Computer Science for High School (CS4HS)

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Presentation Outline

The Computing in the Core Coalition

- Goal: Raise the national profile of K-12 computer science education
- Stakeholders:

Microsoft	ACM	CRA
Google	CSTA	NSTA
SAS	NCWIT	NCTM

- Computer science is marginalized in K-12 classrooms nationwide by federal, state and local education policies, and general confusion about what computer science education is in elementary, middle and secondary schools

The Computing in the Core Coalition

- Computer science K-12 education focuses on basic skills, which teach students how to consume technology, versus acquiring deeper knowledge and skills which teach them to create new technologies

- Computers are ubiquitous in everyday life, business, industry and scientific inquiry and research

The Computing in the Core Coalition

- Florida is one of only four states that has adopted 100% of the level I–III ACM/CSTA education standards, however none of the standards are in the Florida core, they all are elective!

  Level I: K–8 (Foundations of Computer Science)

  Level II: 9 or 10 (Computer Science in the Modern World)

  Level III: 10 or 11 (Computer Science Analysis and Design)

  Level IV: 11 or 12 (Topics in Computer Science; AP)

  FDOE Supervisor: Duane Hume, (850) 245-9003

Why Teach Computer Science in High School?

Teaching computer science in high school meets students' needs in three ways:

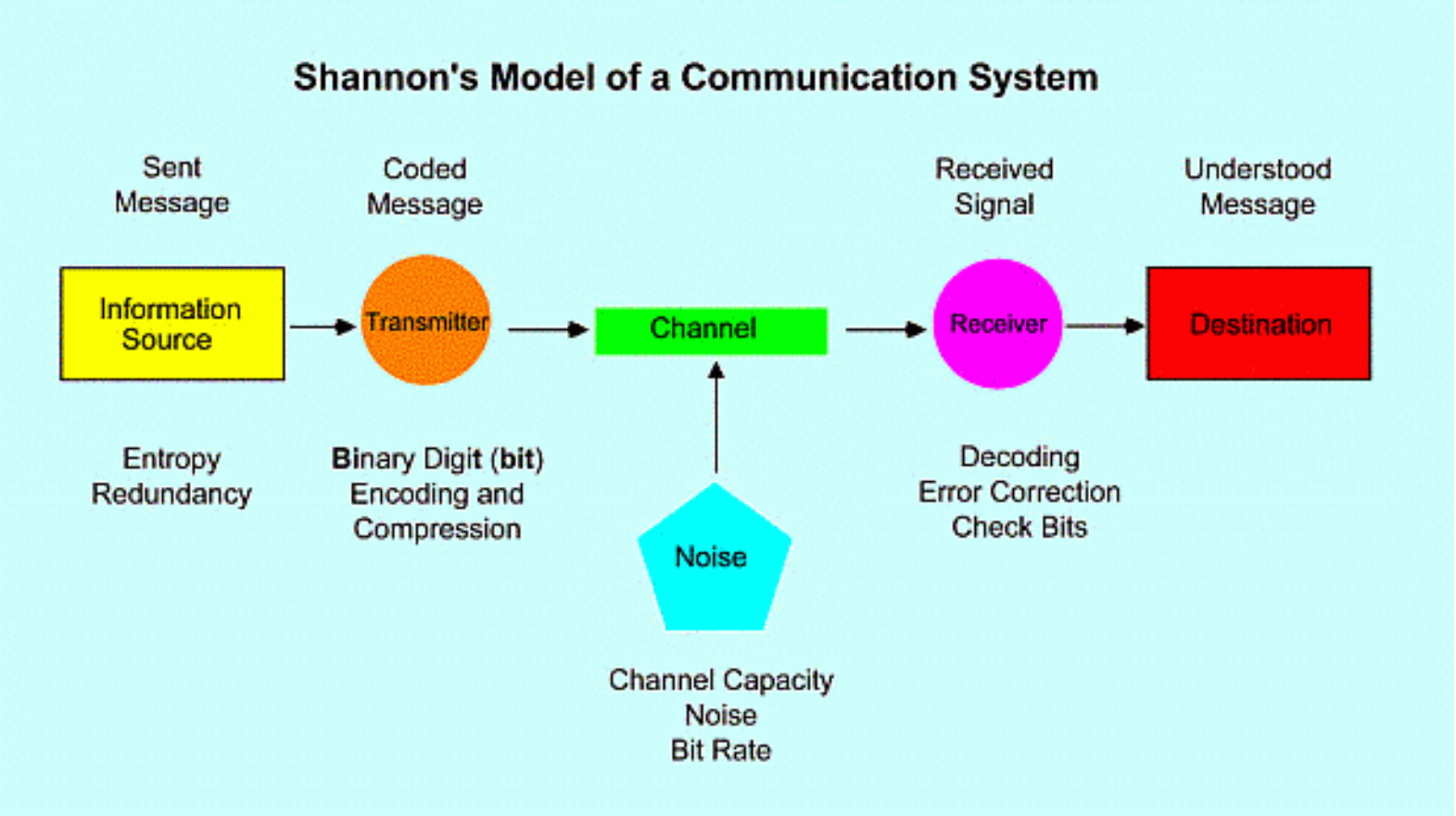
1. Students gain a deeper knowledge of the fundamentals of computing, which–as computing becomes ubiquitous–is critical foundational knowledge that will serve them well throughout their lives

