

MDE Science Assessment Update



OCTOBER 24, 2016



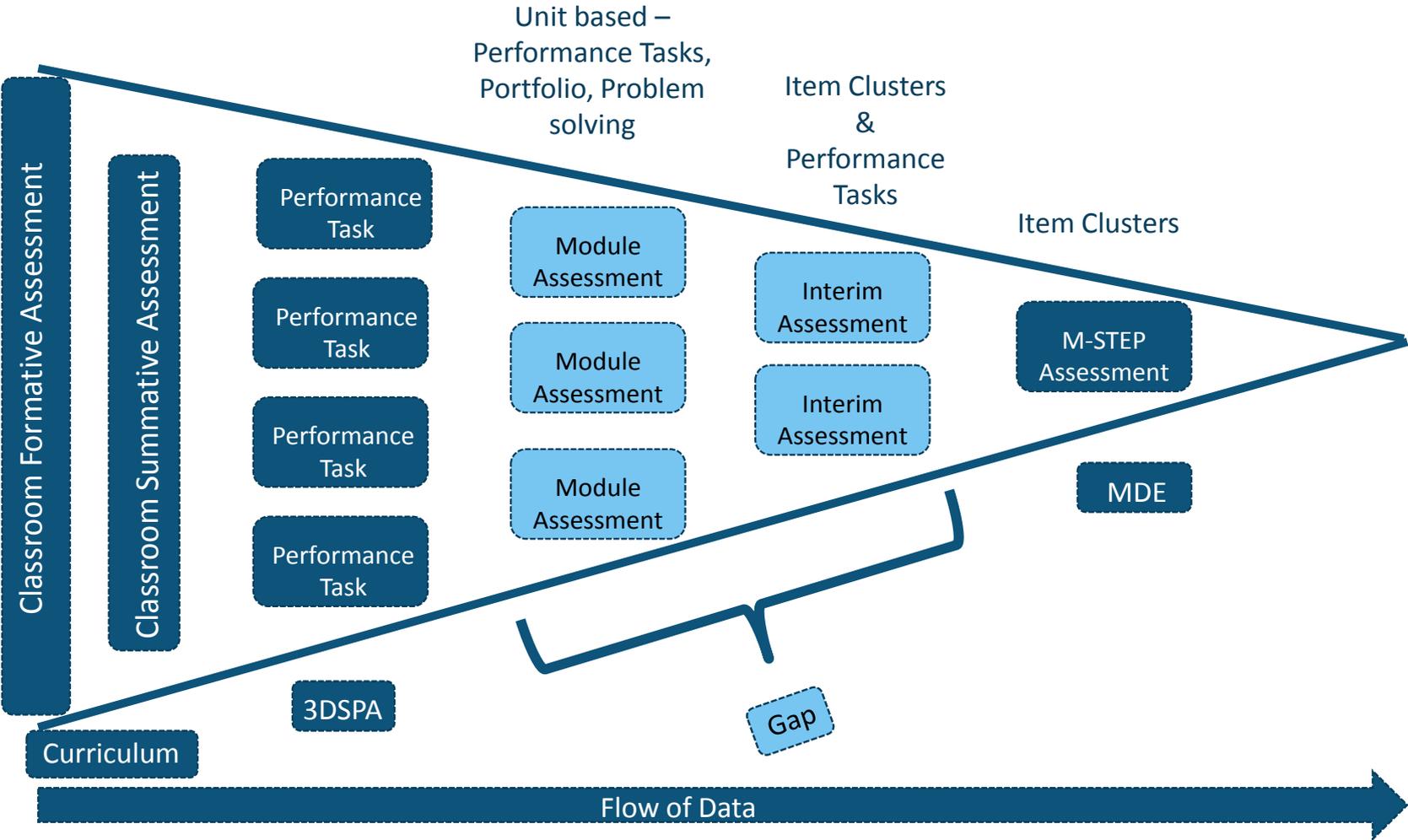
Science Assessment System Goals



- Science assessments in Michigan must be a **coherent system of assessment** to support both classroom learning and policy/monitoring functions.
- Michigan monitoring (accountability) science assessments must **move beyond traditional forms**; testing as usual will NOT suffice.
- Opportunities for **ALL students to learn and demonstrate science understanding** is an essential system component.
- **Classroom** science teaching and assessment **come first**.

