SCIENCE
LEADERSHIP
INITIATIVE

museum of **science+industry** chicago

Introduction

Science Leadership School Partners Program

Table of Contents

Science Leadership School Partners Program

Every child should attend a school that demonstrates an exceptional learning environment for science. School leadership ensures that science and innovation are integrated across the curriculum, and achievement—by students and staff alike—is celebrated.

The Next Generation Science Standards, research recommendations, and a policy focus from the White House have placed science education at the forefront of our nation's education conversation. States and districts have leapt to adopt initiatives and programs to meet school and student needs.

Leading effective science initiatives and program enhancements at the whole-school level requires attention to current research, a structured process, and time. Teacher leaders, supported by their school's administration, can fill an important niche in leading a change in science teaching and learning at their school.

The Museum of Science and Industry's (MSI) Science Leadership School Partners Program provides a mechanism for whole-school change in science teaching and learning. This innovative program is grounded in current research in science education and designed to support K-8 schools as they do the work of science education reform.

The Science Leadership School Partners Program guides schools through a process of assessing their current status in science education, creating an action plan, and implementing that action plan. A School Partner, which includes a Teacher Leader, administrator, and cross-disciplinary school team representing multiple grade levels, is able to utilize MSI supports to elevate science programming.

Science Leadership School Partners Program

- SCHOOL SUPPORT TOOL
- WORK SESSIONS AT MSI
- TEACHER LEADER COHORT
- ADMINISTRATOR COHORT
- CROSS-DISCIPLINARY SCHOOL TEAM
- RECOGNITION

Cross-Disciplinary School Team

The cross-disciplinary school team works collaboratively as a professional learning community at the school.

To support discussion around science education at the whole-school level, the cross-disciplinary school team consists of six to 10 school staff members and includes administration, all grade levels within a school, and cross-disciplinary representation. This team is facilitated by a Teacher Leader to collaborate around the School Support Tool.

Teacher Leader	• Facilitates the team • Contributes to discussion by providing their perspectives
Teachers (science and non-science)	• Classroom perspectives • Cross-departmental perspectives • Individual classroom challenges
Administrator (principal or assistant principal)	• School-wide perspective and vision • Unique school challenges

Teacher Leader Niche

Teacher Leaders, supported by their school's administration, fill an important niche in leading the creation of necessary enhancements in science programming.

The School Support Tool's structured, democratic process is led by a Teacher Leader who facilitates their cross-disciplinary school team's collaboration around the difficult work of science education reform at their school. This Teacher Leader balances facilitating the group while contributing their perspective to the conversation. They lead the discussion while working to integrate all voices and perspectives.

Using a Teacher Leader to facilitate the cross-disciplinary school team enhances the democratic process, builds a mechanism to integrate and elevate teacher voice through the professional learning community, and provides a leadership opportunity for Teacher Leaders ready for their next step.

Work Sessions At MSI

Evening work sessions at MSI provide time for Teacher Leaders to collaborate as active members of a leadership cohort, facilitating the process and leading reform at their schools.

These work sessions, facilitated by MSI, will allow Teacher Leaders to:

• Reflect on their team meetings.

• Troubleshoot.

• Plan.

• Practice through collaboration with other Teacher Leaders.

Evening work sessions for School Partner administrators provide the administrator cohort with opportunities to network with one another, facilitated by MSI. These work sessions will allow School Partner administrators to:
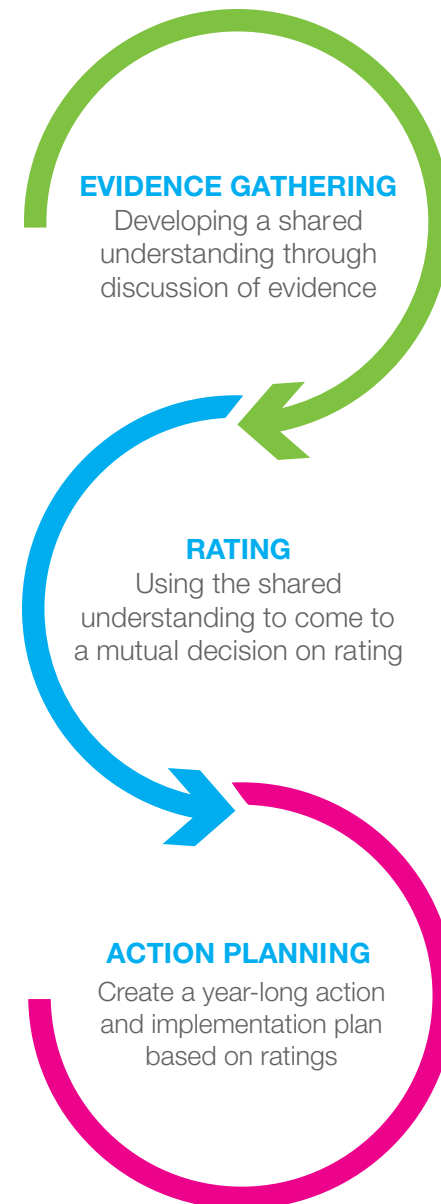
• Support one another through mutual engagement and work.