2. Students are exposed to a field that drives innovation and in which job prospects remain strong despite the current economic challenges;

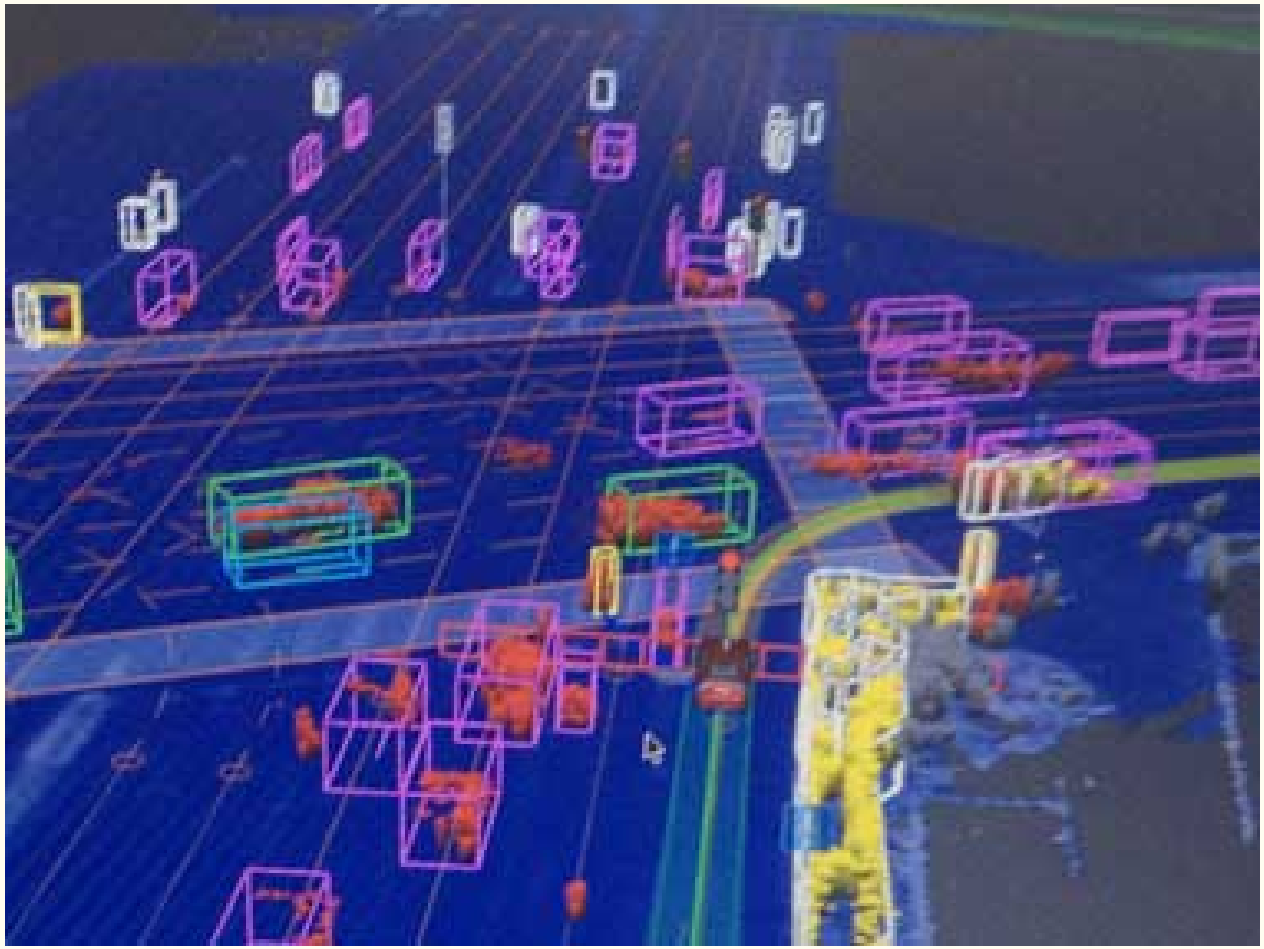
3. Students gain critical knowledge and skills that will bolster their success in higher education academic pursuits