NRC, 2014

Vision for Balanced Assessment System for Michigan Science Standards

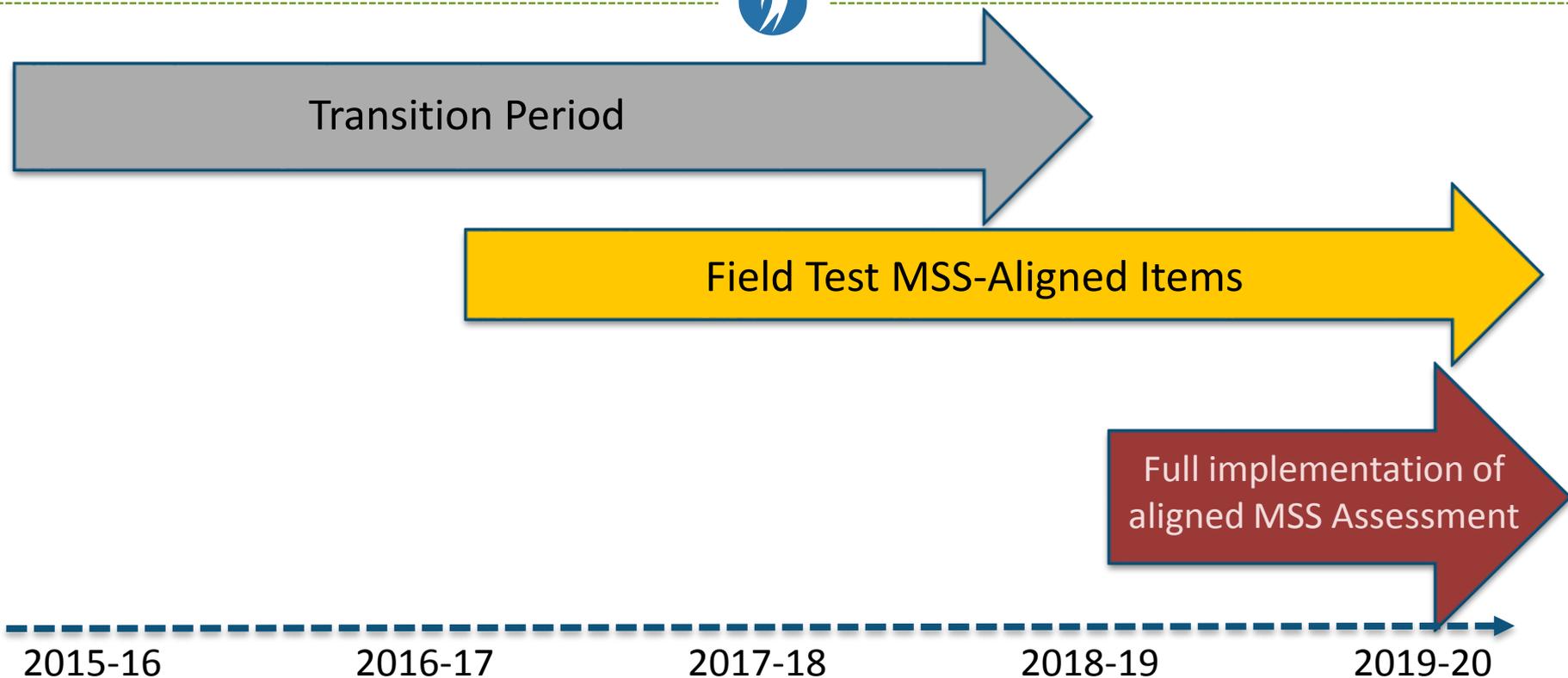


Michigan Science Assessment - Future



- SBE adopted the Michigan K-12 Science Standards in November of 2015
- New Standards – New Assessments
 - M-STEP Delivery
 - Multiple Choice, Technology Enhanced Items & Constructed Response (FT)
 - Focus on online delivery
 - Three dimensional items clusters

