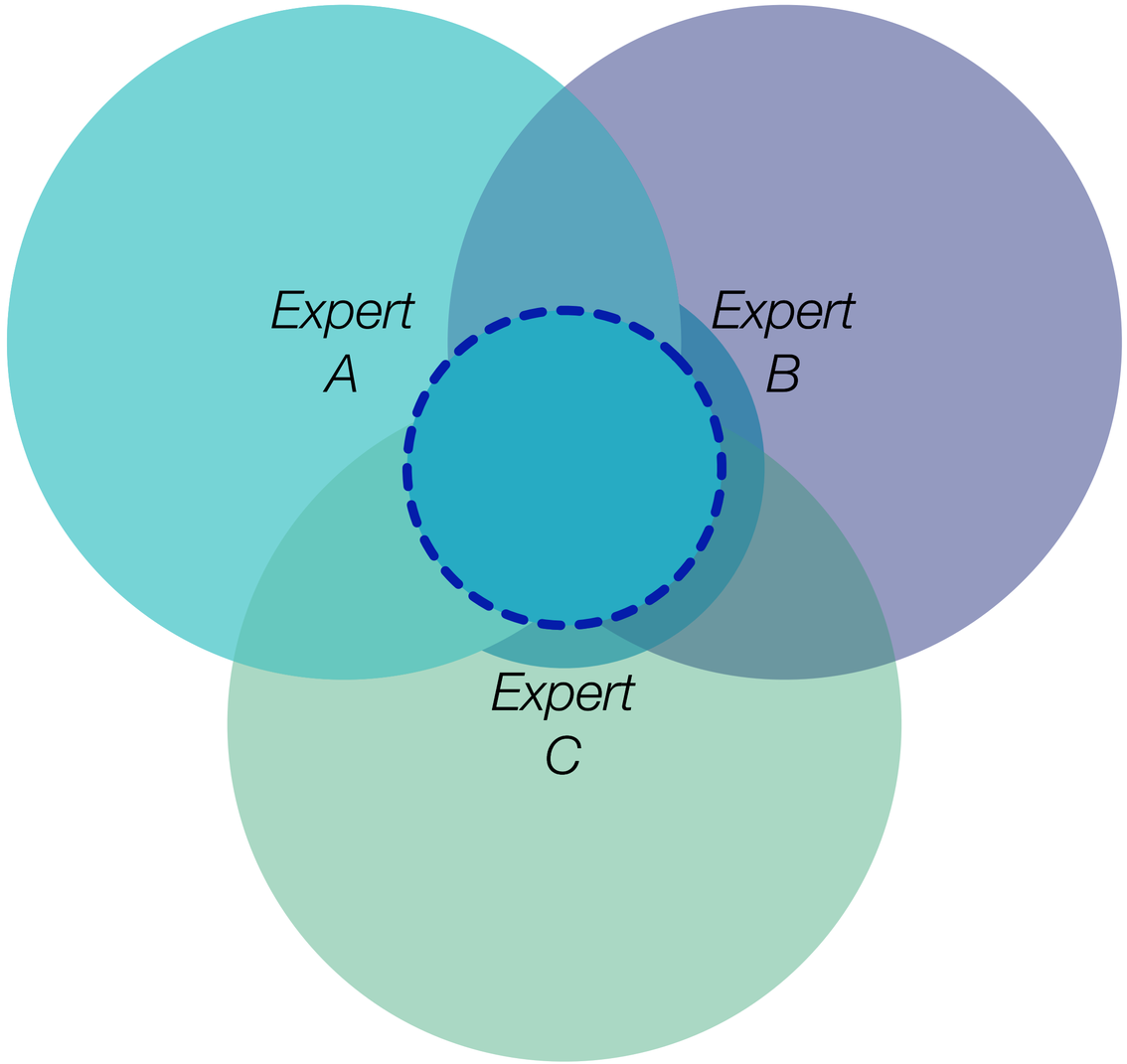
Stage 2: Aggregating the Replies



Stage 3: Informing the Process

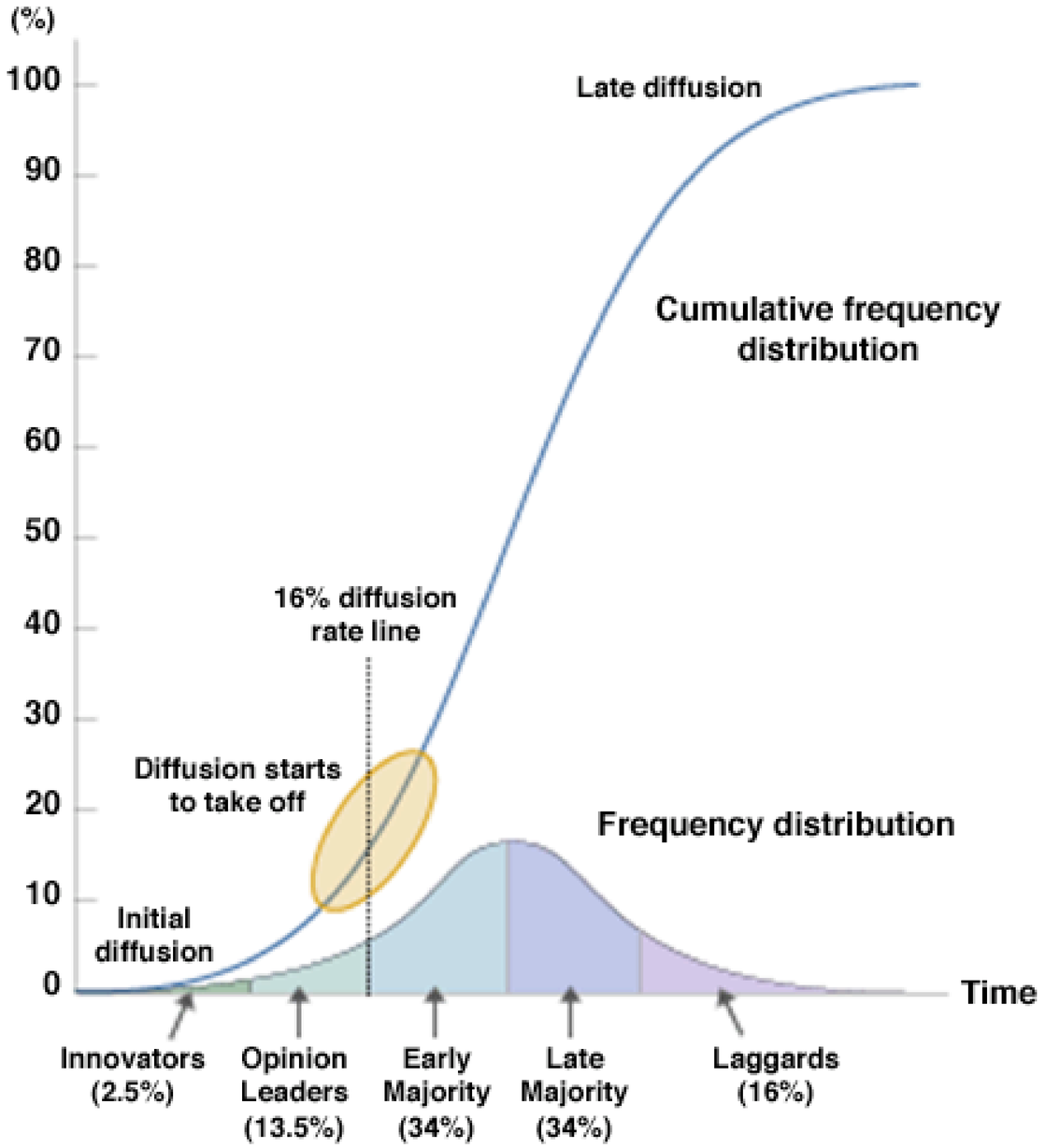


Stage 4: Selecting the Relevant Information Space



Things to Keep In Mind

- Change some, but not all, of your expert panel members each year:
    - Too much change leads to unstable recommendations, too little change leads to groupthink-like phenomena.
- Make sure you have a broad range of expertise and backgrounds in your expert panel:
    - Not everyone should be a technologist, or a teacher, or a student, or an administrator.
- Make sure your panel has innovators, opinion leaders, and early majority members (cf. Rogers) on it:
