# Post-It Notes
# National Summit 2017

## Emerging Technologies

- Short: data (analytics, ownership, etc.), added manufacturing, AI, biotechnology, robotics and automation.
- Long: block chain, cognitive engineering, IOT, cybersecurity.
- Bioplastics NOW!!
- Transportation technologies (e.g. hyper loop).
- Virtual reality.
- IOT sensors.
- Crowd funding. Crowd thinking. Crowd sourcing.
- Bio – customized templates; precision medicine (3D printed organs).
- Autonomous.
- Battery technology.
- Connected technologies.
- Predictive analytics (big data).
- ICME.
- Short: supply-based technologies are established; access to manufacturing machine components is commodity.
- Long: youth (K-20) talent pipeline with hands-on intuition.
- Maker Movement as Workforce Development. MakerNet.work.
- Composites and light weighting (materials).
- Short: Grophone and 3D. Long: basic science.
- Invention of manufacturing methods / technologies for "bio" products (e.g. organs, tissues, cells, etc.).
- Sustaining Makerspaces and developing more opportunities for inter-generational interactions.
- Advanced materials technologies. Industrial big data analytics.
- Bio-plastic.
- Amatrol's "skill boss" trainer. Trains and assess students on 60+ skills performed on plant floor.
- Advancement of cloud computing / big data as it applies to manufacturing.
- [unreadable] more manufacturing.
- Maturation and integrated computational materials engineering.
- High density power storage.
- Virtual reality training options.
- Connecting materials with design capabilities.
- Social network analysis.
- Metamaterials @ scale.
- Machine learning.
- Machine learning, educational technology, virtual reality, CRISPR – augmented brain / consciousness, data analysis, predictive analysis, and robotics.
- Nanotechnology, energy intensive manufacturing (to leverage low energy costs), block chain technology to supply chain certification, AI / machine learning, and high performance computing.
- Maturation of crowd design and micro-factories.
- Maturation of metamaterials.

- Makerspaces as workforce development distributed small batch manufacturing and R&D centers.
- Short: 3D printing. Long: nanomaterials.
- 3D entertainment.
- Predictive analysis.
- Co-Bots. Human – machine production.
- IOT – collaboration of ideas and machines.
- Big Data: becoming usable information.
- ICME. Metamorphic materials.

## Supporting Roles

- Education needs to be rethought – how we foresee a career
- Digital anarchists threaten the future of the digital landscape
- Policy / Regulatory Changes
- Regulations that level the world market playing field (e.g. safety)
- Standards. Assistive Tech. Disability, age, cultural (linguistic).
- Tax structure more conducive for manufacturing in U.S.
- Standards for developing technology and cyber security.
- Provide robust incentives for youth.
- 3D printers capture the imagination of the younger generation. It is a bridge for them to move from their virtual world to the physical world. Government can leverage to address the skills gap.
- Celebrate the success that we want. How many 3 point shooters can power a city?
- Empower / Expand auto – didactic technologies.
- Information sharing.
- Government as first buyer for new technologies (e.g. computer chips / IC).
- MakerNet aims to connect government, edu's, and industry with Maker Movement. Need stakeholders to invest in win/win/win partnerships for workforce development, short-batch distributed manufacturing, and investment in entrepreneurship
- Organizations need to be able to move faster.
- Translators between industry and academia.
- Set-up "silo busting" roundtables. Create event where key stakeholders work to solve key challenges together.
- Manufacturing education.
- Address STEM skills gap at elementary education level.
- Government (long): education, training, research support. Early Education: STEM + manufacturing + entrepreneurship).
- Education and course development. Re-education / continual learning. Framework to connect industry to academia.
- Workforce development. Strategies for accepting tech.
- Training. Educational opportunities. Apprenticeships.
- Re-integrate arts and social sciences into STEM.
- Next-generation supply chain investment. Tax policy, workforce education, developing local contacts.
- Infrastructure.
- Support infrastructure. "Industrial Commons"

- More funds for both fundamental and applied research.
- As corporate research labs (e.g. Bell Labs) ramp down, Federal Funding ramp up is needed to fill the gap (e.g. NSF, ERC Program).
- Elect Chris Coons President.
- More manufacturing USA Institutes. More funding for manufacturing USA. More funding for MEP's.
- Research funding.
- Funding opportunities.
- Technology readiness funding.
- Support transitional research. "Map" of government resources. Consortia and partnerships.
- Focus more on "real world" application and deployment.
- Facilitated partnerships (PPPs).
- Government: research support. Partnership with maker spaces and other vocational institute. Financial support.

## Manufacturing Challenges

- Need to get a way or add to funding for building educational content. Most focus is on 4+ degrees. Need to include 2 year and others. Leverage ATE's.
- Manufacturers need to work with communities and universities to create specific educational content to build skilled workers. Short and long term.
- Government regulations – vestiges of previous eras - solutions to old problems are now obstacles.
- Competitive compensation strategies. Employment shift to independent contractors. Example: UBER and LIFT.
- Help SMEs access tools and services (MEP).
- Advanced manufacturing. Facilities and equipment (for SMEs, especially).
- Integrating biological develops into product. Control / Interface with AI. Security of processes.
- Government dialogue. Workforce.
- Short: Understanding of manufacturing (mindset change). Intellectual property protection. Food, water, energy.
- Supply chain awareness and deployment of advanced materials and technologies.
- Finance for SMEs.
- Prototyping in microelectronics is difficult. Need for National Innovation Foundation for manufacturing and meld with makerspace community.
- Speed of change. Helping manufactures keep up.
- Workforce: evaluating societal norm stigmas, stereotypes that are inhibiting performance.
- Antitrust. IP.
- Reactive Educational Policy Development versus Proactive Educational Policy Development. Sluggish policy development results in antiquated policy deployment.
- Getting manufacturing science respect as a science – image of manufacturing.
- Attracting innovative talent by redefining and marketing "the new manufacturing worker." Partnering with MakerSpaces for make-over and recruitment. MakerNet work.
- Missing middle leverage MFGUSA. Bring manufacturers and universities together to identify and solve manufacturing challenges. But still ? on scale.
- Unfair trade practices.
- Robust supply chain.

- Fast manufacturing ramp up associated with advanced materials / production
- Cyber security.
- Validation / certification of small lot part quality (e.g. 3D printing).
- Short: robots to do the dirty, dangerous jobs to free workers to do high value added.
- Pay to play is an issue.
- Agile R&D and acquisition.
- Systems level thinking and problem solving.
- Culture for workers to take ownership.
- Cyber-physical system security. Digital drawing file security.
- Data cleaning.
- Connectivity – info/data and equipment.
- Workforce: new ways of thinking. Usability / universality of computing tools. Information gaps in SME on how to join larger supply chains.
- Skills gap – what is it really and how do we address it?
- Skills gap.
- Cybersecurity of "OT" / shop floor. Skills gap.
- Workforce skilled in automation repair.
- Long: skills gap, scaling personalized manufacturing, and data ownership.
- Long: how to prepare workers to have proper training, including skills for life-long learning and self-learning.
- Skills gap.
- High school administration and school boards.
- Barriers to collaboration and communication