Greater Southern Tier STEM Education Initiative

Motivation and Progress

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To the Engineering Technology Leadership Institute

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MST connect
Math-Science-Technology Network
Engaging communities to enrich our region

Outline

- **Science, Technology, Engineering and Math (STEM) Pipeline Realities**
- Changing the Realities in our Region

Why STEM?

- **In 2010, 43%** U.S. high school graduates are ready for college-level math
- **In 2010, 29%** U.S. high school students are ready for college-level science
- **In 2010, the U.S. ranked 25th out of 30** in an international assessment of high school student performance in math

source: http://www.changetheequation.org/why/stem-education-in-your-state/

STEM Pipeline Realities

Doing the math in the USA…Of 100 9th Graders

- 68 graduate High School on time
- 40 who graduate HS enroll in college
- Of those 40, 27 are still there after 1 year
- 18 of the original 100 graduate w/an Associates degree after 3 years or a Bachelors after 6 years
- …but 67% of new jobs in the US require a post-secondary credential (only 38% of adults have such!)

(See http://nces.ed.gov/programs/digest/d09/tables/dt09_202.asp)

STEM Pipeline Realities

What does "doing the math" have to do with STEM?

- Because of technology, more and more jobs require stem-capability
- Anecdotally
  - > 95% of HS students who attend "STEM" schools enroll in college
  - > 85% of those "STEM school" graduates who enroll in college complete their bachelors degrees on time (compared to the national average of <18%)
- "STEM" education is just an overall great education that positively impacts all subjects

STEM Pipeline Realities

The State of Manufacturing and STEM in the USA

A 2009 NAM study revealed that…

- 50% of Manufacturers feel shortage of skilled workforce
- 70% feel strong manufacturing capability is a National priority
- Only 17% of school systems encourage manufacturing careers
- STEM-based jobs are highest paying jobs in the public sector
- Graduation rates are dropping in STEM-based curriculums

STEM Pipeline Realities

What's Happening in the Southern Tier?

Southern Tier

Workforce & Industry Data

Broome, Chemung, Chenango, Delaware, Otsego, Schuyler, Steuben, Tioga and Tompkins counties

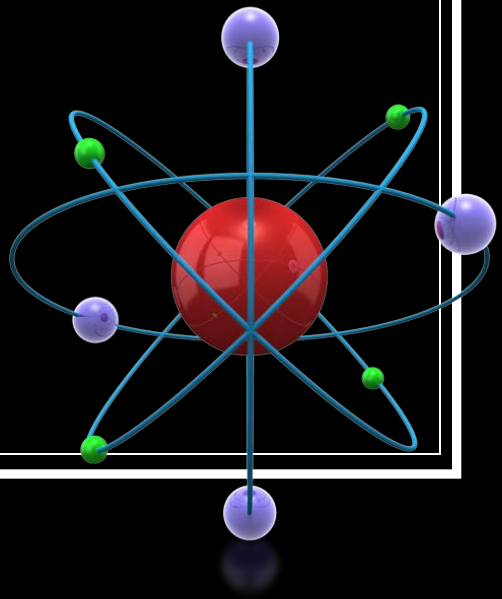
- The NYS Department of Labor projects the top 25 fastest growing occupations between 2002 and 2012 in a 9-county Southern Tier region that includes Chemung, Schuyler and Steuben Counties.
- Of the top 10 fastest growing occupations on the projection, **8 require a background and training in math, science and/or technology**.
- ***The 2006-2016 report showed the same trend!*** The fastest growing occupation in our area is projected to be Network Systems and Data Communications Analysts with a 42% increase.

STEM Pipeline Realities
In the Greater Southern Tier (c. 2010)