• Share ideas.

• Highlight successes and challenges as they advance science education at their schools.
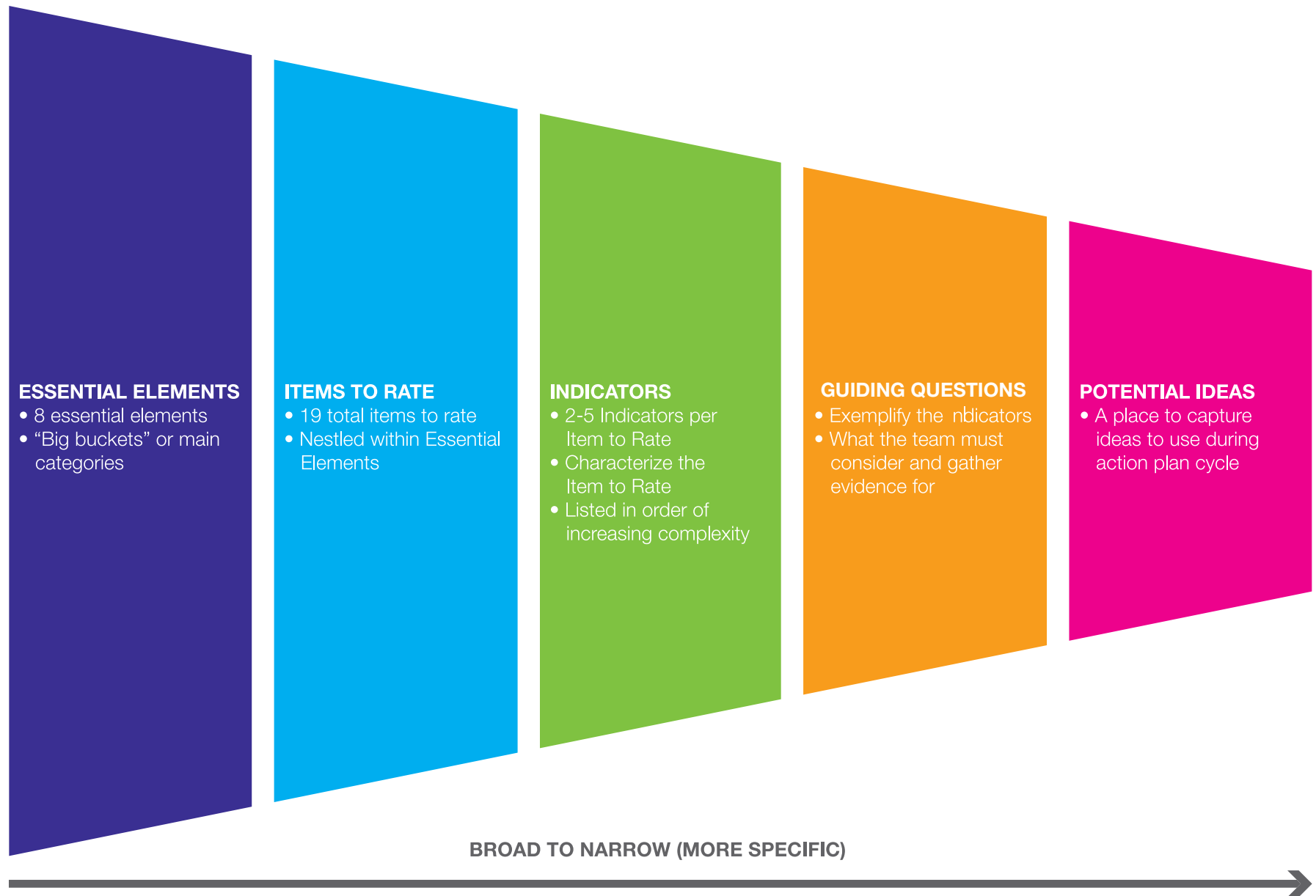
School Support Tool Overview

Grounded in current education research, the School Support Tool identifies eight Essential Elements for schools to consider as they gauge the level of science education across their school. The tool's design utilizes a rating system and an action plan cycle for yearlong planning and implementation, and is housed in a digital database that collects, archives, and manages information.