Assessment Transition Timeline



Implementation Timeline



- Spring 2017
 - ✦ MSTEP: Continues testing with items aligned to 2006-adopted Science Standards (Grades 4, 7, 11)
 - ✦ Separate Pilot Test New MSS aligned item clusters in select schools (Grades 5, 8, 11)
- MDE is hoping to look for flexibility through its ESSA plan to do the following:
 - **Spring 2018** – Pilot MSS aligned item clusters (Grades 5, 8, 11)
 - ✦ Accountability TBD
 - **Spring 2019** - Aligned MSS M-STEP State-wide Field Test (Grades 5, 8, 11)
 - ✦ Accountability TBD
 - **Spring 2020** - Fully operational MSS assessment (Grades 5, 8, 11)

Major shifts



- Move from Grade 4 & 7 → 5 & 8
- Practices embedded throughout
- Grade 11 and Grade 8 tests assess the entire band of standards (Middle School 6-8; High School 9-12)
- Grade 5 test to assess 3-5 grade standards

Michigan Merit Curriculum Graduation Requirements



- Michigan Merit Curriculum requirements are:
 - Students have to take 3 credits of science
 - The state law says grade 11 students must take the MME
 - Seat time and course types are not requirements

MSS Assessment Development Cycle



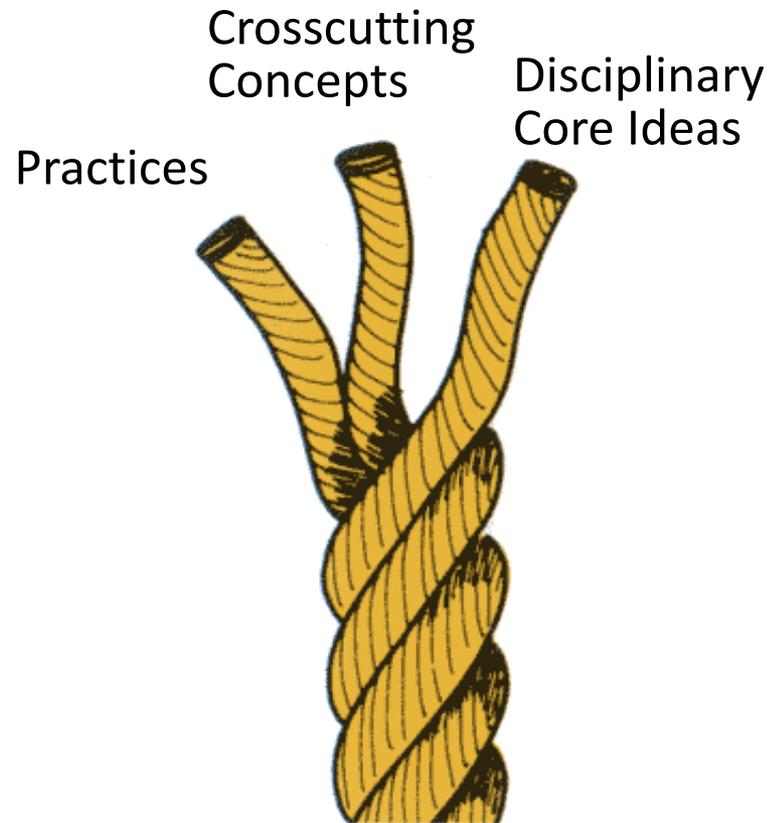
- STEP 1:** Develop Blueprints and Item Specifications
- STEP 2:** Local Education Expert Teams Develop Item Clusters
- STEP 3:** Feedback on draft item clusters and revisions
- STEP 4:** Local Education and Research Expert Bias/Content Review Committees
- STEP 5:** Cognitive Labs
- STEP 6:** Field testing / Pilot Testing
- STEP 7:** Data Review Committees / Local Education Experts
- STEP 8:** Revisions, if necessary
- STEP 9:** Operational
- STEP 10:** Local Education Expert Standard Setting *(Only done with new tests)*



NGSS / MSS calls for students to become proficient in science and engineering:



- Demands integration of 3 dimensions – not separate treatment of “scientific ideas” and “inquiry”
- Need to pay attention to how we build understanding over time and across the disciplines
- Need to involve learners in using science practices to develop and apply scientific & engineering ideas

