

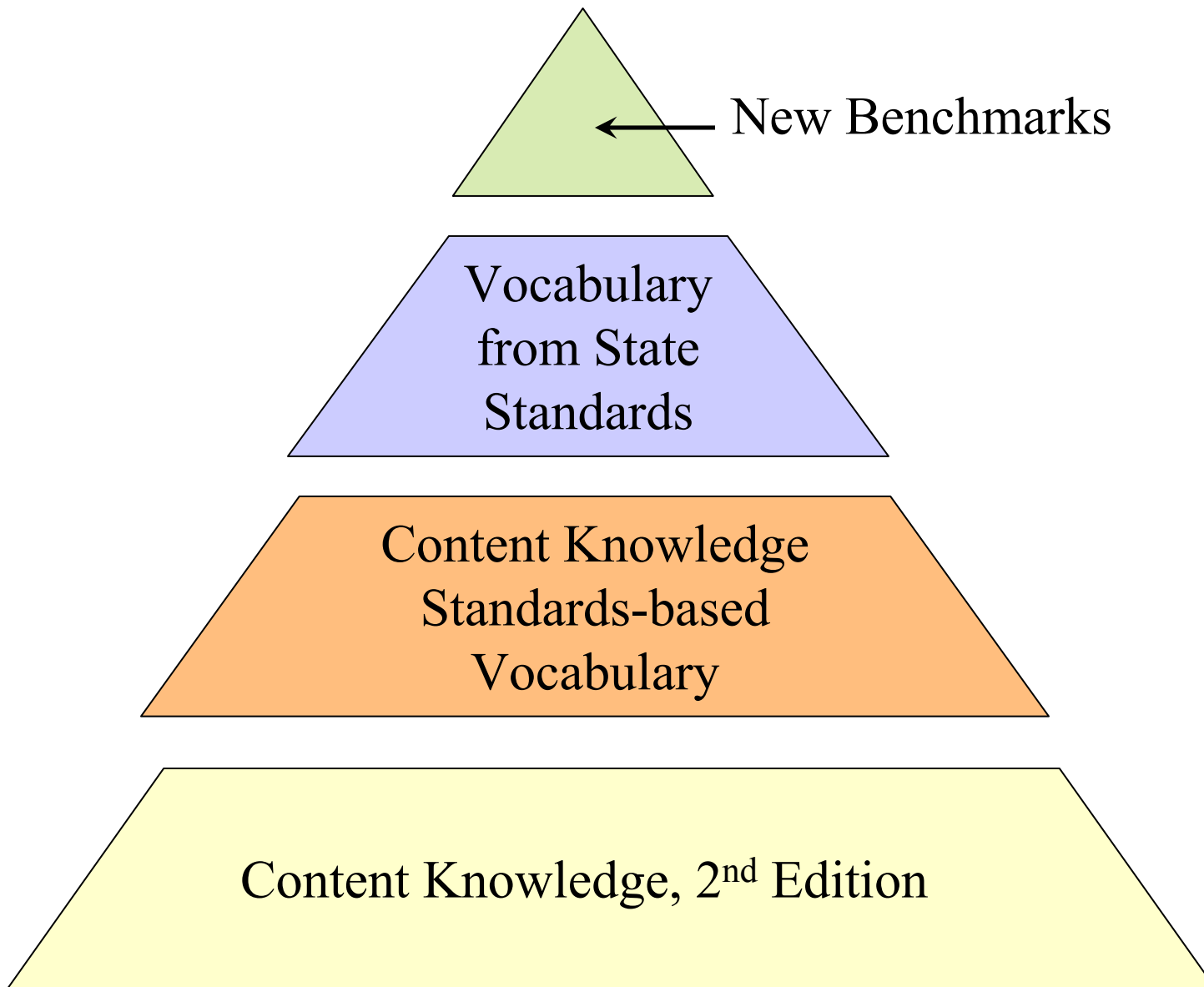
# StandardConnection

NSF/NSDL-2

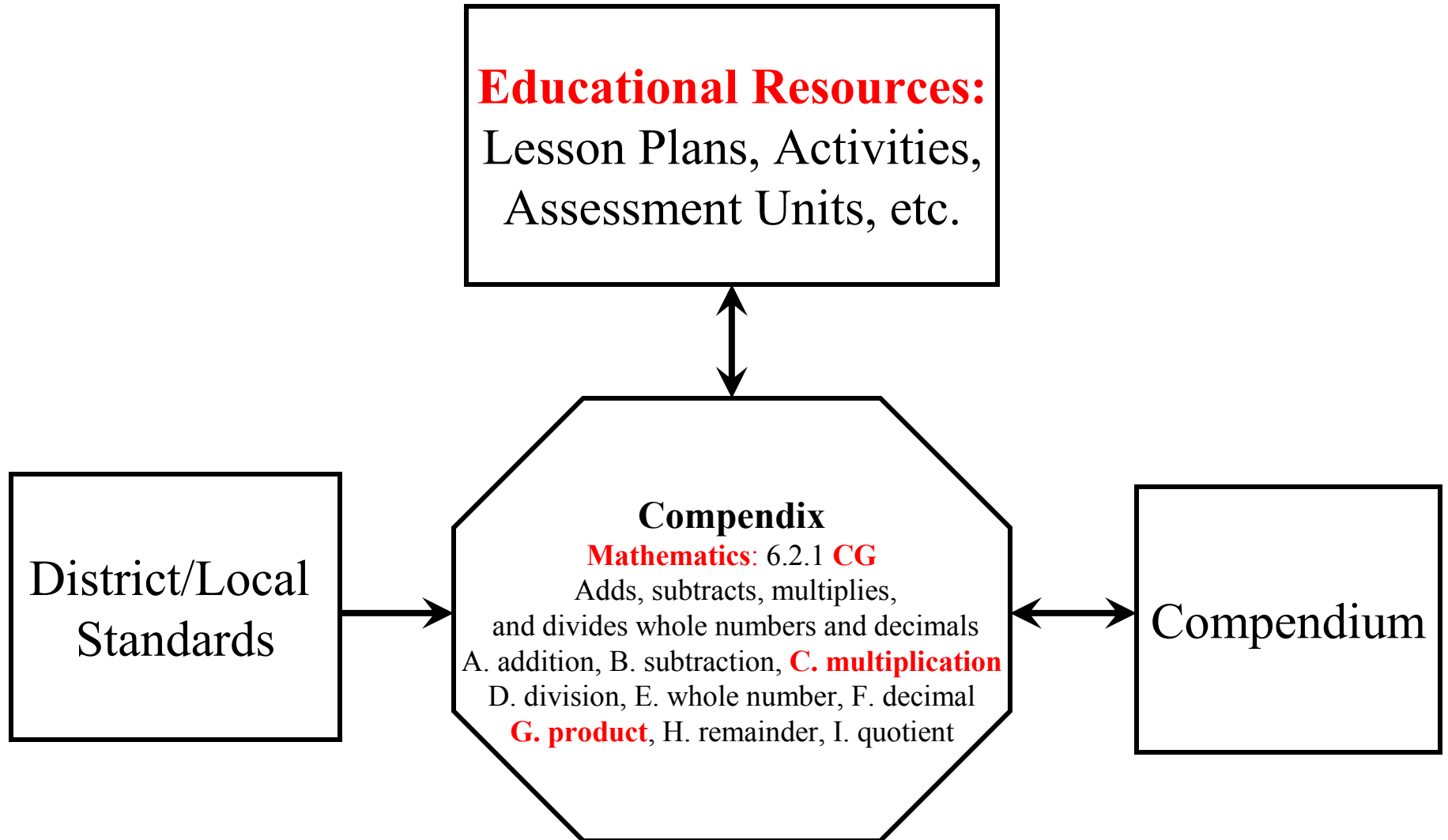
Automatic Mapping of Resources to  
Content Standards

# Participating Organizations

- Achieve.org
  - Fred Balfour
- McREL (Mid-continent Research for Education and Learning)
  - John Kendall
- Syracuse University Center for Natural Language Processing
  - Elizabeth Liddy
- Information School of the University of Washington
  - Stuart Sutton



# StandardConnection Components



## California, 2<sup>nd</sup> Grade

Use repeated addition, arrays, and counting by multiples to do multiplication.