1. Computation — What Can and Cannot Be Computed

2. Communication — Reliably moving information between locations

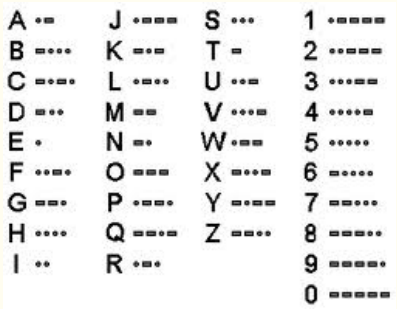


3. Coordination — Effectively using many autonomous computers

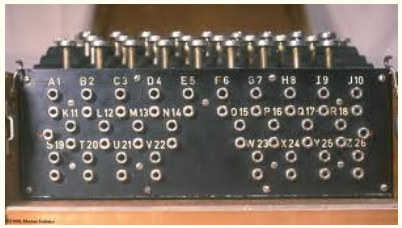


4. Recollection — Representing, storing and retrieving information

Cuneiform Tablets

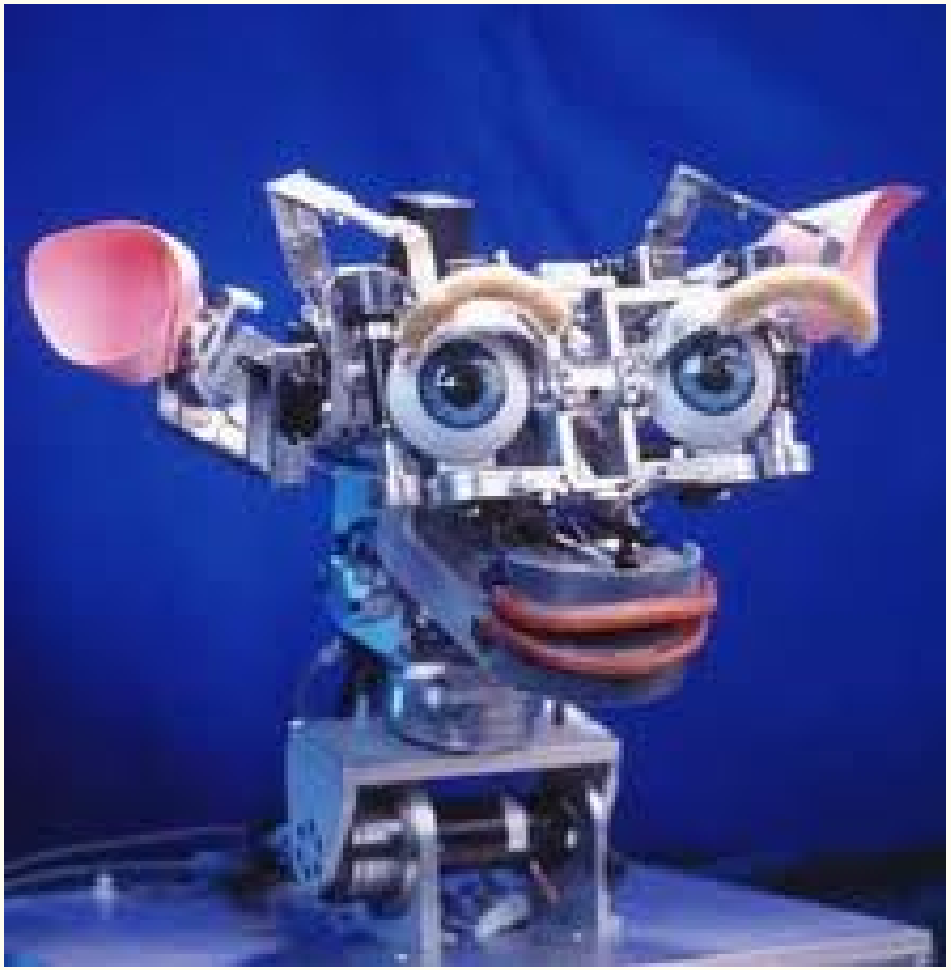


