Specifying the Domain of the NGSS for Assessment

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2017 Program in the Edward F. Reidy, Jr. Interactive Lecture Series

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California's Next Generation Science Standards (CA NGSS) Assessment Plan

State Board of Education
March 2016

Source: Slides from Michelle Center, Director Assessment Development and Administration

NGSS Design Team Members

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- Dr. James Pellegrino, Professor and Co-Director of the Learning Sciences Institute, University of Illinois, Chicago

- Dr. Kathleen Scalise, National Assessment of Educational Progress (NAEP) Science Director, ETS; Professor, University of Oregon

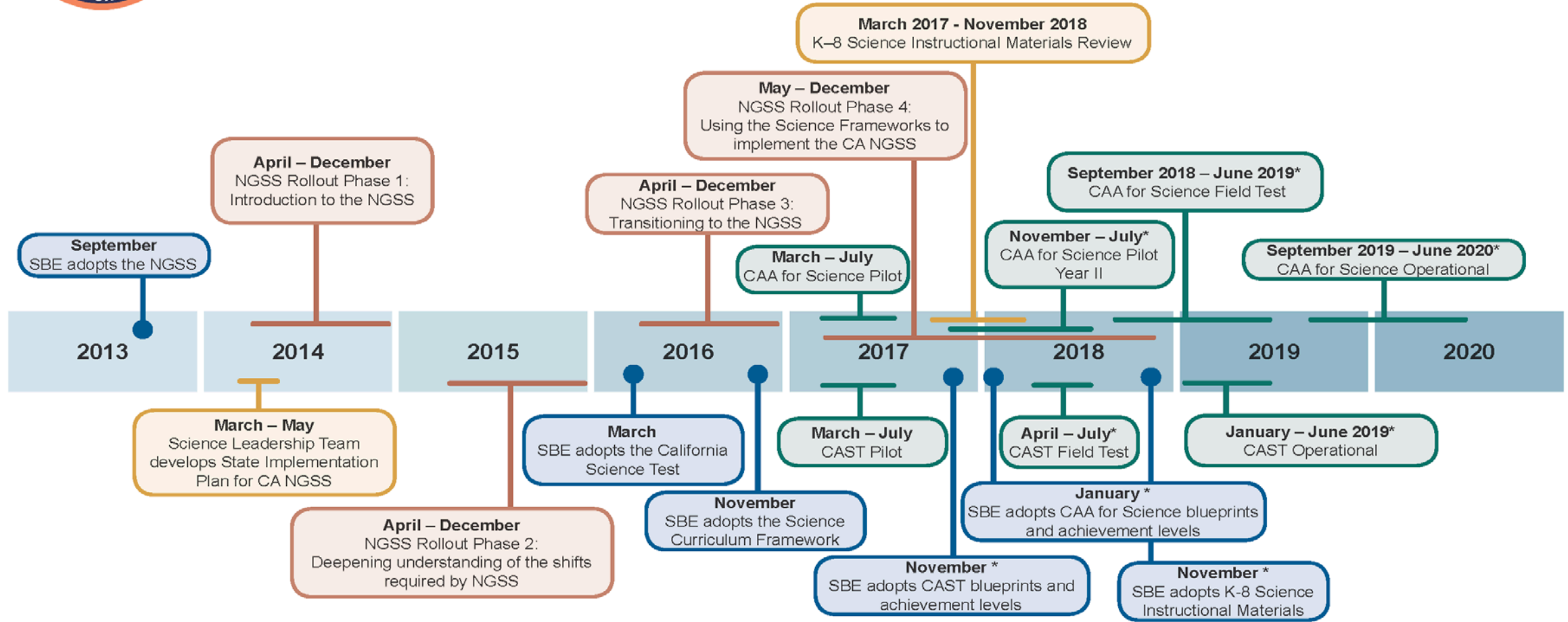- Kit Viator, Executive Director, K−12 Assessment, ETS