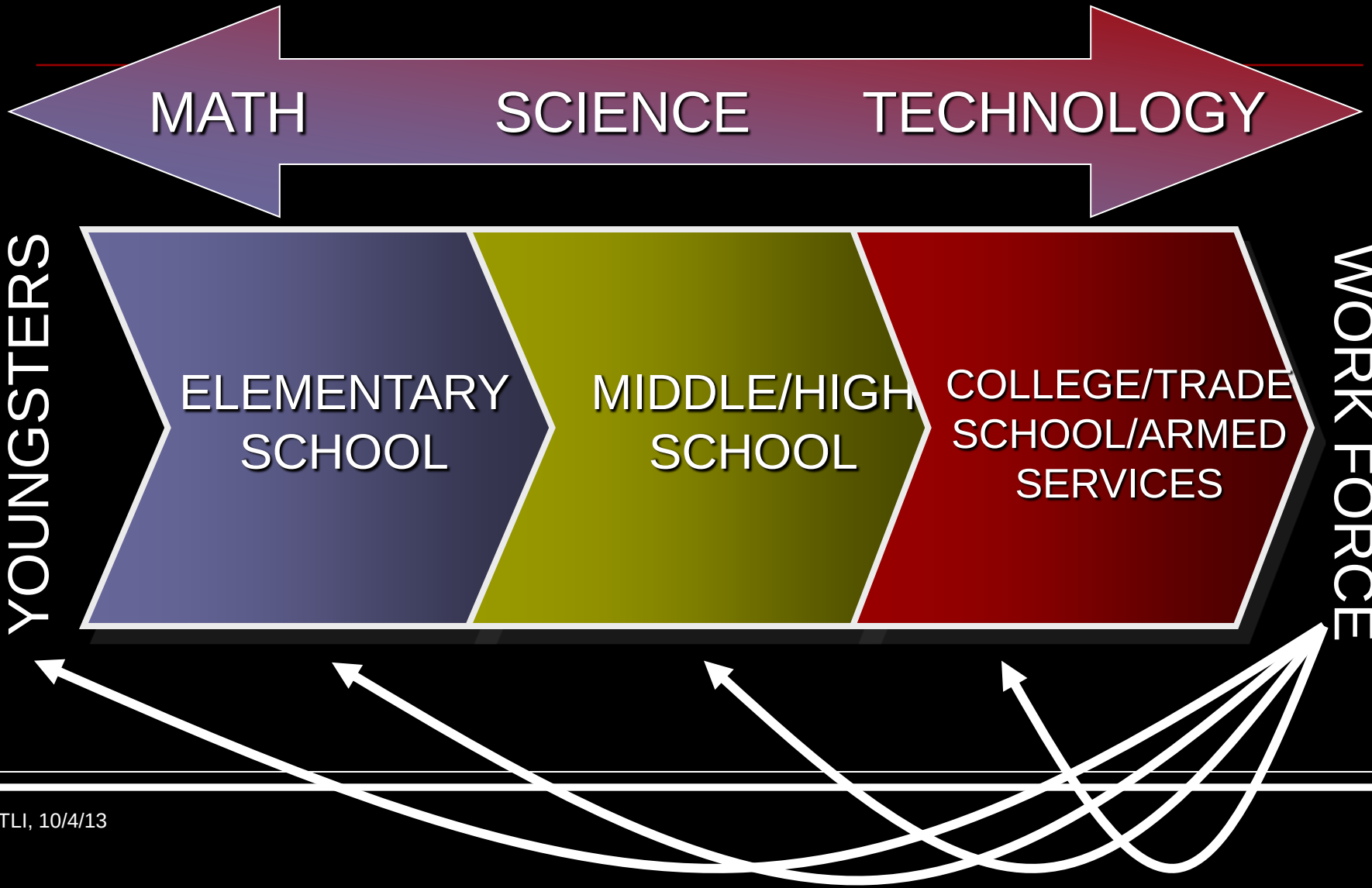
- 50% pass rate on basic competency tests (6th and 7th grade level) for entering the workforce
- Student mastery level for secondary Math and Science is only 10%
- Up to 70% of students entering community colleges need remedial math education
- School requirements strive to meet not exceed state requirements
- Local industry has a difficult time finding certified trade employees
- By 2016, 8 of the top 10 jobs will require STEM education

Motivation and Approach

- Science, Technology, Engineering and Math (STEM) Pipeline Realities
- **Changing the Realities in our Region: Focus on the pre-college pipeline**



Pipeline Reality



MST Connect

Vision

Our region will be a model in generating math, science and technology interest, excitement and marketable skills.