Morse Code

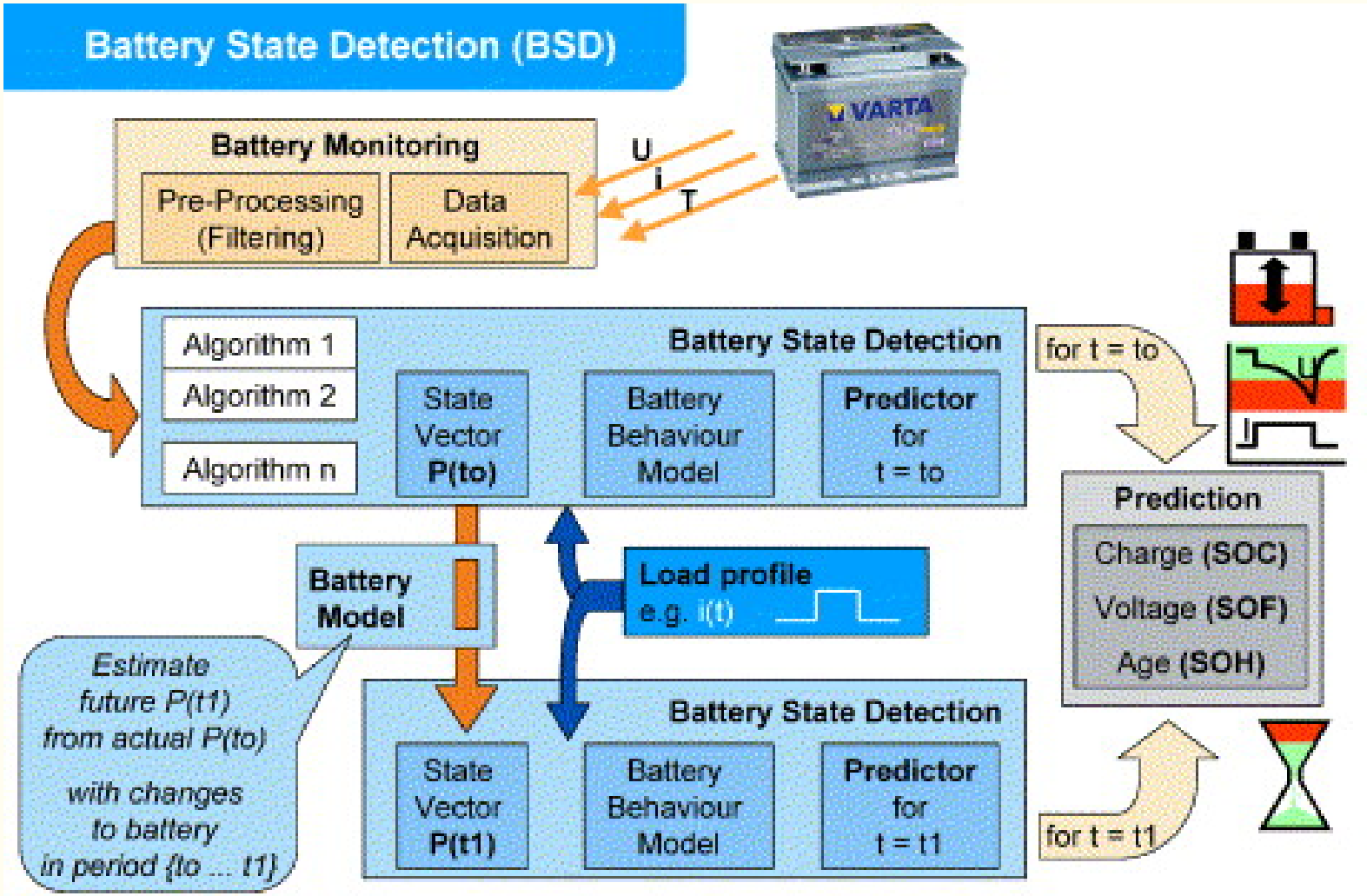


Enigma Machine

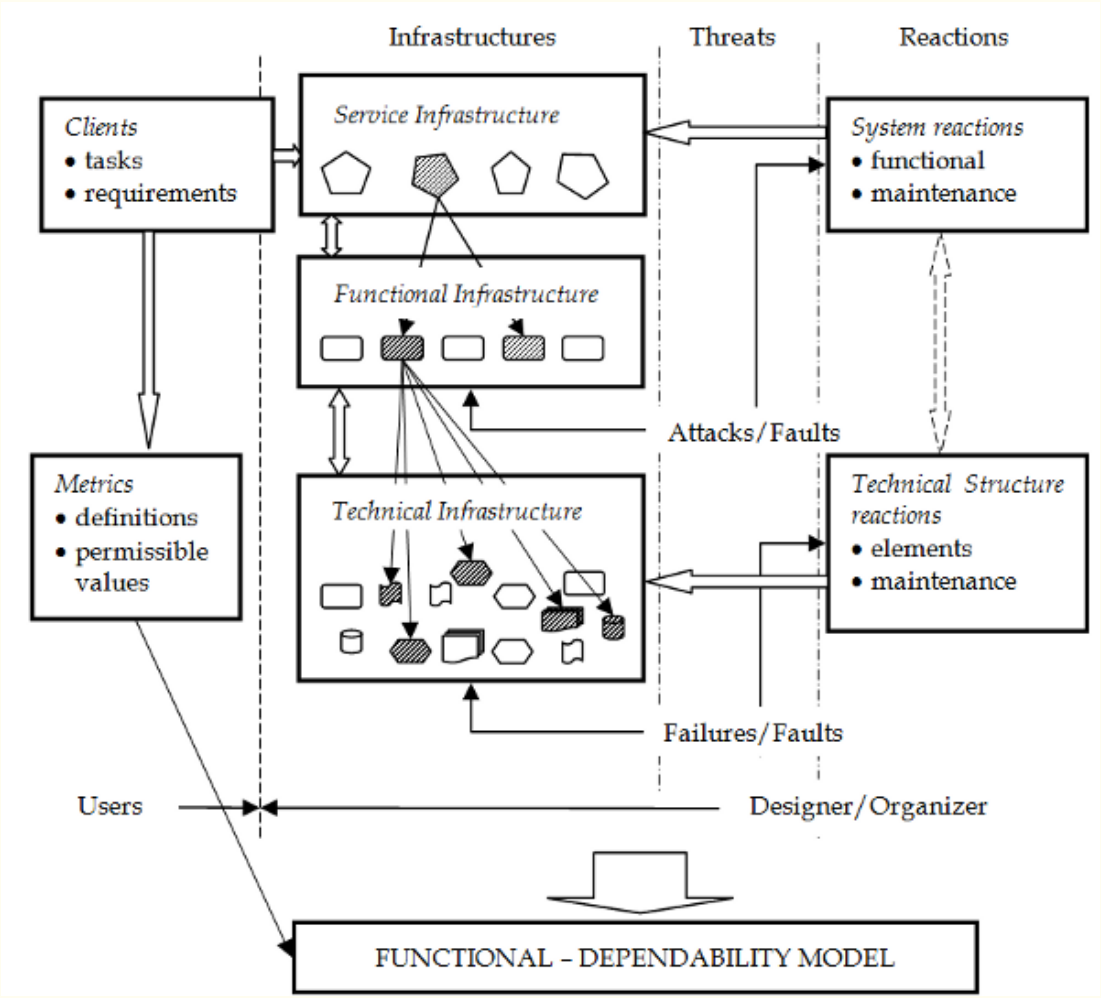
5. Automation — Discovering algorithms to control processes