2014
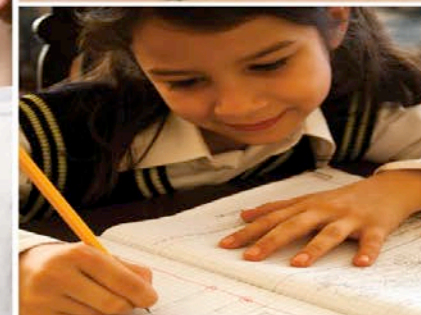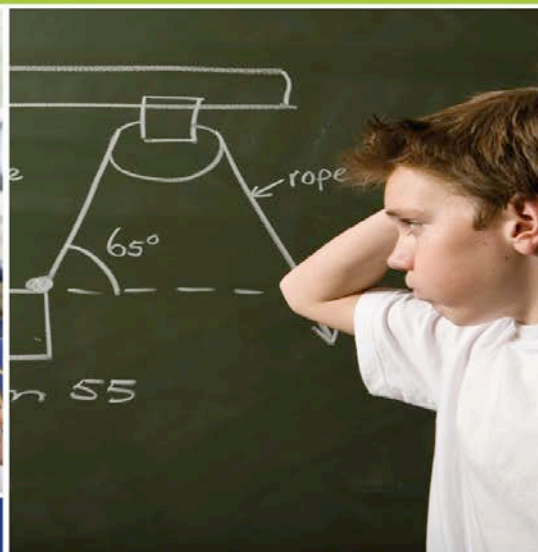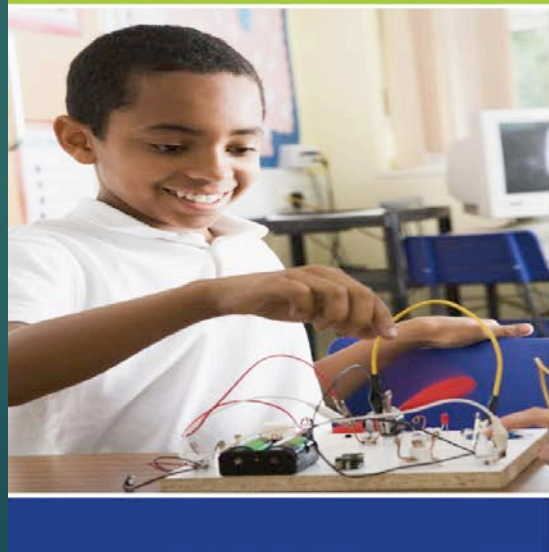
Report's Main Messages

1. Assessment tasks should allow students to engage in science practices in the context of disciplinary core ideas and crosscutting concepts. This poses a significant design challenge.

   ► Multi-component tasks that make use of a variety of response formats will be best suited for this.

   ► Selected-response questions, short and extended constructed response questions, and performance tasks can all be used, but should be carefully designed to ensure that they measure the intended construct and support the intended inference.

2. Students will need multiple and varied assessment opportunities to demonstrate their proficiencies with the NGSS performance expectations.

Next Generation Science Standards Implementation Time Line

September — SBE adopts the NGSS

April – December — NGSS Rollout Phase 1: Introduction to the NGSS

March – May — Science Leadership Team develops State Implementation Plan for CA NGSS

April – December — NGSS Rollout Phase 2: Deepening understanding of the shifts required by NGSS

April – December — NGSS Rollout Phase 3: Transitioning to the NGSS

March — SBE adopts the California Science Test

November — SBE adopts the Science Curriculum Framework

March 2017 - November 2018 — K–8 Science Instructional Materials Review

May – December — NGSS Rollout Phase 4: Using the Science Frameworks to implement the CA NGSS

March – July — CAA for Science Pilot

March – July — CAST Pilot

November * — SBE adopts CAST blueprints and achievement levels

November – July* — CAA for Science Pilot Year II

September 2018 – June 2019* — CAA for Science Field Test

April – July* — CAST Field Test

January * — SBE adopts CAA for Science blueprints and achievement levels

November * — SBE adopts K-8 Science Instructional Materials

September 2019 – June 2020* — CAA for Science Operational

January – June 2019* — CAST Operational

Timeline years: 2013, 2014, 2015, 2016, 2017, 2018, 2019, 2020

*Tentative Dates

Legend:

CAST – California Science Test
CAA – California Alternate Assessments
NGSS – Next Generation Science Standards
SBE – State Board of Education

Planning | Board Action | Professional Learning | Testing

Role of Stakeholders

CAST and CAA for Science designs were informed by feedback from:

California science teachers, including representatives of the California Science Teachers Association (CSTA)	Higher education officials, including representatives of Stanford University's Next Generation Science Standards (NGSS) Assessment Program (SNAP)	STEM reform experts, including representatives from the National Research Council (NRC), which developed *A Framework for K–12 Science Education*	Representatives from various other advocacy groups

CA NGSS Assessment Design Goals

Goals for the design are to:

- Emphasize importance of group-level results to promote improvements to teaching and learning.
- Provide models of high quality, CA NGSS-aligned assessment items.
- Create incentives for schools to provide science instruction in <u>every</u> grade, not just in tested grades
- Measure the range and depth of NGSS performance expectations by leveraging the state's distinctly large student population.
- Minimize testing time and costs.