Mission

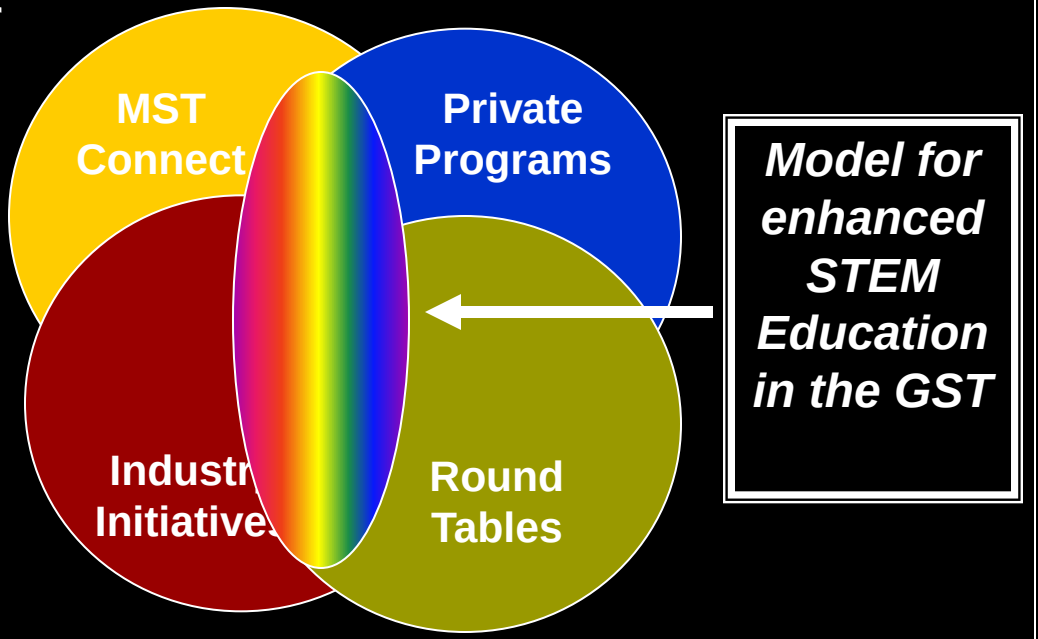
Create a regional math, science and technology pipeline that results in the development of a workforce that is rich in M-S-T skills.

Purpose

To re-energize, revitalize and refocus attention, interest and understanding of the embedded importance of math, science and technology to life-long learning and success.

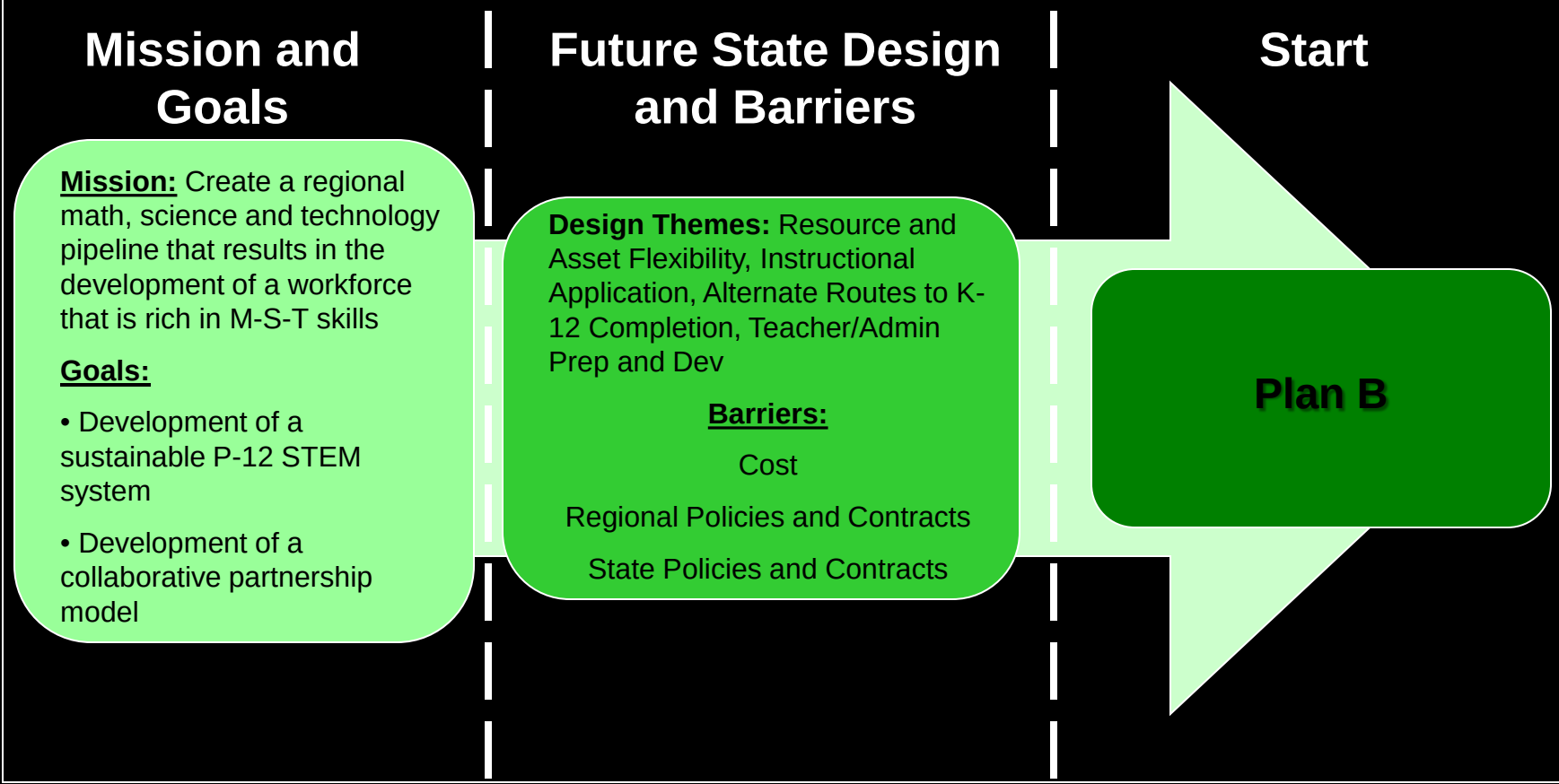
Greater Southern Tier STEM Education Project