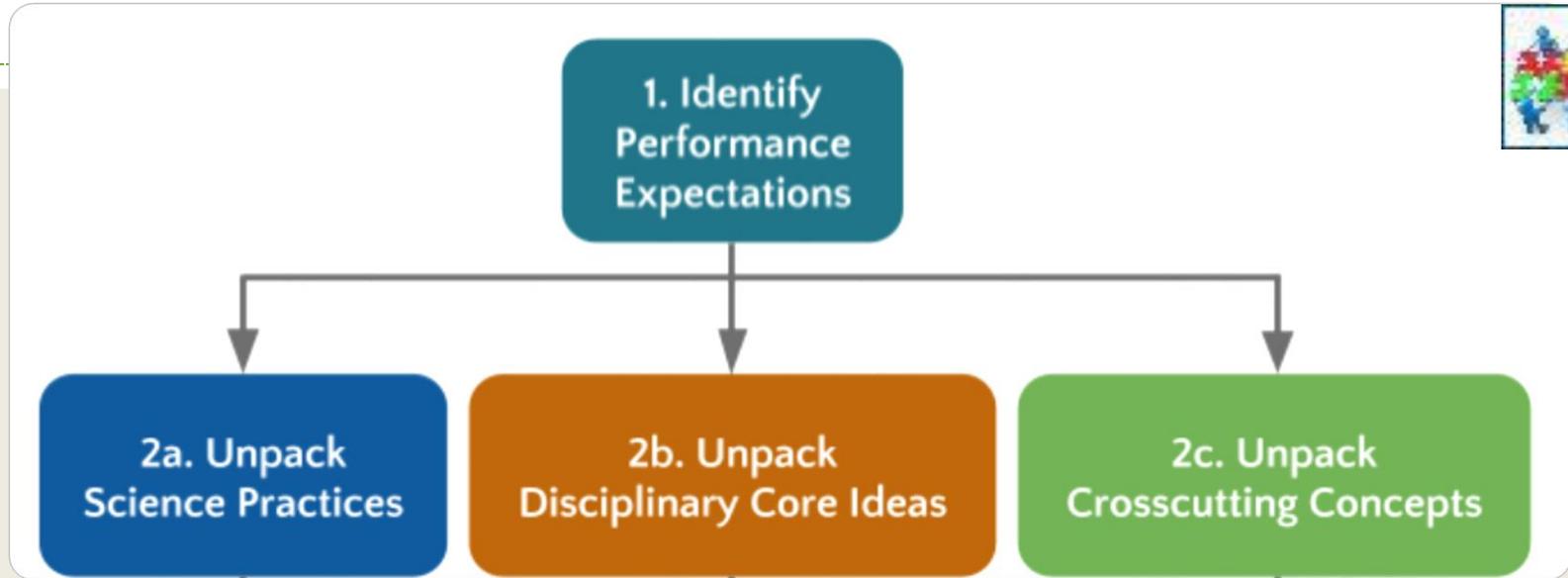


Standards Expressed as Performance Expectations



- Combine practices, core ideas, and crosscutting concepts into a single statement of ***what is to be assessed***
- Requires students to demonstrate ***knowledge-in-use***
- PEs are not instructional strategies or objectives for a lesson – ***they describe achievement, not instruction***
- Intended to describe the end-goals of instruction – ***the student performance at the conclusion of instruction***

Design Approach – Evidence Centered Design



Phase 1: Unpack the Dimensions of the PE

Phase 2: Determine Evidence of high level of performance

Phase 3: Develop out Item Cluster that supports high level of performance

Evidence Centered Design: Michigan Science Assessment Claims



Student Level Claim: Student has demonstrated grade band proficiency of Life Science, Earth Science, and Physical Science Topic Bundles using all dimensions represented in the standards.

District/State Level Claim: Students have demonstrated grade band proficiency to explain the presented phenomenon (local or global) and design solutions to problems using all dimensions represented in the given topic bundle.

Equity Claim: Non-dominant and dominant groups of students have the opportunity to demonstrate grade band proficiency through the use of engineering, local contexts, and relevant phenomena.

Scientific Literacy Claim: Students demonstrate grade band proficiency in using the three dimensions to critically evaluate scientific and technological information in order to design solutions to problems and investigate phenomena.

PE Bundle – Topic Bundles



Bundles should enable assessment via a **single natural phenomenon** presented within a stimulus.

