APPENDIX C

A FRAMEWORK FOR ASSESSING THE GROWTH OF THE CAPACITY OF A SCHOOL DISTRICT FOR IMPLEMENTING SCIENCE, MATH, AND TECHNOLOGY EDUCATION REFORM

A FRAMEWORK FOR ASSESSING THE GROWTH OF THE CAPACITY OF A SCHOOL DISTRICT FOR IMPLEMENTING SCIENCE, MATH, AND TECHNOLOGY EDUCATION REFORM

OVERVIEW

This framework is intended to provide a set of questions that will review the degree to which and the ways in which a school district is developing the capacities and policies that are necessary to develop and sustain a standards-based science, math and technology education program. The Framework also documents the conditions that most influence the probability that a science, math and technology reform effort will succeed. This framework can be used by outside evaluators to monitor the degree to which a district is making progress toward a standards-based program. But it can also be used by the district itself, as a self-assessment tool and, perhaps more importantly, as a means to promote a dialogue within the district about the status of its current efforts to improve the science, math and technology program. Finally, this framework can also be used to provide a longitudinal view of how the district's capacities for reform are changing over time.

The theory that lies behind this framework may be stated as follows:

(1) Student success in science, math and technology depends upon classrooms that provide a steady and daily diet of high quality science, math and/or technology instruction. (It is well known that in most districts in the United States both the quantity and quality of elementary science instruction is lacking.)

(2) Good classroom instruction that takes place in every classroom in the district depends upon the presence of a solid district-wide science, math and/or technology program. Such a program includes good curriculum, readily available and well-designed materials, and supportive professional development activities.

(3) To establish such a program is not easy. Few districts across the United States can boast of a high quality science, math and technology programs that reach of all its students. To put such a program in place, and to sustain it, a lot of work must be done. And this work does not happen automatically, but rather it requires a district to develop a set of capacities –each of which is necessary but not sufficient to create a standards-based district-wide science, math and technology programs.

The capacities, policies and conditions outlined in this framework are not mere theoretical constructs (although they are congruent with a vision of systemic reform). Rather, the capacities that are listed here are those that emerge from a five-year study of

twelve urban school districts,[1] all of whom are part of the Center for Urban Science Education Reform. (For more detail about CUSER and for a thorough explication of the Framework, see Parts One and Two of our report: The Capacities, Policies and Conditions That Influence Reform: Lessons Learned From CUSER About the Development of District-wide Elementary Science Programs.)

[1] Fall River, MA; Springfield, MA; Worcester, MA; Portland, OR; Tucson, AZ; Pueblo, CO; Ft. Wayne, IN; South Bend, IN; Spring Branch, TX; Beaumont, TX; Jackson, MS; and Fayette County, KY.

I. VISION AND REALITY

1) ***A Widely-shared Vision of Good Science, Math and Technology Teaching.*** The degree to which the district / project[2] has been able to create, articulate and build consensus around **an explicit and concrete instructional vision of what good science, math and technology instruction looks like**. (This vision would, for example, outline the range of instructional approaches, the underlying philosophies, as well as the subject matter to be included.)

A) Current Status of District's Capacity

1	2	3	4	5	6
Very Low		Some		Very High	Unknown

B) ARSI Influence on District's Current Capacity

1	2	3	4	5	6
Very Low		Some		Very High	Unknown

[2] Throughout this report we refer to the district / project as the agent that is propelling the MST reform effort. What is important is the degree to which the project has helped the targeted district(s) develop their own internal capacities for developing and sustaining a high quality science, math or technology program. Thus, ultimately, it is the district that must invest in and come to value the requisite capacities.

2) ***A Widely-shared Programmatic Vision.*** The degree to which the district / project has been able to develop, articulate and build consensus around **an explicit and concrete vision of what the desired science, math and/or technology programs will look like**. (This vision might, for example, outline the key program components including specific science kits to be used at each grade level, additional activities beyond the kits such as field trips or science fairs, the use of math manipulatives, etc.)

A) Current Status of District's Capacity

1	2	3	4	5	6
Very Low		Some		Very High	Unknown

B) ARSI Influence on District's Current Capacity

1	2	3	4	5	6
Very Low		Some		Very High	Unknown

3) ***A Concrete Vision of the Development and Implementation Process.*** The degree to which project leaders are able to develop agreement about and support for the specific steps of the process that will allow for the implementation of standards-based science, math and technology programs on a district-wide basis.