The School Support Tool uses three main processes: evidence gathering, rating, and action planning.

Through a democratic process with open, honest discussions lead by the Teacher Leader, the cross-disciplinary school team collaborates to gather evidence and build a shared understanding around what is happening with science at their school, and what additional support is required. Using this shared understanding, the team comes to a mutual decision on how to rate items and creates a customized action plan.

EVIDENCE GATHERING
Developing a shared understanding through discussion of evidence

RATING
Using the shared understanding to come to a mutual decision on rating

ACTION PLANNING
Create a year-long action and implementation plan based on ratings

School Support Tool Design Structure

ESSENTIAL ELEMENTS
- 8 essential elements
- "Big buckets" or main categories

ITEMS TO RATE
- 19 total items to rate
- Nestled within Essential Elements

INDICATORS
- 2-5 Indicators per Item to Rate
- Characterize the Item to Rate
- Listed in order of increasing complexity

GUIDING QUESTIONS
- Exemplify the indicators
- What the team must consider and gather evidence for

POTENTIAL IDEAS
- A place to capture ideas to use during action plan cycle

BROAD TO NARROW (MORE SPECIFIC)

Essential Element: **School Support Tool**

The eight Essential Elements are the main categories, or "big buckets," of what education research identifies as necessary to support science education at the whole-school level.

Values	Establish a positive school culture emphasizing sustained, systemic collaboration and shared norms, attitudes, and beliefs.
Collaboration and Planning	Maintain an effective collaboration infrastructure within and across all grade levels.
Curriculum and Instruction	Prioritize high-quality science and STEM educational experiences in every grade to prepare students with the skills necessary for college and careers.
Professional Learning	Participate in high-quality, research-based professional development.
Communication	Provide ongoing communication with school community highlighting science programming priorities in support of the school's STEM education initiatives.
Technology	Invest/reinvest in usable instructional tools, including modern technology, to support transformative learning.
Partners	Foster cross-sector collaboration with industry, community, business, and post-secondary institutions.
Money	Establish and maintain a strategic plan that sustainably funds science education.

Items to Rate

Each Essential Element encompasses Items to Rate, totaling 19 items.

Essential Element		Items to Rate
Values	1	The inclusion of every student in science programming is a priority.
	2	Teachers share and collaborate openly, without judgment or negative repercussions.
	3	Students and families are strategically integrated into school collaboration and planning.
	4	Science is promoted as a body of deep conceptual knowledge that is central to our world.
Collaboration and Planning	5	Decision-making for science programming is done through team collaboration.
	6	Collaborative structures enable sustained implementation of science programming.
	7	Sufficient time for science learning is provided in every grade and for every student.
Curriculum and Instruction	8	Science curriculum and instructional materials are aligned with Next Generation Science Standards (NGSS) and implemented at all grade levels.
	9	STEM experiences guide and support all students as they prepare for the 21st century workplace.
	10	Authentic assessment practices support high-quality science instruction.
Professional Learning	11	Professional learning opportunities for administrators and teachers focus on the unique nature of science and STEM teaching and learning.
	12	Professional learning plans for science teachers provide multiple sustained learning opportunities over a substantial time interval.
Communication	13	Science and STEM implementation strategies and resources are regularly communicated with school staff.
	14	The school's science programming vision, opportunities, successes, and next steps are regularly communicated with school community (students, parents, staff, partners, community members).

Essential Element		Items to Rate
Technology	15	A variety of modern technologies are embedded in the instructional process.
Partners	16	Cross-sector partnerships with science centers, museums, zoos, and other STEM-related nonprofits and local businesses enhance STEM programming.
	17	Science and STEM professional learning opportunities for teachers and administrators include partnerships with community organizations, museums, business, industry, and postsecondary education partnerships.
Money	18	The school raises funds and procures resources to prioritize quality science and STEM education.
	19	Adequate levels of funding are allocated to prioritize quality science and STEM education.