MS. Structure, Function, and Information Processing	MS. Space Systems	MS. Structure and Properties of Matter
MS. Matter and Energy in Organisms and Ecosystems	MS. History of Earth	MS. Chemical Reactions
MS. Interdependent Relationships in Ecosystems	MS. Earth's Systems	MS. Forces and Interactions
MS. Natural Selection and Adaptations	MS. Weather and Climate	MS. Energy
MS. Growth, Development, and Reproduction of Organisms	MS. Human Impacts	MS. Waves and Electromagnetic Radiation

Example Middle School Topic Bundle



Waves and Electromagnetic Radiation

- MS-PS4-1 Use mathematical representations to describe a simple model for waves that includes how the amplitude of a wave is related to the energy in a wave.
- MS-PS4-2 Develop and use a model to describe that waves are reflected, absorbed, or transmitted through various materials.
- MS-PS4-3 Integrate qualitative scientific and technical information to support the claim that digitized signals are a more reliable way to encode and transmit information than analog signals.

- 3 SEPs: Math Rep., Modeling, Obt. Eval. & Com Info.
- 2 CCCs: Patterns, Structure & Function
- 3 DCIs: PS4.A, PS4.B, PS4.C

Topic Bundles Middle School



Topic Bundle	Domain	No. PEs
Structure, Function, and Information Processing	Life Science	4
Matter and Energy in Organisms and Ecosystems	Life Science	5
Interdependent Relationships in Ecosystems	Life Science	2
Natural Selection and Adaptations	Life Science	5
Growth, Development, and Reproduction of Organisms	Life Science	5
Space Systems	Earth Science	3
History of Earth	Earth Science	3
Earth's Systems	Earth Science	3
Weather and Climate	Earth Science	3
Human Impacts	Earth Science	3

Topic Bundles Middle School Continued



Topic Bundle	Domain	No. PEs
Structure and Properties of matter	Physical Science	3
Chemical Reactions	Physical Science	3
Forces and Interactions	Physical Science	5
Energy	Physical Science	5
Waves and Radiation	Physical Science	3
Engineering Design	Engineering	4
Total Topic Bundles	16	59

Middle School Sampling / Blueprint



	Time
Life Science – Topic Bundle 1	10-15 minutes
Life Science – Topic Bundle 2	10-15 Minutes
Physical Science – Topic Bundle 1	10-15 Minutes
Physical Science – Topic Bundle 2	10-15 Minutes
Earth Science – Topic Bundle 1	10-15 Minutes
Earth Science – Topic Bundle 2	10-15 Minutes
Field Test Topic Bundle 1	10-15 Minutes
Field Test Topic Bundle 2	10-15 Minutes
Total Time	80-120 Minutes (Two 40-60 Minute Sessions)

Item Clusters



- Base unit for test development.
- Set of items (4-8), some items having more than one part, that are based on at least one common stimulus
- Individual items are not intended to be separated and used independently from one another.

Item Clusters



- Each individual item within the cluster should align with at least two dimensions of the Topic Bundle (e.g., DCI/SEP, or SEP/CCC).
- At least one item in a cluster should be aligned to all three dimensions.
- The overall item cluster must demonstrate alignment to all three dimensions represented in the Topic Bundle (SEPs, DCIs, CCCs).