A) Current Status of District's Capacity

1	2	3	4	5	6
Very Low		Some		Very High	Unknown

B) ARSI Influence on District's Current Capacity

1	2	3	4	5	6
Very Low		Some		Very High	Unknown

4) ***A Knowledge of Classroom Realities.*** The degree to which the district / project is interested in and willing to examine **the realities in the field**. The degree to which the project / district has in place multiple mechanisms for assessing the quantity and quality of science, math and / or technology instruction that is taking place district-wide. (Such mechanisms generate easily understandable data that can help district leaders understand, for example, which science kits and lessons are being taught, the quality of that teaching, and the degree to which program supports, such as professional development and materials distributions, are working.)

A) Current Status of District's Capacity

1	2	3	4	5	6
Very Low		Some		Very High	Unknown

B) ARSI Influence on District's Current Capacity

1	2	3	4	5	6
Very Low		Some		Very High	Unknown

5) ***A System for Gathering and Using Data.*** The degree to which the project has the **capacity to both gather and use data**. Data about program implementation, and about the realities of classroom science, math and technology instruction can be used both for program improvement and for "making the case" for the program to external audiences. (Such data might include a teacher and school database; information about the current status of science, math and technology teaching; teacher beliefs and attitudes; the success of program implementation; and/or evidence of student success and achievement.)

A) Current Status of District's Capacity

1	2	3	4	5	6
Very Low		Some		Very High	Unknown

B) ARSI Influence on District's Current Capacity

1	2	3	4	5	6
Very Low		Some		Very High	Unknown

II. LEADERSHIP
"The Workers"

6) ***A "Point Person" for Science, Mathematics and Technology Reform.*** The degree to which the district / project has identified, developed, and supported one individual person as a **"point person" for science, math and technology reform**. (An effective point person is an individual working (full time) at the district level who has the mandate, expertise, commitment, energy, knowledge, and position to further science, math and technology education reform in the district.)

A) Current Status of District's Capacity

1	2	3	4	5	6
Very Low		Some		Very High	Unknown

B) ARSI Influence on District's Current Capacity

1	2	3	4	5	6
Very Low		Some		Very High	Unknown

7) ***Core Group.*** The degree to which there exists a committed and empowered **core group** of people (a project-based "leadership team") either formally or informally designated as responsible for furthering the improvement of science, math and technology education in the district. (An effective core group consists of individuals who share a common vision, are highly motivated, work well together, and bring complementary skills to the reform effort.)

A) Current Status of District's Capacity

1	2	3	4	5	6
Very Low		Some		Very High	Unknown

B) ARSI Influence on District's Current Capacity

1	2	3	4	5	6
Very Low		Some		Very High	Unknown

8) ***Science, Math, and Technology Lead Teachers***. The degree to which the district has been able to identify, recruit, train and deploy **a cadre of strong lead teachers**. (These are teachers who are still teaching full-time but are willing to assist the reform effort by leading workshops, doing demonstration teaching, working on district task forces or contributing in a multitude of other ways.)

A) Current Status of District's Capacity

1	2	3	4	5	6
Very Low		Some		Very High	Unknown

B) ARSI Influence on District's Current Capacity

1	2	3	4	5	6
Very Low		Some		Very High	Unknown

9) ***Science, Math, or Technology Classroom "Exemplars."*** The degree to which there are available in the district **sources of classroom expertise** (e.g., classroom teachers who can present visible examples and models of exemplary, inquiry-based science teaching).

A) Current Status of District's Capacity

1	2	3	4	5	6
Very Low		Some		Very High	Unknown

B) ARSI Influence on District's Current Capacity

1	2	3	4	5	6
Very Low		Some		Very High	Unknown

10) ***District Science, Math or Technology Coordinator or Specialist***. The degree to which the district has designated a **permanent position** (and accompanying support) **for a district administrator** who is expected to provide strong and stable leadership for the effort to promote a district-wide standards-based science, math and technology education reform effort.

A) Current Status of District's Capacity

1	2	3	4	5	6
Very Low		Some		Very High	Unknown

B) ARSI Influence on District's Current Capacity

1	2	3	4	5	6
Very Low		Some		Very High	Unknown

"The Supporters"

11) ***The Superintendent.*** The degree to which the **District Superintendent** is interested in the success of the science, math and technology education program and is willing to assume a proactive role, making science, math and technology education reform a public priority. Also, the degree to which the Superintendent is able and willing to provide the resources necessary to further the reform effort in this district at this time.

A) Current Status of District's Capacity

1	2	3	4	5	6
Very Low		Some		Very High	Unknown

B) ARSI Influence on District's Current Capacity

1	2	3	4	5	6
Very Low		Some		Very High	Unknown

12) ***Administrative Supporters and Science, Math and Technology Advocates***. The degree to which there exists at least a few **key upper-level district administrators** (e.g., the assistant superintendent of Curriculum and Instruction, Area Superintendents, a key Financial Officer) who are involved in and actively supporting the science, math, and technology education reform.