- In Q3 of 2009, MST Connect was the forum for a special session on STEM Education in the Greater Southern Tier
- Objective
  - To highlight some of what's already happening and consider what could /should happen next on the topic of MST



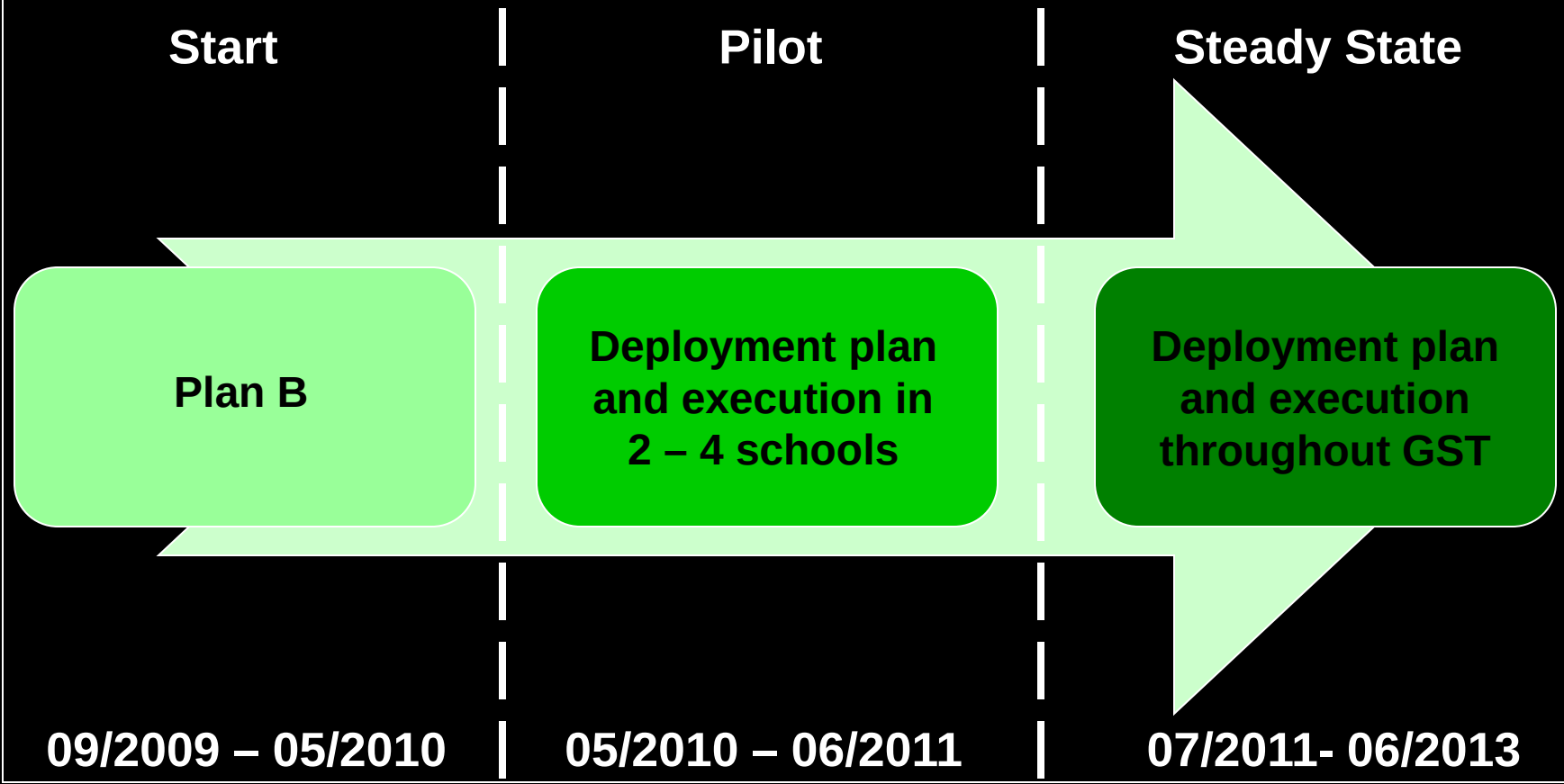
Deployment Progress Report

Historical View: Where we started…



Deployment Progress Report

Pilot View: Where we've been…



Deployment Progress Report
3 Years of Deployment (2010-2013)

Design and implement a management structure and non-negotiable parameters

Build an innovation infrastructure that amplifies best practices and accelerates key improvement processes

Launch and connect school programs

Pilot an embedded, inquiry-based program of study in volunteer elementary and middle schools

Build an inquiry delivered STEM high school course using input from interdisciplinary departments

Deployment Progress Report

Expected Outcomes – College and Career Ready

- **Significant increase** in the number of "STEM capable" high school graduates
- **Implementation** of STEM programs that reduce achievement gaps and enhance student mastery of 21st Century skills
- **Implementation** of a STEM support network that leverages regional assets and partnerships to meet a student's personal learning needs and delivers continuously improving teacher effectiveness, proactive leadership, aligned curriculum/instruction/assessment and interlocking community engagement.

Deployment Progress Report
Year One Deployment (2010-2011)