TOM TORLAKSON
State Superintendent
of Public Instruction

CA NGSS Design Features *(continued)*

- This is a two-stage adaptive assessment.

- Uses partial matrix sampling of content

  - Group level feedback while ensuring individual student performance is measured fairly and comparably

- Administered at grades five, eight and grade ten, eleven, or twelve.

- The assessment is designed to be administered in two hours or less.

TOM TORLAKSON
State Superintendent
of Public Instruction

From slides of:

Test Design Features, CCSSO, June 2017

TIM DAVEY
Educational Testing Service

Test Design

A

- 32 mainly discrete items.
- 60 minutes,
- Contributes to student and group scores.

B

- 2 performance tasks, each with 5-6 items.
- 40 minutes.
- Contributes to student and group scores.

C

- Differs across students.
- Looks like either A *or* B, but half length.
- 13 mainly discrete items *or* 1 PT.
- 20 minutes.
- Contributes only to group-level scores.

Domain	Practice								Integrated Content Scores
	1	2	3	4	5	6	...	n	
Physical Science	CCC								
Life Science			CCC						
Earth & Space Science		Etc.							
Integrated Practice Scores									Total Score

Accumulating Scores

- Individual Total scores are based on Segments A & B only.
  - Individual subscores (perhaps augmented) may be possible for major content areas.
- Group-level score means and distributions are based on A, B and C.
  - Subscore means & distributions are likely for all major content domains and SEPs.
  - Group size sufficient to support reporting needs to be determined.
- Field test analyses will inform aggregation and reporting methodology.

CAST Training Tests

- Purpose: Provide students with an opportunity to view CA NGSS–aligned items

- Educators and students are encouraged to access the training test to see a variety of science content and item types.

Link to the CAST training tests is available at http://www.caaspp.org/practice-and-training/index.html. Select a test for grades 5, 8 or high school.

For more information about CAST and CAASPP:

California Science Test Web Page
http://www.cde.ca.gov/ta/tg/ca/caasppscience.asp

NGSS for California Public Schools, K-12
http://www.cde.ca.gov/pd/ca/sc/ngssstandards.asp

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CDE CAASPP Office
caaspp@cde.ca.gov
916-445-8765

Pocket Slides

- END HERE

Summary

Requirement

Comparable student scores

Reliable student-level scores.

Stable, valid and detailed group-level scores.

Minimize testing time.

Feature

- Segments A & B
- Adaptive content selection.

- Multi-stage adaptation in Segment A.

- Partial matrix design
- Use of variable section to deepen and broaden item sampling.

- Multi-stage adaptation.
- Partial matrix design.

CAASPP Assessments

California Assessment of Student Performance and Progress (CAASPP)

2016–17
CAASPP System
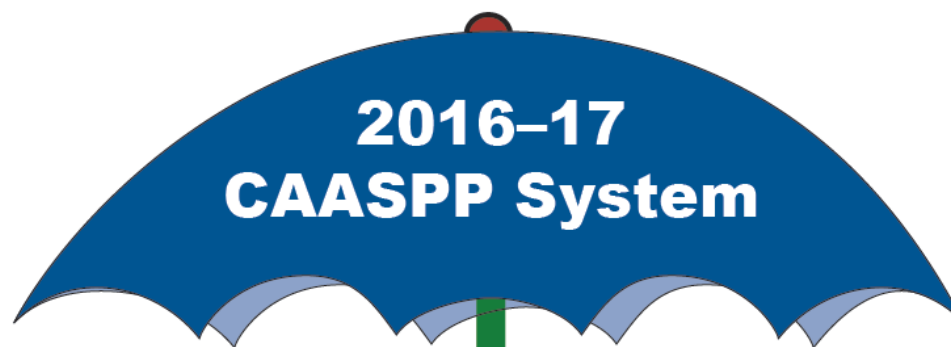
English Language Arts/Literacy and Mathematics Summative Assessments
Smarter Balanced
California Alternate Assessment (CAA)

Science
California Science Test (CAST)
CAA for Science

Reading/Language Arts
Standards-based Tests in Spanish

Additional Resources:
- Interim assessments
- Formative assessment processes (Digital Library)
- Grade two diagnostics (English language arts/literacy and mathematics)

California Department of Education

December 2016

Science Assessment: The California Way

From slides of Michelle Center
Director,
Assessment Development and
Administration Division

California Department of Education

Summary

Requirement

Comparable student scores

Reliable student-level scores.