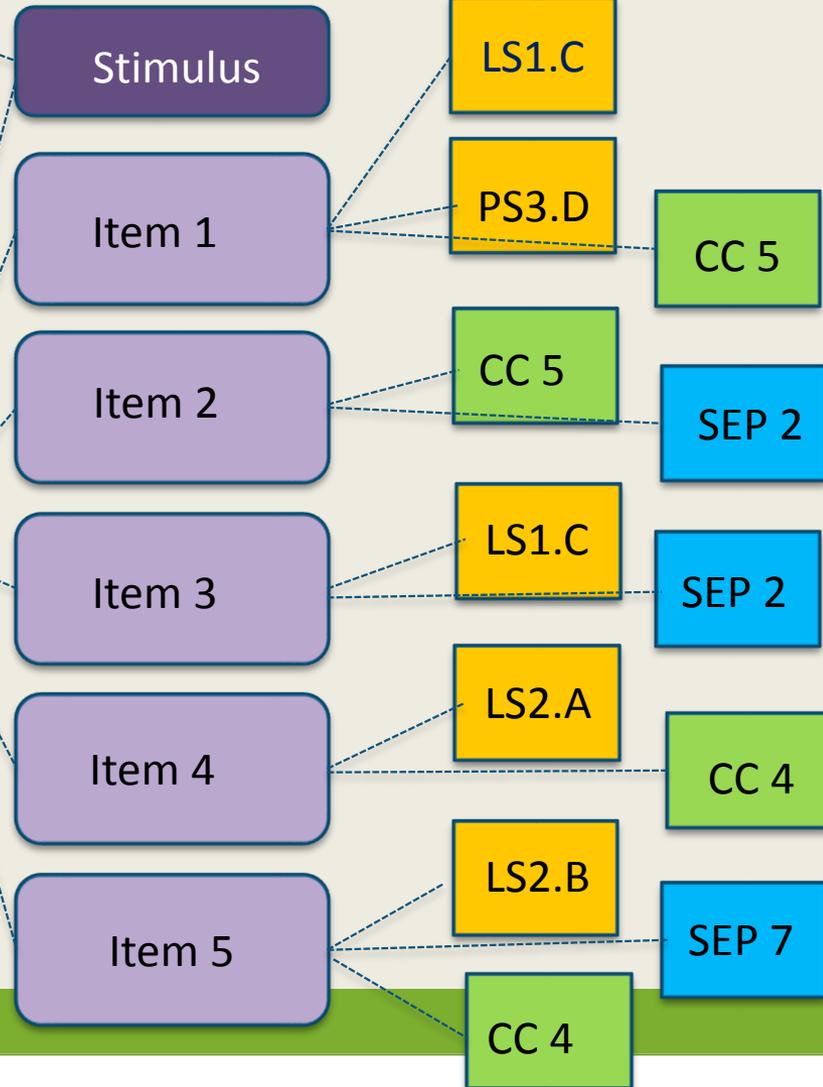
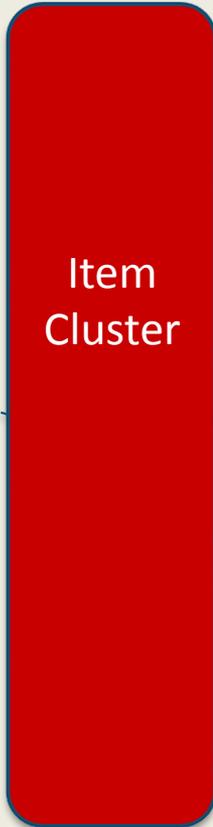
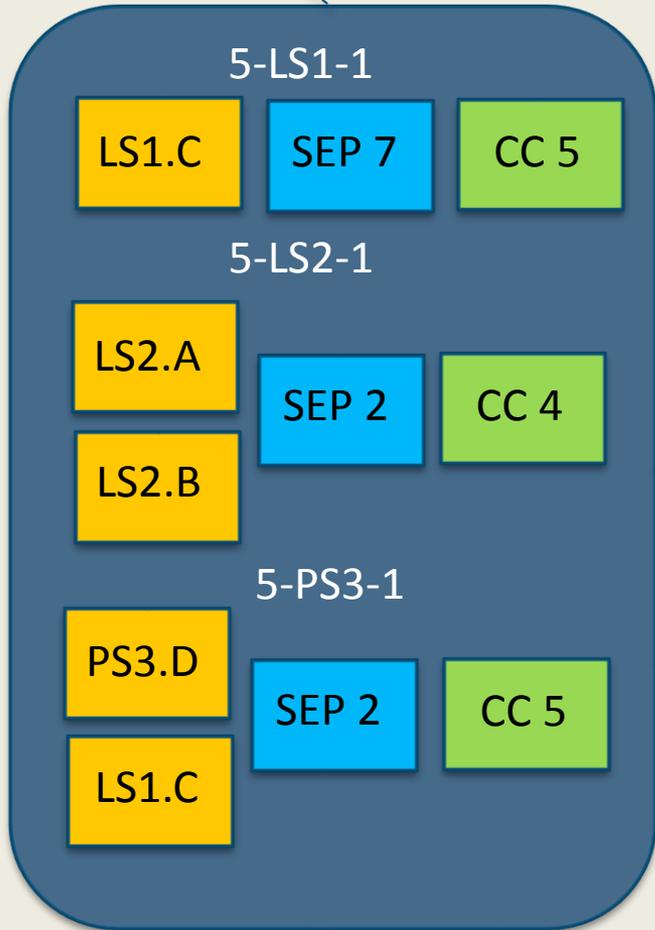
Phenomenon