A) Current Status of District's Capacity

1	2	3	4	5	6
Very Low		Some		Very High	Unknown

B) ARSI Influence on District's Current Capacity

1	2	3	4	5	6
Very Low		Some		Very High	Unknown

13) ***Principals***. The degree to which the district / project has been able to identify, support and draw upon a group of **school principals** who are leading the science, math and technology reform effort in their own schools; in addition, they are knowledgeable about, and actively involved in, the effort to improve science, math and technology education in this district.

A) Current Status of District's Capacity

1	2	3	4	5	6
Very Low		Some		Very High	Unknown

B) ARSI Influence on District's Current Capacity

1	2	3	4	5	6
Very Low		Some		Very High	Unknown

14) ***School Board Members***. The degree to which the **School Board** is knowledgeable about and supportive of the science, math and technology education reform effort:

A) Current Status of District's Capacity

1	2	3	4	5	6
Very Low		Some		Very High	Unknown

B) ARSI Influence on District's Current Capacity

1	2	3	4	5	6
Very Low		Some		Very High	Unknown

15) ***Scientists, Mathematicians and Technology Specialist s and/or Expertise***. The degree to which the district / project has developed a relationship with and has working access to **sources of expertise** (e.g., university faculty or graduate students, local industry scientists, high school teachers, local science museum staff). The degree to which the district / project helps design and provide appropriate and useful supportive roles for these people (e.g., enabling them to ensure the content integrity of kits, or teach science content to elementary teachers, etc.).

A) Current Status of District's Capacity

1	2	3	4	5	6
Very Low		Some		Very High	Unknown

B) ARSI Influence on District's Current Capacity

1	2	3	4	5	6
Very Low		Some		Very High	Unknown

16) ***Partner Organizations***. The degree to which there are symbiotic **connections or partnerships between the project/district and other institutions**, agencies, and/or program aimed at science, math and technology education improvement (e.g., BOCES, universities, science museums, industry roundtables; other NSF reform projects).

A) Current Status of District's Capacity

1	2	3	4	5	6
Very Low		Some		Very High	Unknown

B) ARSI Influence on District's Current Capacity

1	2	3	4	5	6
Very Low		Some		Very High	Unknown

17) ***Political Leadership***. The degree to which there is **strong external political leadership** (individual or group) that is organized and committed so that it is effective in playing an advocacy role for science, math and technology both within and outside of the district.

A) Current Status of District's Capacity

1	2	3	4	5	6
Very Low		Some		Very High	Unknown

B) ARSI Influence on District's Current Capacity

1	2	3	4	5	6
Very Low		Some		Very High	Unknown

18) ***National connections and expertise***. The degree to which district **leaders are connected with and involved in professional associations**, networks, and national projects involving science, math and technology reform (e.g., NSTA, CUSER, NSRC, Exploratorium Institute for Inquiry).

A) Current Status of District's Capacity

1	2	3	4	5	6
Very Low		Some		Very High	Unknown

B) ARSI Influence on District's Current Capacity

1	2	3	4	5	6
Very Low		Some		Very High	Unknown

III. REFORM INFRASTRUCTURE

19) ***Curriculum.*** Overall extent to which the district has the capacity and will to identify, select and implement district-wide a **standards-based and inquiry-based curriculum** in science, math and technology:

A) Current Status of District's Capacity

1	2	3	4	5	6
Very Low		Some		Very High	Unknown

B) ARSI Influence on District's Current Capacity

1	2	3	4	5	6
Very Low		Some		Very High	Unknown

20) ***Instructional Materials.*** Overall extent to which the district has the capacity and will to establish and implement a system for providing all its teachers with the **instructional materials** necessary to implement a district-wide inquiry-based ("hands-on") curriculum in science, math and technology.

A) Current Status of District's Capacity

1	2	3	4	5	6
Very Low		Some		Very High	Unknown

B) ARSI Influence on District's Current Capacity

1	2	3	4	5	6
Very Low		Some		Very High	Unknown

21) **Technology**: ARSI's overall influence on the district's ability and propensity to use technology intelligently in the service of math and science reform.

A) Current Status of District's Capacity

1	2	3	4	5	6
Very Low		Some		Very High	Unknown

B) ARSI Influence on District's Current Capacity

1	2	3	4	5	6
Very Low		Some		Very High	Unknown

22) ***Professional Development for Teachers.*** Overall extent to which the district has the capacity and will to implement a coherent and district-wide **professional development program that can support teachers** in gaining the knowledge, skills and inclination to implement a standards-based and inquiry-based curriculum in science, math and technology.