    - Panels that only feature innovators tend to produce recommendations that are not representative of the needs of the institution as a whole.

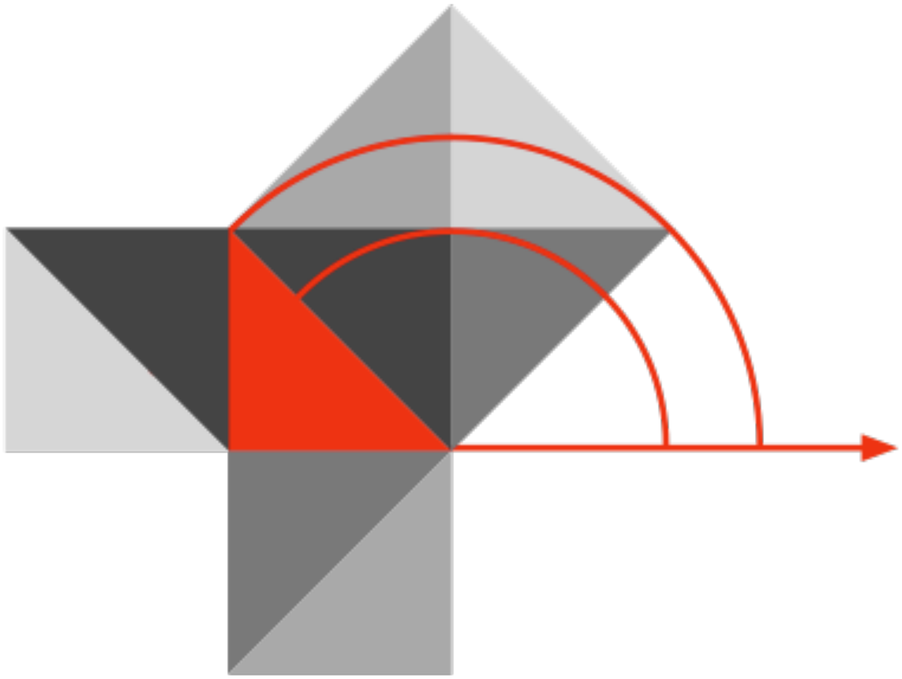


Everett M. Rogers. *Diffusion of Innovations, 5th Edition*. New York:Free Press, 2003.

Bibliography

- **The Delphi Method:**
  - Harold A. Linstone and Murray Turoff (Eds.) *The Delphi Method: Techniques and Applications*.
- **Diffusion of Innovations:**
  - Everett M. Rogers. *Diffusion of Innovations, 5th Edition*. New York:Free Press, 2003.
  - Geoffrey A. Moore. *Crossing the Chasm, Revised Edition*. New York:Harper Perennial, 1999.

Hippasus



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