Indicators and Guiding Questions

Each Item to Rate is characterized by two to five Indicators for which the team gathers evidence. Indicators are listed in order of increasing complexity. Guiding Questions guide the teams' consideration of evidence

For example, the Essential Element of Collaboration and Planning: Maintain an effective collaboration infrastructure within and across all grade levels, has a total of three Items to Rate (see Essential Element and Items to Rate Table). To the right is an example of one Item to Rate with its Indicators and Guiding Questions that the team will consider as it gathers evidence.

Potential Ideas

As teams gather evidence and identify gaps, the tool provides a place to capture ideas for each Indicator. Ideas should be about strategies or resources not currently in place, but that might support the Indicator in the future. Teams will use these ideas when developing their action plans.

Example		
Item To Rate	**Indicators**	**Guiding Questions**
5: Decision-making for science programming is done through team collaboration.	**5A:** Science mission and vision are identified by a diverse team.	**5A.1:** Is this team an existing team at the school (instructional leadership team, science department, school improvement team, cross-disciplinary school team, etc.?) If not, describe the team structure. Does the team include teachers (science and non-science), administrators, and/or other stakeholders?
		5A.2: Does the team have defined roles and responsibilities matched to science programming goals?
		5A.3: What is the team's process for identifying science needs, goals, and next steps?
		5A.4: How does the team monitor and reflect on the school's science mission and vision? Is this done on an ongoing basis?
		5A.5: How does the team advocate for science and support of STEM with the school staff and community?
	5B: The diverse team systematically analyzes a variety of student performance assessment data to inform instructional and programmatic decisions on an ongoing basis.	**5B.1:** What is the strategy for collecting, analyzing, and monitoring student science performance assessment data? Is this happening on an ongoing basis? How is this analysis used?
		5B.2: How are the team's instructional and programmatic decisions in science informed by analysis of student science performance assessment data? In what systemic ways is authentic student work collaboratively analyzed and used to inform planning?
		5B.3: Describe how intervention plans are collaboratively designed to address gaps in student achievement in science. What kinds of student performance data are used? For example REACH BOY/EOY, NWAE/MAP testing, in-class assessments.
		5B.4: How is this analysis used in ongoing monitoring of the school's science mission, vision, goals, and next steps?

Rating

Once discussions have occurred and evidence has been gathered for all Indicators within an Item to Rate, the team is ready to come to a mutual rating decision. Rating always happens collectively, during meetings and in the team setting.

| School Support Tool Rating System	
Rating	**Descriptor**
Awaiting Initiation	This item has not been initiated No evidence is present
Igniting It	**Initiate, Plan, Organize** Initiative to organize is underway, a plan is being developed
Building It	**Implement, Grow, Transform** A plan is in place and is being implemented, the item is growing and transforming
Living It	**Sustainable, Strategic, Systemic** The item is fully activated and sustainable at the school

Action Plan

Through consideration of the Essential Elements and rating each Item, teams develop a snapshot of science at their school. The next step, action planning, helps teams prioritize ideas that will improve school-wide science teaching and learning.

Teams create an achievable and customized yearlong action plan and begin implementation. At the end of the year, they will revisit the plan, assess any changes in their ratings of Essential Elements, and consider new goals for the following year.

School Change Over Time

Innovation and change in science teaching and learning at the whole-school level happens over time. Science Leadership School Partners have the opportunity to partner with MSI for up to three consecutive years. School Partners will celebrate success and accomplishments of their action plans in an annual recognition event at MSI.
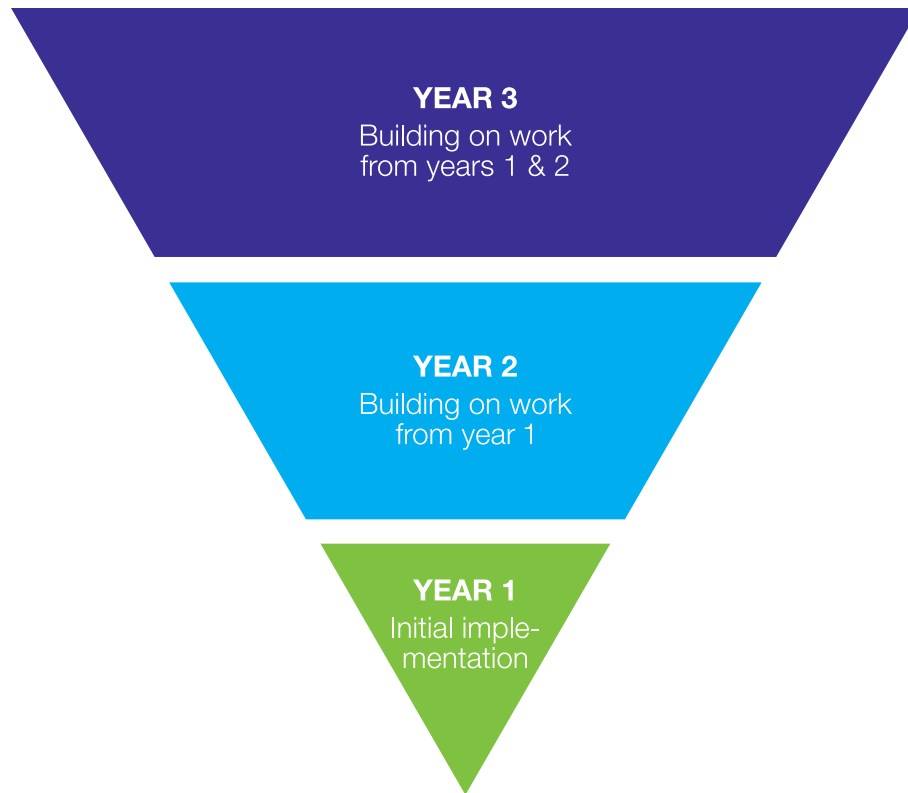
Recognition Event