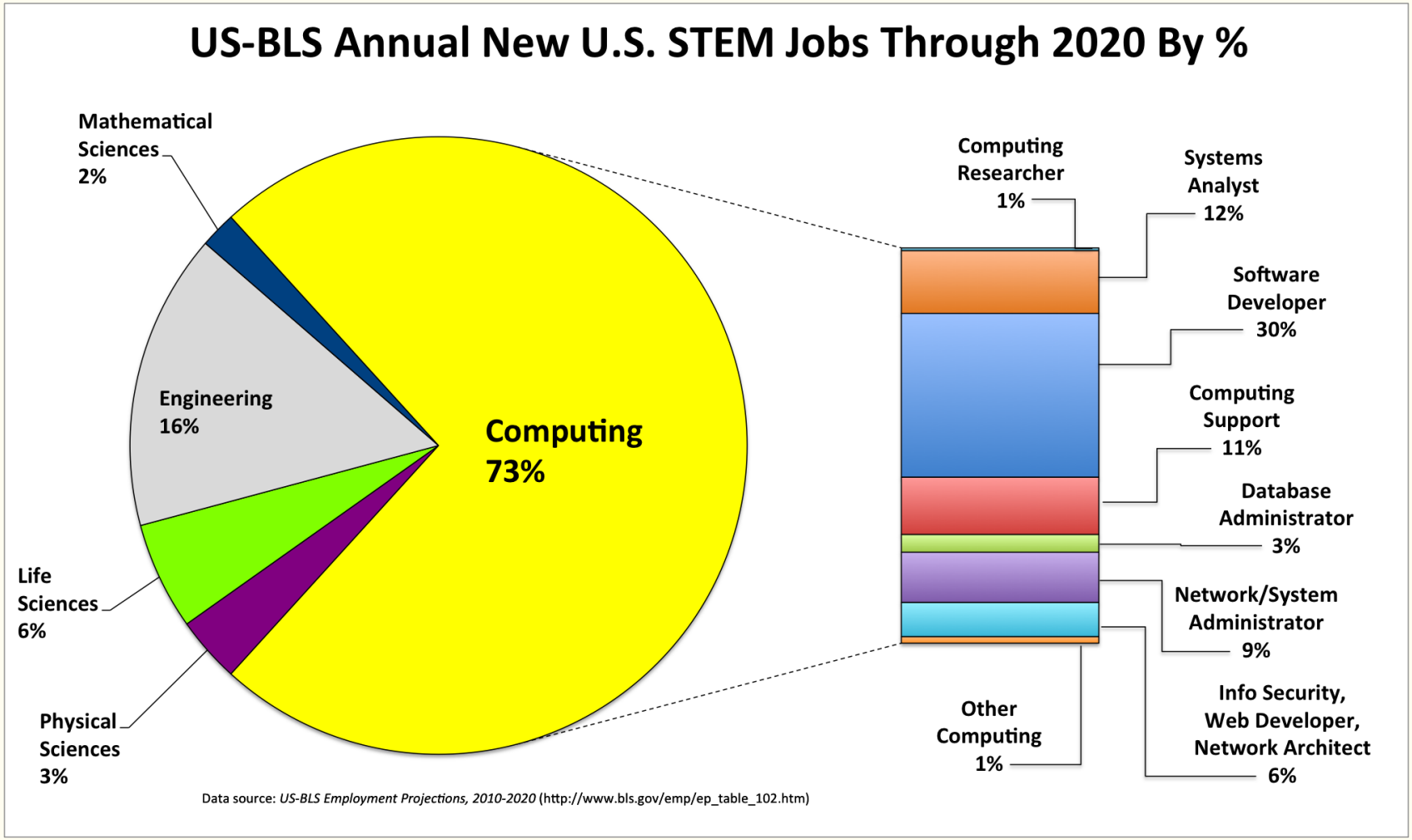
6 Evaluation — Predicting performance of complex systems