Example Item Cluster Map



Topic Bundle

Structure and Properties of Matter



Sample Item Cluster Designer Task



Structure, Function, and Information Processing

Performance Expectations



Conduct an investigation to provide evidence that living things are made of cells; either one cell or many different numbers and types of cells. MS-LS1-1

▶ Clarification Statement and Assessment Boundary



Develop and use a model to describe the function of a cell as a whole and ways parts of cells contribute to the function. MS-LS1-2

▶ Clarification Statement and Assessment Boundary



Use argument supported by evidence for how the body is a system of interacting subsystems composed of groups of cells. MS-LS1-3

▶ Clarification Statement and Assessment Boundary



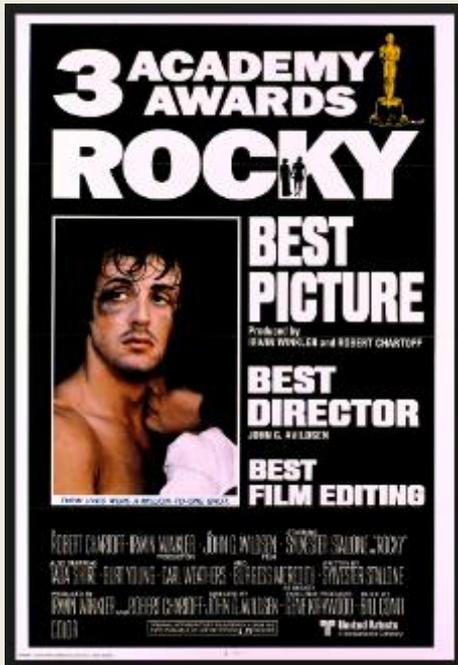
Gather and synthesize information that sensory receptors respond to stimuli by sending messages to the brain for immediate behavior or storage as memories. MS-LS1-8

▶ Clarification Statement and Assessment Boundary

Peer & Content Review



- What it isn't...



PRESIDENTIAL DEBATE



“Now that we're down to three candidates, we're switching to a 'rock, paper, scissors' format.”

How might you use your item cluster development experience to inform your work and/or the work of your colleagues?



“I think it highlights the importance of starting with unpacking and the importance of using and referring to the Framework for K-12 Science Education.”
Grade 11 Participant - July 2016

“I learned so much the past week from experts in the room and the conversation really helps me think about what it means to assess students' engagement in practices.” Grade 8 Participant – June 2016

“I will be sharing the process we went through and training teachers in my district.” Grade 11 Participant - July 2016

“I will definitely share this with teachers to help them understand how phenomena-based teaching will prepare their students for the new science assessment.” Grade 8 Participant – June 2016

“This process has informed how I think about instruction and unit planning, development of formative assessments, using PEs flexibly” Grade 8 Participant – June 2016

What is your overall impression of the direction of MSS state assessments?



“I was very impressed with the writers, facilitators, questions and deep beliefs in the education of students.” Grade 11 Participant – July 2016

“I like to format, and requirements for the thinking and processing!” Grade 11 Participant – July 2016

“A huge improvement. I love the way that the assessment surrounds phenomena.” Grade 8 Participant – June 2016

“I am so happy, thankful and hopeful for the future.” Grade 8 Participant – June 2016

“This is a very big task, developing questions for this assessment is so much more complex than what has been taking place in at least the last 10 years.” Grade 11 Participant – July 2016

“I am so excited! I think that assessing at the topic bundle level is really important for moving people away from ‘teaching to the test.’” Grade 8 Participant – June 2016

“I applaud the effort of trying to meet the needs of competing forces.” Grade 11 Participant – July 2016

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they're
coherent
assessing
including
education
surrounds
familiar
three
integrate
instance
authentically
continues
forms
hard science
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thank
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Michigan Science Standards Item Cluster Development



Grade 11 #MSSICD. Ready for another week of fun! @akolonich @WendyJohnsonMI @edis2012 @mskmayer pic.twitter.com/iq0s7dFkp3

TAMARA (TJ) SMOLEK @TJHECKYEAH · 22 DAYS AGO



Wendy Johnson
@WendyJohnsonMI

Let's get this #NGSS party started!!! #MSSICD twitter.com/tjheckyeah/sta...

22 DAYS AGO