At the end of each year, participating schools will be recognized as Museum of Science and Industry Science Leadership School Partners.

A celebratory event will allow School Partners to share their accomplishments and demonstrate their growth over time. Science Leadership School Partners will be highlighted as models for other schools looking to reform science education at the whole-school level.

YEAR 3
Building on work
from years 1 & 2

YEAR 2
Building on work
from year 1

YEAR 1
Initial imple-
mentation

A Note About Science Versus Stem

The term STEM stands for science, technology, engineering, and math, and is a frequent topic amongst policymakers, education researchers, and in schools.

With the release of the Next Generation Science Standards, there has been a drive for schools to revise science programming along with a push toward using STEM to integrate subjects. However, a clear pathway for doing so is rarely identified or described. Some schools have STEM courses in which students can enroll but these are often stand-alone courses that are offered in addition to science. These STEM courses may be electives or extracurricular activities, and may not be available to every student.

Science is a foundational subject and all students need an understanding of science in order to approach and understand STEM. A solid foundation in science incorporates the other three subjects—i.e. science in support of STEM.

MSI's School Support Tool is designed to support all K-8 schools, not to create specialized "STEM schools." Science is our central focus, while STEM is used to reflect integrated experiences in school as well for broader experiences (such as programs with partners and workforce/skills development) both inside and outside of the classroom.

Evaluation and Research

Understanding the impact of the School Partners Program and obtaining feedback from program participants is essential to the ongoing development and refinement the Science Leadership Initiative at MSI.

MSI's Research and Evaluation staff will collect data throughout the year, with a special focus on how participants use the digital School Support Tool (including the content users enter) and through surveys. The Research and Evaluation staff will keep responses and data anonymous, i.e. individualized data will not be shared with Museum staff members or with schools. With your consent, we would like to share this anonymous, de-identified data in reports with our stakeholders and through presentations at conferences. We value your feedback, and encourage open, honest, and constructive criticism to help us improve our program.
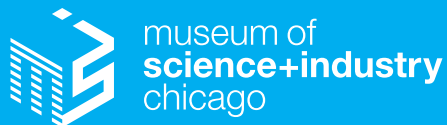
More information about the evaluation and research for the Science Leadership School Partners program will be provided throughout the year. If you have any questions please email msiresearch@msichicago.org.

The Museum of Science and Industry, Chicago (MSI), one of the largest science museums in the world, offers world-class and uniquely interactive experiences that inspire inventive genius and foster curiosity. From groundbreaking and award-winning exhibits that can't be found anywhere else, to hands-on opportunities that make you the scientist—a visit to MSI is where fun and learning mix.

Through its Welcome to Science Initiative, the Museum offers a variety of student, family and teacher programs that make a difference in communities and contribute to MSI's larger vision: to inspire and motivate children to achieve their full potential in science, technology, medicine and engineering.

The Museum's Science Leadership Initiative is addressing the critical issue of student achievement and exposure to STEM by supporting science education on a whole-school level. This innovative new effort identifies the components that lead to an effective science education, recognizes schools that get it right, and helps schools succeed by providing tools and supports for teachers and administrators.

Learn more at **msichicago.org/scienceleadership**.

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