- Plan embedded inquiry based program of study in volunteer elementary and middle schools
- Build an inquiry delivered STEM high school course using input from interdisciplinary departments
- Complete planning for a 4 year BOCES lab school program based on HTH principles
- Coordinate and monitor existing and new out of school time programs
- Plan and deliver extended year experiences to students and instructors during the summer of 2011
- Plan and deliver appropriate teacher training
- ***Hire a regional STEM coordinator***

Deployment Report
Approach

Initially

- 3rd and 6th - Leverage FOSS science curriculum (FOSS is an established inquiry-based learning curriculum that fosters critical thinking that is student-driven)
- High School – Design and deliver STEM elective (credit bearing elective facilitates both interdisciplinary exchange as well as STEM beyond tradition)

Today

- Moving to full K-8 coverage + High School

Deployment Report
Participating Districts

Three Initially

- Bath, Bradford and Horseheads

14 Today!

- Addison, Arkport, Bath, BOCES, Bradford, Campbell-Savona, Canaseraga, Canisteo-Greenwood, Corning, Elmira, Elmira Heights, Hornell, Horseheads, Notre Dame and Watkins Glen
- Represents > 50% of the Greater Southern Tiers districts, impacting > 11,000 students and providing Professional Development of > 500 teachers in '13-'14
- Already realized as much as a 5X improvement in teacher effectiveness and 12% improvement on standardized tests