3.2.1 **AC**

## Compendix, Grades 3-5

3.2.1 Adds, subtracts, multiplies, and divides whole numbers and decimals

**A. addition**, B. subtraction, **C. multiplication**, D. division, E. whole number, F. decimal, G. product, H. remainder, I. quotient

# Lesson Plan: “Simultaneous Equations Using Elimination”

**Submitted by:** Leslie Howe

**Email:** teachhowe2@hotmail.com

**School/University/Affiliation:** Farragut High School,  
Knoxville, Tn

**Grade Level:** 9, 10, 11, 12, Higher education, Vocational education, Adult/Continuing education

**Subject(s):** Mathematics / Algebra

**Duration:** 30 minutes

**Description:** The Elimination method is an effective method for solving a system of two unknowns. This lesson provides students with immediate feedback using a computer program or online applet.

**Goals:** The student will be able to solve a system of two equations when there are two unknowns.

**Materials:** Online computer applet / program  
<http://www.usit.com/howe2/eqations/index.htm>  
Similar downloadable C++ application available at the same site.

**Procedure:** A system of two unknowns can be solved by multiplying each equation by the constant that will make the coefficient of one of the variables become the LCM (least common multiple) of the initial coefficients. Students may use the scroll bars on the indicated applet to multiply the equations by constants until the GCF is located. When the "add" button is activated after the correct constants are chosen one of the variables will be eliminated. The process can be repeated for the second variable. The student may enter the solution of the system by using scroll bars. When the "check" button is pressed the answer is evaluated and the student is given immediate feedback. (The same procedure can be done using the downloadable C++ application.) After 5-10 correct responses the student should make the transition to paper and solve the equations without using the applet. The student can still use the applet to check the answer. The applet will generate problems in a random fashion. All solutions are integers.

**Assessment:** The lesson itself provides alternative assessment. The correct responses are recorded.

## “Simultaneous Equations Using Elimination”



### Compendix

### Michigan

#### Mathematics Benchmark: 8.4.11ABCJ

Grades: 9-12

3. Solve linear equations and inequalities algebraically and non-linear equations using graphing, symbol-manipulating or spreadsheet technology; and solve linear and non-linear systems using appropriate methods.



#### Mathematics Benchmark: 8.4.11ABCJ

Level 4 (Grades 9-12)

Uses a variety of methods (e.g., with graphs, algebraic methods, and matrices) to solve systems of equations and inequalities

#### Vocabulary:

**A. solution method**, **B. system**, **C. equation**, D. inequality, E. graph, F. algebraic method, G. matrix, H. substitution, I. consistency, **J. elimination**, K. linear programming, L. Cramer's rule, M. Gauss-Jordan elimination, N. problem solving