Stable, valid and detailed group-level scores.

Minimize testing time.

# California Science Test (CAST) Design Goals

- ▶ Promote improvements to teaching and learning

- ▶ Provide models of high quality assessment items

- ▶ Incentivize science instruction in <u>every</u> grade

- ▶ Measure the range and depth of CA NGSS

- ▶ Minimize testing time and costs

- ▶ Reflect fidelity to the CA NGSS

Segment A

Segment A is two-stage adaptive, presenting selected response and machine-scored short answer items that cover a *broad* range of the CA NGSS performance expectations.

Segment A

Segment A is two-stage adaptive, presenting selected response and machine-scored short answer items that cover a *broad* range of the CA NGSS performance expectations.

Routing Test

Easier Items

Medium Difficulty

Harder Items
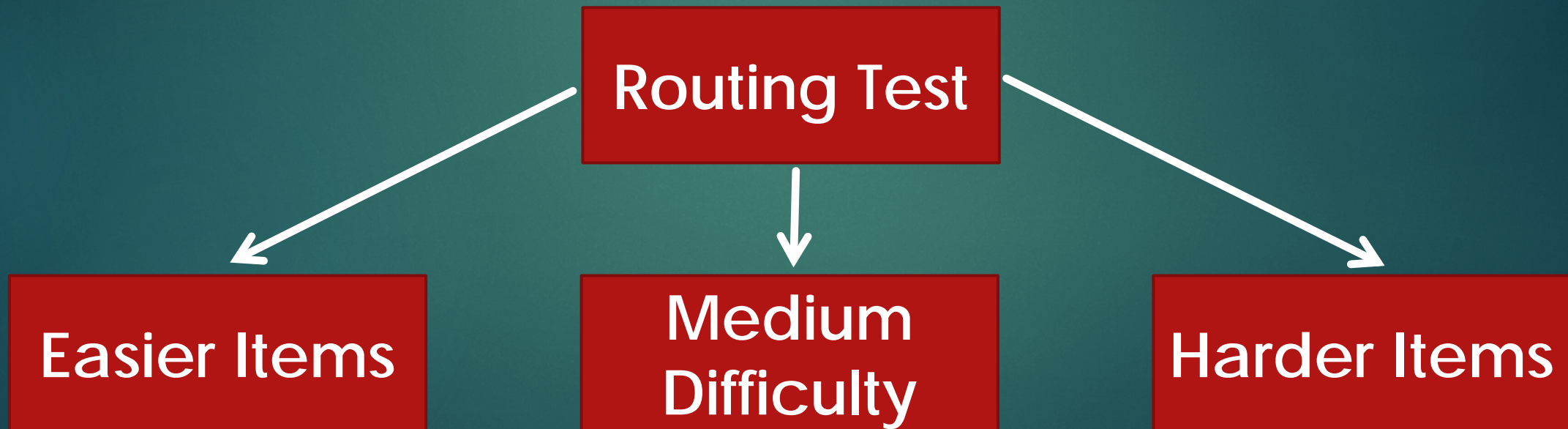
Segment B

Segment B presents a pair of performance tasks that ask students to solve complex problems set in domain-specific contexts.

Segment B

Segment B presents a pair of performance tasks that ask students to solve complex problems set in domain-specific contexts.

A Different Sort of Adaptation

► Performance in **Segment A** guides the selection of science domains presented in **Segment B**.

► The assignment of the science domains in **Segment B** is random *unless* performance on a particular domain in **Segment A** is conspicuously weak.

Variable Segment

Segment C presents items or tasks that serve a variety of purposes:

- ▶ Strengthen group-level scores by expanding the breadth and depth of the item samples on which scores are based.
  - ▪ Group scores are most valid and stable when based on dense item samples.
  - ▪ Extending the item sample across grades encourages teaching of science at all grade levels.
- ▶ Increases the size of the equating "anchor", further stabilizing trend scores.