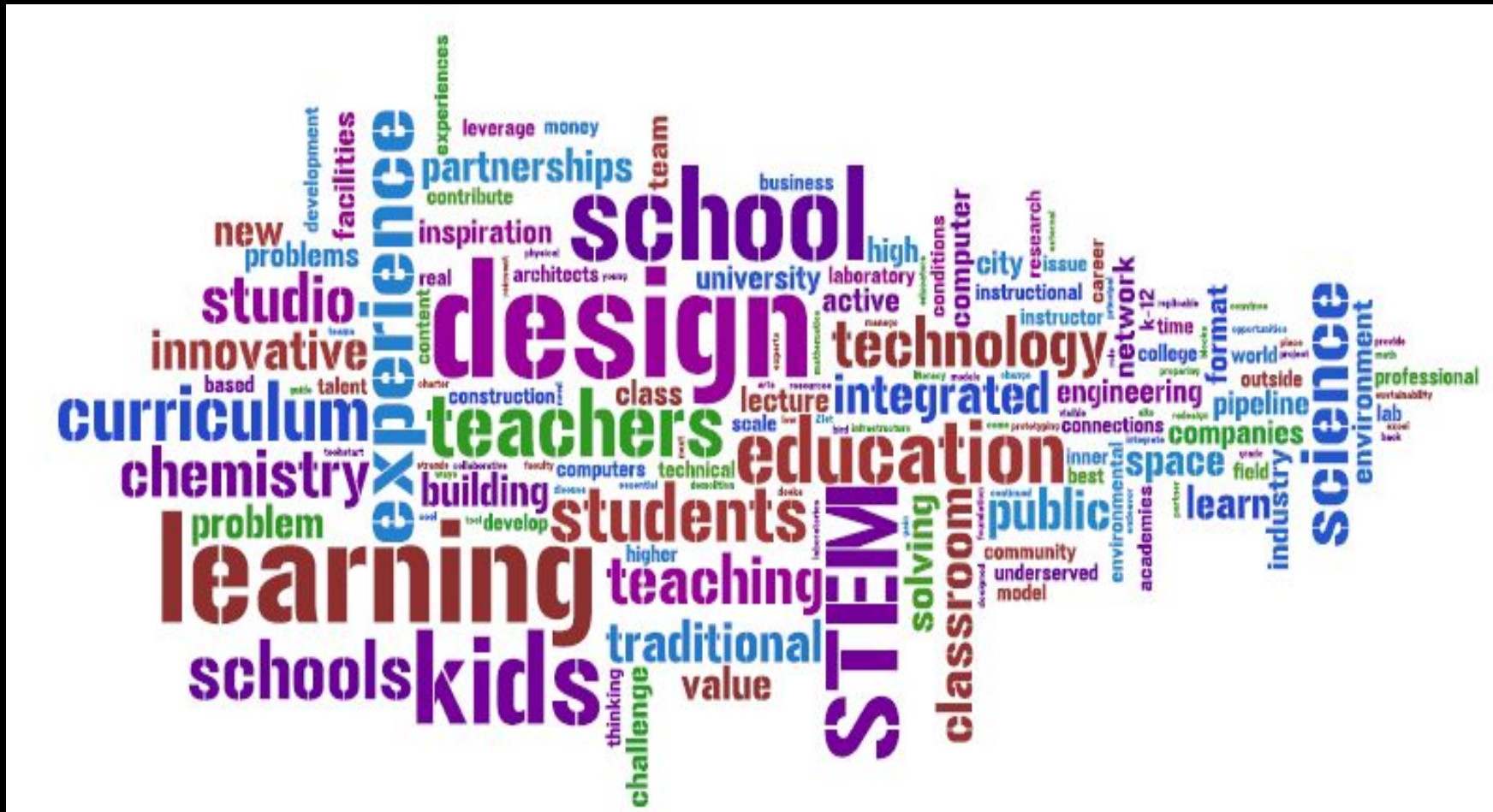
Deployment Progress Report
Value of the Plan

- Reflects the results of the “Plan B” sub-team work
- Significantly advances STEM education in the GST
- Enables the institutionalizing of practice
  - Embeds costs into current money streams and systems (excluding STEM Coordinator)
- Support strengthening of 4Cs of education delivery
  - Communication, Collaboration, Connectivity and Continuity
- Continues forward-looking leadership
  - Is aligned w/where State is going with STEM
  - Benchmarked around NYS (contributor to RTTT) and nationally

Key Partners

- **MST Connect Coalition Core Team** continues as the overall STEM program steering committee
  - Maintain coordination between the community, educational organizations and business
  - Has overall program responsibility shared with the GST District Superintendents and GST BOCES
- **GST BOCES**
  - Provide staff development, IT support and shared staffing to help make the initiative logistically affordable
- **Syracuse University**
  - Provide 3rd Party evaluation

Thank You!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