STEM ECOSYSTEM INITIATIVE
Preparing Students for Industry 4.0

Paula Golden
President, Broadcom Foundation
“Science, technology, engineering, and mathematics (STEM) are the essential pillars of an advanced society and its sustainability. The mission of Broadcom Foundation is to educate, inspire and deploy the next generation of scientists, engineers and STEM innovators who will take on the Grand Challenges of the 21st century.”

Henry Samueli
Co-Founder, Broadcom Corporation
Chief Technical Officer, Broadcom Inc
Chairman, Broadcom Foundation
Patron, Samuel Prize in the Broadcom MASTERS
OUR WORLD HAS EXPERIENCED REVOLUTIONARY CHANGE IN FIFTY 50 YEARS

1968

(Internet of Things) Communications

(Smart) Cars

(Smart) Cities

2018

Cloud Computing

OVER 1/2 OF THE TOP 10 ‘IN DEMAND’ JOBS DID NOT EXIST IN 2004
OUR CHILDREN HAVE BEEN BORN INTO AN AMAZING AGE – THE FOURTH INDUSTRIAL REVOLUTION – INDUSTRY 4.0

Industry 4.0 is a name for the nonlinear trend of automation and data exchange in technology. It includes cyber-physical systems, the Internet of things, cloud and cognitive computing.

1  1784  Steam, water, mechanical production equipment

2  1870  Division of labour, electricity, mass production

3  1969  Electronics, IT, automated production

4  ?     Cyber-physical systems
THEIR WORLD IS GLOBAL: JUST LOOK HOW THE IPHONE IS MADE...

A TYPICAL IPHONE CONTAINS:

<table>
<thead>
<tr>
<th>Metal</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gold</td>
<td>$1.58</td>
</tr>
<tr>
<td>Silver</td>
<td>$0.36</td>
</tr>
<tr>
<td>Platinum</td>
<td>$0.05</td>
</tr>
<tr>
<td>Copper</td>
<td>$0.12</td>
</tr>
<tr>
<td>Aluminum</td>
<td></td>
</tr>
<tr>
<td>Palladium</td>
<td></td>
</tr>
</tbody>
</table>
AND RAPID PACE OF INNOVATION IN AN ACCELERATED MARKETPLACE

How long to reach 50 million users?

- Radio: 38 Years
- Television: 13 Years
- Cellphone: 7 Years
- Internet: 4 Years
- Facebook: 2 Years
- PokemonGo: 3 Weeks

Information provided by Dean Gregory Washington, UCI Henry Samueli School of Engineering
INDUSTRY 4.0 IS A TIME OF EXPLOSIVE INNOVATION

Information provided by Dean Gregory Washington, UCI Henry Samuell School of Engineering

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... AT A TIME OF EXPONENTIAL RAPID POPULATION GROWTH

OurWorldInData.org/world-population-growth/ • CC BY-SA
Sustainability: Global advancement while improving quality of life

Pollution: 4.2 Million Global Deaths Linked to Air Pollution in 2017

Waste: 1 tonne of Plastic for Every 3 tonnes of fish by 2025

NAE  Institute of Health Metrics  World Economic Forum
INDUSTRY 4.0 REQUIRES DRAMATIC CHANGES IN STEM EDUCATION

NO

Reading, writing and arithmetic 19th century classroom style (even with ergonomic chairs and tablets) are not enough to prepare students for Industrial 4.0

We need to create STEM Ecosystems that enable youth to think critically, collaborate, clearly communicate ideas, be creative and confident

YES

INQUIRY-BASED LEARNING

COLLABORATIVE LEARNING

PROJECT-BASED LEARNING
STEM Learning Ecosystems are child-centered collaborations between our schools, after school programs, museums, science centers, businesses, colleges and universities, STEM associations like Society for Science & the Public, community-based organizations and – of course – families.
US STEM ECOSYSTEM PARTNERS TO DATE
Stemecosystems.org/apply

- 56 Communities Representing 26 States, District of Columbia, and Canada
- Over 4,200 Business + Industry Partners
- Nearly 400 Local/Regional Philanthropic Organizations
- Over 21 Million PK-12 Students
- Over 1,320 School Districts Representing Rural, Urban, and Suburban Areas
- Over 850,000 PK-12 Teachers + Informal Educators
- Over 1,200 Out-of-School + Informal Partners
HERE ARE THE PARTNERS OF A CHILD CENTERED STEM ECOSYSTEM

- **Government, Foundations & Institutes of Higher Education**
- **Community and Out-of-School Programs/STEM-Rich Institutions, Museums & Science Centers**
- **Business Community**
- **Formal PK-12 Education**
- **Family**
- **SCIENCE FAIRS**
- **STEM COMPETITIONS**
STEM ECOSYSTEMS NEED SCIENCE FAIRS TO TEACH STUDENTS THE 5C’s

CRITICAL THINKING
Making Observations/Sustaining Focus on Testing Facts
Using Tools to Objectively Measure and Assess a Hypothesis

COLLABORATION
Developing Confidence in Ability to Contribute;
Tapping Others’ Complementary skills; Listening and Communicating

COMMUNICATION
Sharing in Linguistic and Nonlinguistic Forms.
Leadership and Advocacy; Listening, Processing, Sharing

CREATIVITY
Learning through Trial and Error.
Giving Oneself Permission to Make Mistakes; Perseverance

CONFIDENCE
Belief in one’s own abilities;
Expressing Personal Opinions; Taking on New Challenges
1. Common goal of Build STEM knowledge and capacity of educators in all sectors.
2. Equip educators with tools and structures to sustain collaborations with STEM Ecosystem Partners.
3. Weave together formal, informal and out-of-school STEM learning around 24/7 child-centered STEM learning.
5. Partner with businesses who need a STEM-Ready Workforce of the future.
6. Focus on expanding student awareness on STEM college and career opportunities at all levels.
7. **SCIENCE FAIRS ARE A STEM ECOSYSTEM CENTERPIECE: CREATING A PROJECT-BASED LEARNING OPPORTUNITY TO MAKE REAL-WORLD CONNECTION TO STEM EDUCATION**
HELP PREPARE
THE NEXT GENERATION FOR INDUSTRY 4.0

&

Partner with Your Local STEM Ecosystem

To learn more: stemecosystems.org

For Information contact: alyssabriggs@tiesteach.org
THANK YOU