A) Current Status of District's Capacity

1	2	3	4	5	6
Very Low		Some		Very High	Unknown

B) ARSI Influence on District's Current Capacity

1	2	3	4	5	6
Very Low		Some		Very High	Unknown

23) ***Professional Development for District and Project Leaders***. The degree to which the district / project has the intention and capacity to provide appropriate ongoing **professional development experiences for those who are the key leaders and supporters of the science, math and technology education reform effort** (e.g., District science specialists, TOSAs; principals).

A) Current Status of District's Capacity

1	2	3	4	5	6
Very Low		Some		Very High	Unknown

B) ARSI Influence on District's Current Capacity

1	2	3	4	5	6
Very Low		Some		Very High	Unknown

24) ***Financial Resources***. Overall extent to which the district has the capacity and will to acquire and designate the **financial resources necessary to implement a district-wide standards-based and inquiry-based program** in science, math and technology.

A) Current Status of District's Capacity

1	2	3	4	5	6
Very Low		Some		Very High	Unknown

B) ARSI Influence on District's Current Capacity

1	2	3	4	5	6
Very Low		Some		Very High	Unknown

IV. DISTRICT PRIORITIES AND POLICIES

25) ***District Science Standards***. The degree to which the district has **reviewed and addressed its own science, math and technology standards**, science, math, and technology framework and/or course of study so that it might better support the envisioned reform effort.

A) Current Status of District's Capacity

1	2	3	4	5	6
Very Low		Some		Very High	Unknown

B) ARSI Influence on District's Current Capacity

1	2	3	4	5	6
Very Low		Some		Very High	Unknown

26) ***Formal District Science Assessment Policies***. The degree to which the district has reviewed and addressed **its own formal testing policies and practices** so that they might better support the envisioned science, math and technology reform effort.

A) Current Status of District's Capacity

1	2	3	4	5	6
Very Low		Some		Very High	Unknown

B) ARSI Influence on District's Current Capacity

1	2	3	4	5	6
Very Low		Some		Very High	Unknown

27) ***Informal Science, Math and Technology Assessment Policies***. The degree to which the district / project has supported teachers at the classroom level in **developing informal assessment practices** so that they might better support this science, math and technology education reform effort.

A) Current Status of District's Capacity

1	2	3	4	5	6
Very Low		Some		Very High	Unknown

B) ARSI Influence on District's Current Capacity

1	2	3	4	5	6
Very Low		Some		Very High	Unknown

28) ***Science, Math and Technology Reform and Site-based Management***. The degree to which the district has designed its science, math and technology education reform so that it is **supportive of and congruent with school restructuring and site-based managed reforms** (e.g., proactively working with individual schools and/or supporting pilot schools through school-wide professional development efforts).

A) Current Status of District's Capacity

1	2	3	4	5	6
Very Low		Some		Very High	Unknown

B) ARSI Influence on District's Current Capacity

1	2	3	4	5	6
Very Low		Some		Very High	Unknown

29) ***Science, Math and Technology Reform and Equity.*** The degree to which the district has sought to **integrate this science, math, and technology education reform with the broader efforts of the district to increase equity** (e.g., bilingual programs, magnet schools, Title I) so that the science, math and technology reform effort can "piggyback" on and be compatible with other equity-related reform efforts.

A) Current Status of District's Capacity

1	2	3	4	5	6
Very Low		Some		Very High	Unknown

B) ARSI Influence on District's Current Capacity

1	2	3	4	5	6
Very Low		Some		Very High	Unknown

30) ***Science, Math and Technology Reform and Broader District Policies.*** Overall degree to which the district is **addressing its own broader policies and practices** (e.g., textbook adoptions, materials support structures) so that the district context is supportive and/or aligned with an inquiry-based and standards-based elementary science, math and technology education reform.

A) Current Status of District's Capacity

1	2	3	4	5	6
Very Low		Some		Very High	Unknown

B) ARSI Influence on District's Current Capacity

1	2	3	4	5	6
Very Low		Some		Very High	Unknown

31) ***A Proactive Stance to Barriers.*** Overall degree to which the district is proactively and deliberately **identifying and resolving systemic barriers and blockages** that stand in the way of the progress of the science, math and technology reform program (e.g., finding creative solutions to chronic teacher substitute shortages, organizing time for classroom coaching, etc.).