**“Simultaneous Equations  
Using Elimination”**

**URI: M8.4.11ABCJ**

**Washington Mapping**

**California Mapping**

**New York Mapping**

**Florida Mapping**

**Arkansas Mapping**

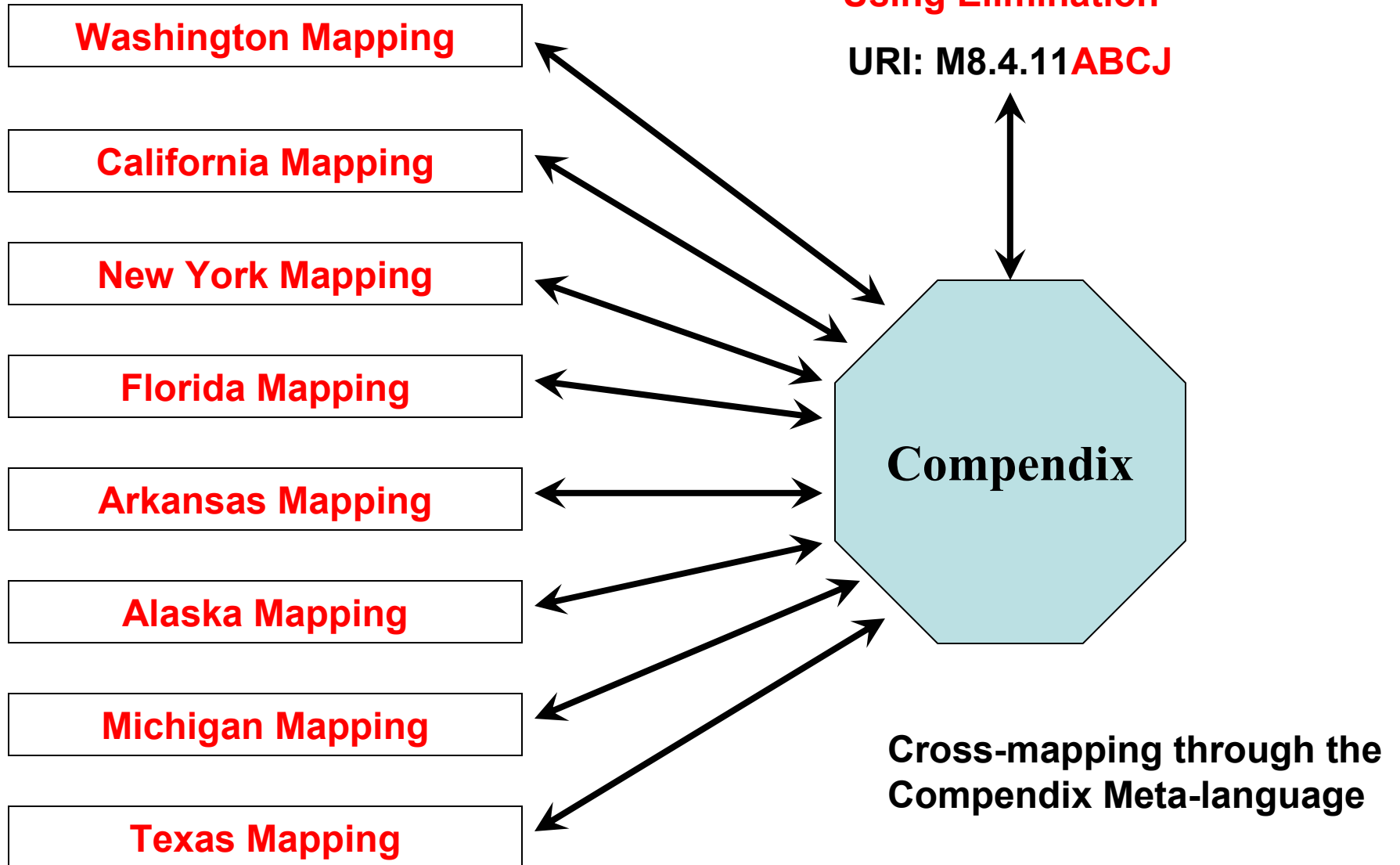
**Alaska Mapping**

**Michigan Mapping**

**Texas Mapping**

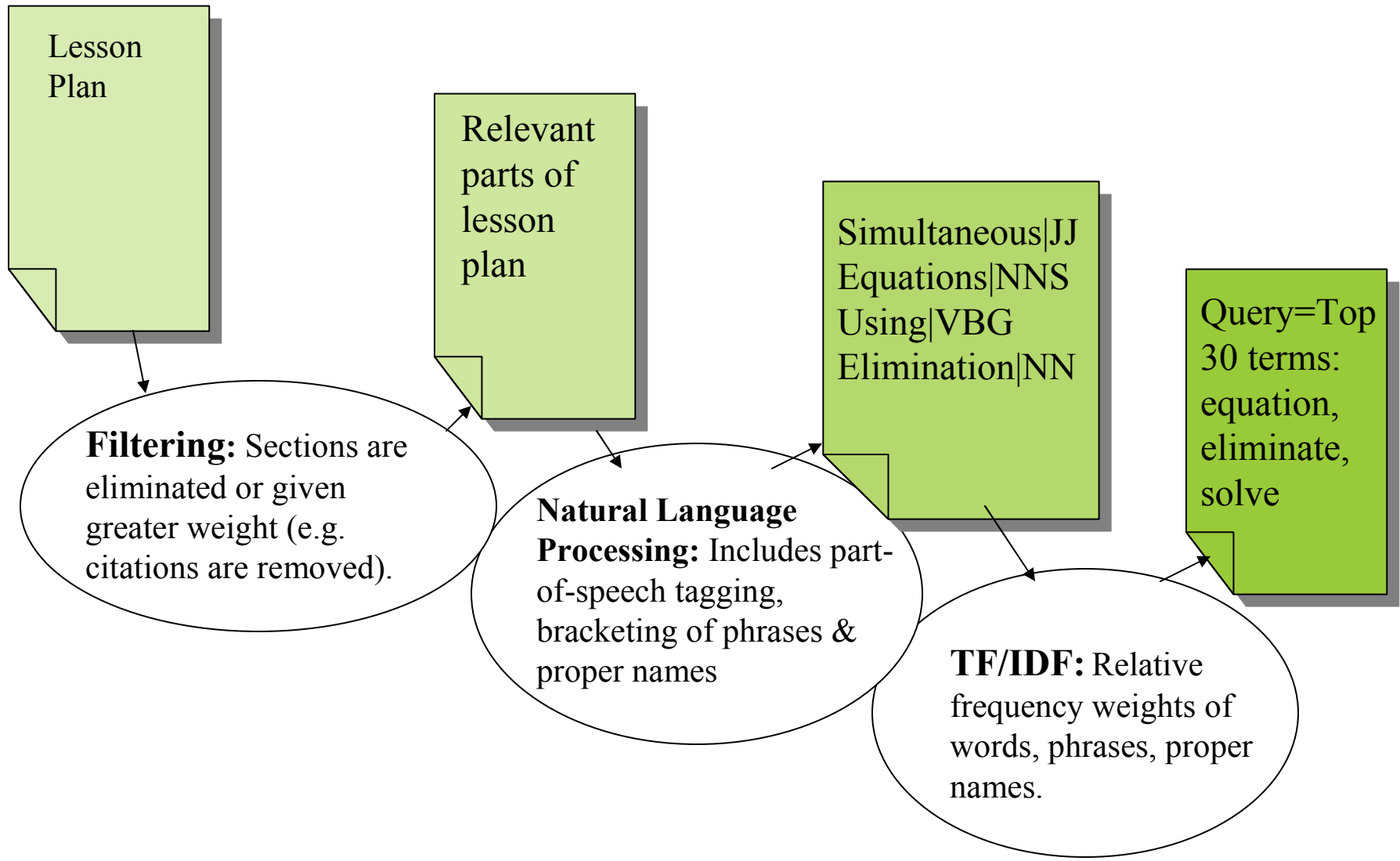
**Compendix**

**Cross-mapping through the  
Compendix Meta-language**

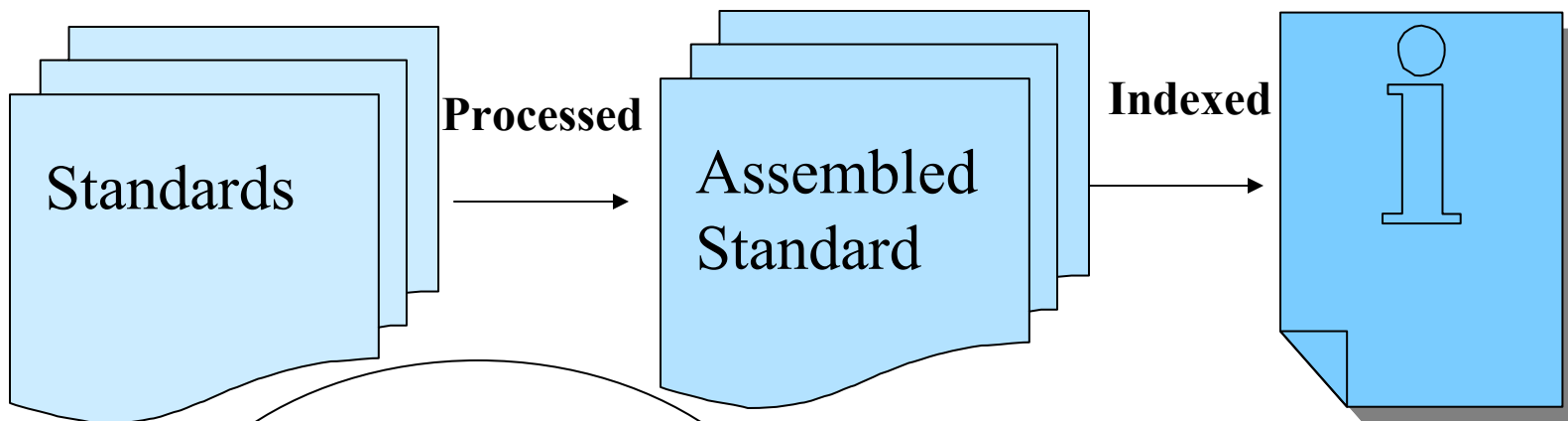


**The Retrieval Process:  
Lesson Plans as Query  
and  
Standards as Documents**

# QUERY = Processed Lesson Plan

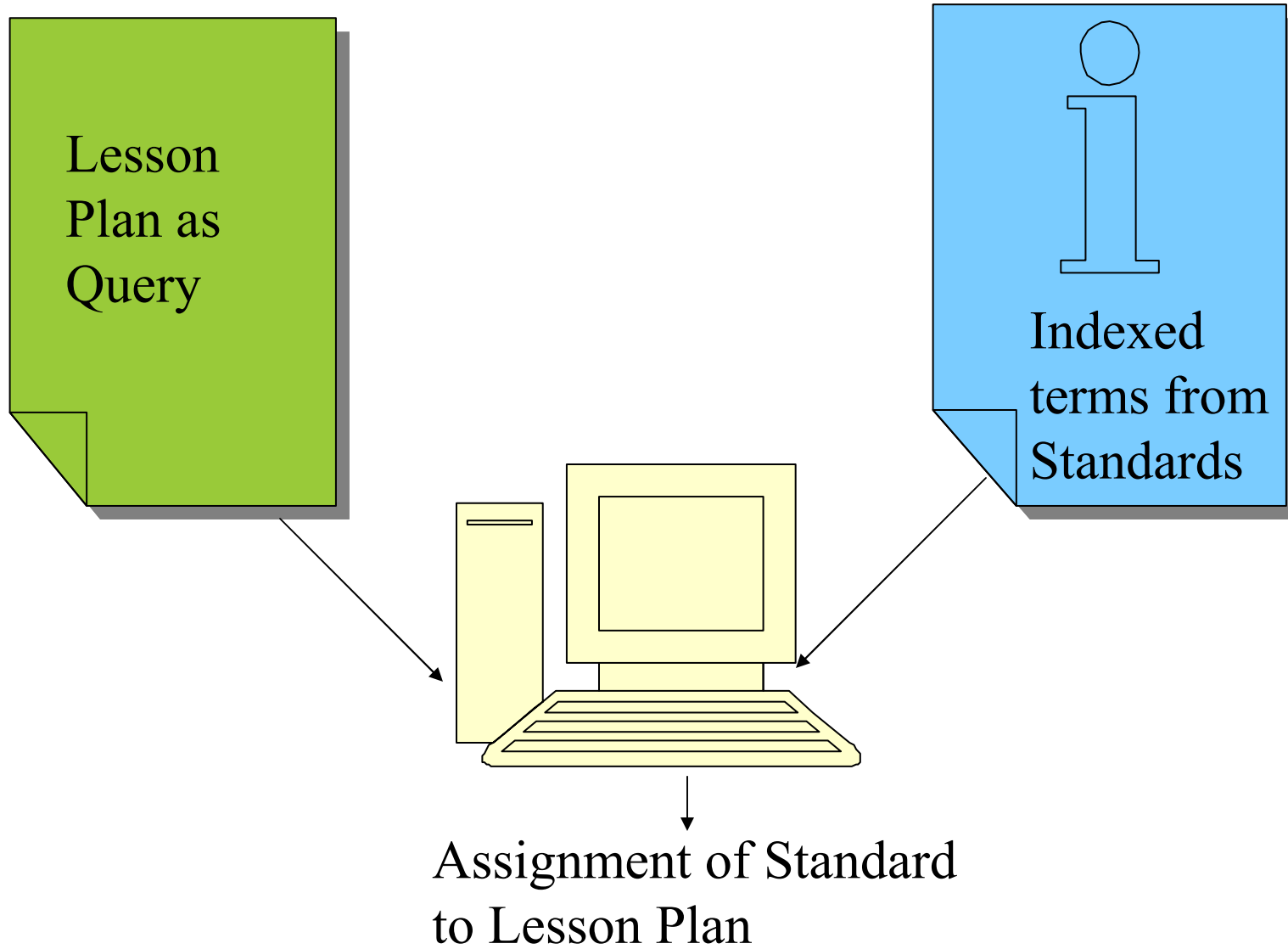


# DOCUMENT = Compendix Standards



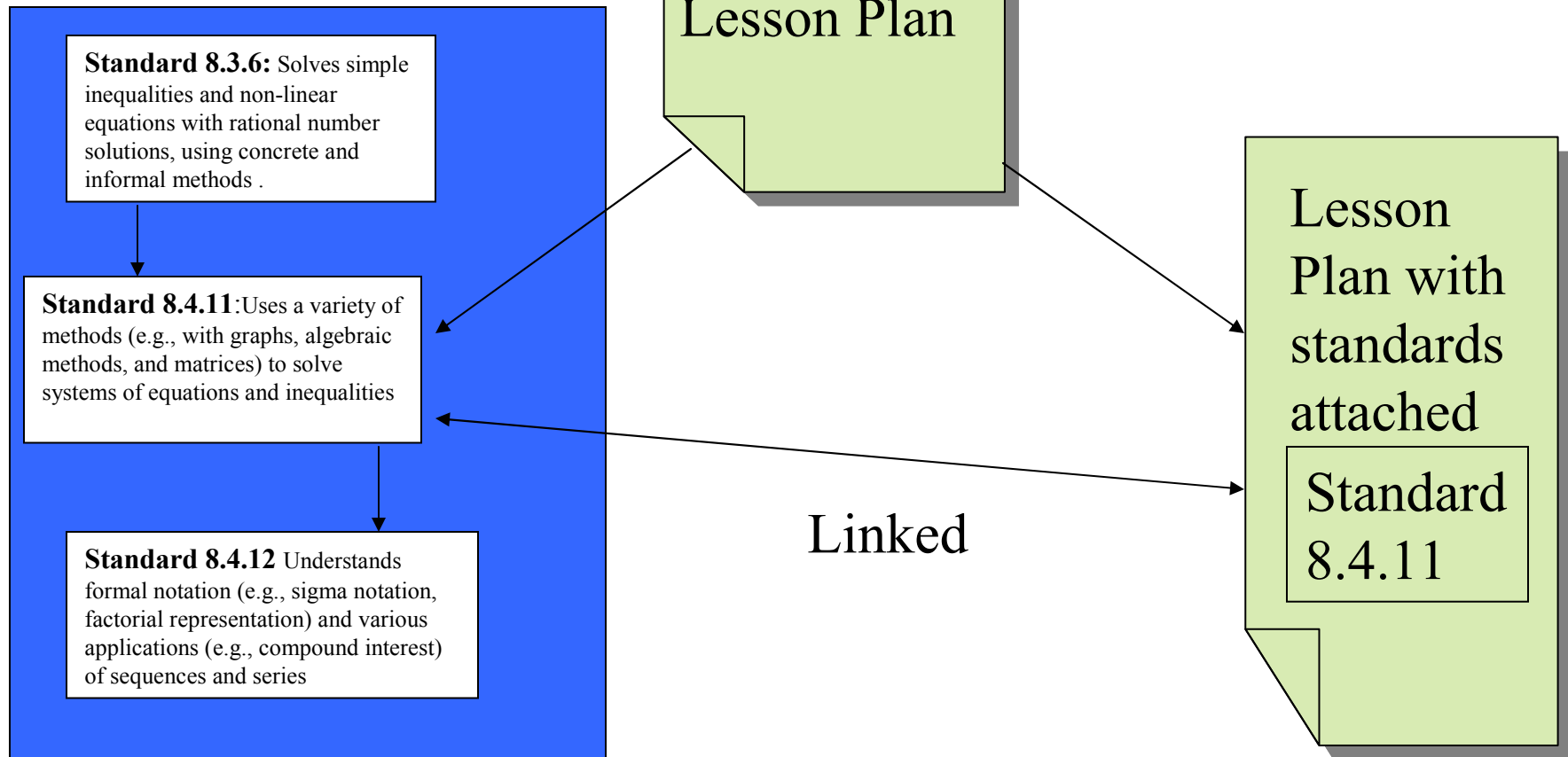
Metadata records are assembled from the subject heading, secondary subject, actual standard, and vocabulary.

# Standards Retrieval Process



# Applications

## Browseable Map of Standards, e.g. Strand Maps



# Feature Extraction & ML-based Text Classification

## Types of Features:

- Non-linguistic
  - Length of a document
- Linguistic
  - Root forms of a words
  - Part-of-speech tags:
  - Noun, Verb, Proper Noun, and Numeric Concept phrases
  - Proper Name & Numeric Concept categories
  - Semantic Relations
  - Discourse Analysis Results
  - Concepts (sense disambiguated words/phrases)

## ML-based Text Classification Techniques:

- Regression model
- Nearest neighbor classifier
- Bayesian probabilistic classifier
- Decision trees

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