A) Current Status of District's Capacity

1	2	3	4	5	6
Very Low		Some		Very High	Unknown

B) ARSI Influence on District's Current Capacity

1	2	3	4	5	6
Very Low		Some		Very High	Unknown

V. CLIMATIC CONDITIONS THAT INFLUENCE REFORM

32) ***Overall State Political and Policy Climate.*** The overall degree to which **major state policies (e.g., accountability) and current state political climate are supportive** of the district's effort to improve science, math and technology education.

Current Status of District's Capacity

1	2	3	4	5	6
Very Low		Some		Very High	Unknown

33) ***State Science, Math Standards and Testing.*** The overall degree to which **state science and math standards and science and math tests are supportive** of the district's effort to improve science and math education:

Current Status of District's Capacity

1	2	3	4	5	6
Very Low		Some		Very High	Unknown

34) ***District and Local Community Political Climate.*** Overall extent to which the local district has the **capacity to go into its community and generate support and revenue** for its activities for science, math and technology reform (i.e., PTA, community engagement group, school councils, etc.). This relates to how much the **climate in the community** is very negative, very supportive, or very demanding of science, math and technology reform)

Current Status of District's Capacity

1	2	3	4	5	6
Very Low		Some		Very High	Unknown

35) ***District and Local Community Financial Conditions.*** Overall extent to **which local district and community financial conditions** affect the district's effort to develop a plan and process for improving science, math and technology education in the district.

Current Status of District's Capacity

1	2	3	4	5	6
Very Low		Some		Very High	Unknown

36) ***District professional culture and climate***. The overall **professional "culture" and "climate" in the district** (the working conditions, professional culture and overall morale in the district) that influence the willingness of all those working in the district to initiate and sustain reform efforts.

Current Status of District's Capacity

1	2	3	4	5	6
Very Low		Some		Very High	Unknown

37) ***District Turbulence and Instability***. Overall extent to which **unexpected or rapid changes in the local district or community** (e.g., new Superintendents, teacher turnover, growth, the number and pace of new reforms) affect the ability and willingness of the district to promote science, math and technology education.

Current Status of District's Capacity

1	2	3	4	5	6
Very Low		Some		Very High	Unknown

VI. SUMMARY JUDGMENTS

This section summarizes the previous sections and asks the rater to make judgments about the overall status of the capacity of the district to engage in a successful elementary science education reform effort and the probability of its continued success.

38) ***Overall Development of Increased Internal Capacity***. Overall degree to which this district has developed its **own internal capacity for initiating and sustaining** science, math and technology education reform (e.g., its leadership, resources, relationships, infrastructure, and implementation progress).

A) Current Status of District's Capacity

1	2	3	4	5	6
Very Low		Some		Very High	Unknown

B) ARSI Influence on District's Current Capacity

1	2	3	4	5	6
Very Low		Some		Very High	Unknown

39) ***Visible Success in Program Development.*** The overall degree to which the district / project has **made visible progress** in implementing its science, math and technology reform program, thereby building a positive reputation for the initiative and showing visible and publicly-recognized evidence of success (e.g., establishing a Materials Center, model classrooms, press releases, test scores, testimonials, etc.) that can buoy and further support additional reform activities:

A) Current Status of District's Capacity

1	2	3	4	5	6
Very Low		Some		Very High	Unknown

B) ARSI Influence on District's Current Capacity

1	2	3	4	5	6
Very Low		Some		Very High	Unknown

40) ***Intentionality.*** The **overall "seriousness" and priority** that this district places upon science, math and technology education reform.

A) Current Status of District's Capacity

1	2	3	4	5	6
Very Low		Some		Very High	Unknown

B) ARSI Influence on District's Current Capacity

1	2	3	4	5	6
Very Low		Some		Very High	Unknown

41) ***Signal-to-noise Ratio***. Overall, any district's efforts to reform science, math and technology education are inevitably a small "signal" in an otherwise noisy district environment. The degree to which the **signal-to-noise ratio**[3] of elementary science reform in this district is strong enough to be significant.

A) Current Status of District's Capacity

1	2	3	4	5	6
Very Low		Some		Very High	Unknown

B) ARSI Influence on District's Current Capacity

1	2	3	4	5	6
Very Low		Some		Very High	Unknown

[3] Note that here, on the "Current Status of District's Capacity" scale, a high number indicates "lots of noise," a low number means "less noise." On the "ARSI Influence on District's Current Capacity" scale, a high rating indicates a strong "signal," and a low number indicates a weak "signal."

42) ***Trajectory.*** The overall **trajectory** of the science, math and technology program in this district.

A) Current Status of District's Capacity

1	2	3	4	5	6
Very Low		Some		Very High	Unknown

B) ARSI Influence on District's Current Capacity

1	2	3	4	5	6
Very Low		Some		Very High	Unknown