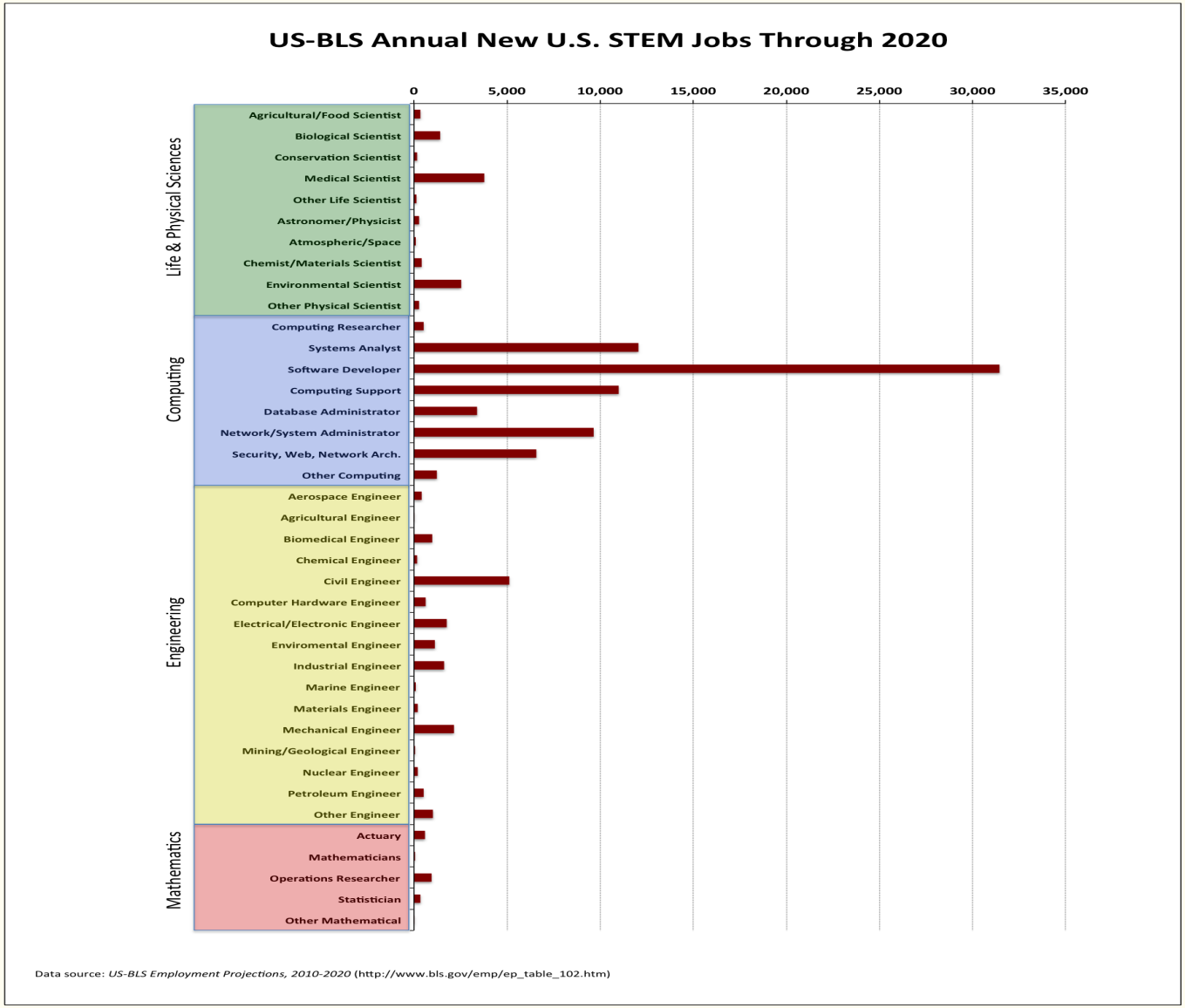
7 Design — Structuring systems for reliability and dependability



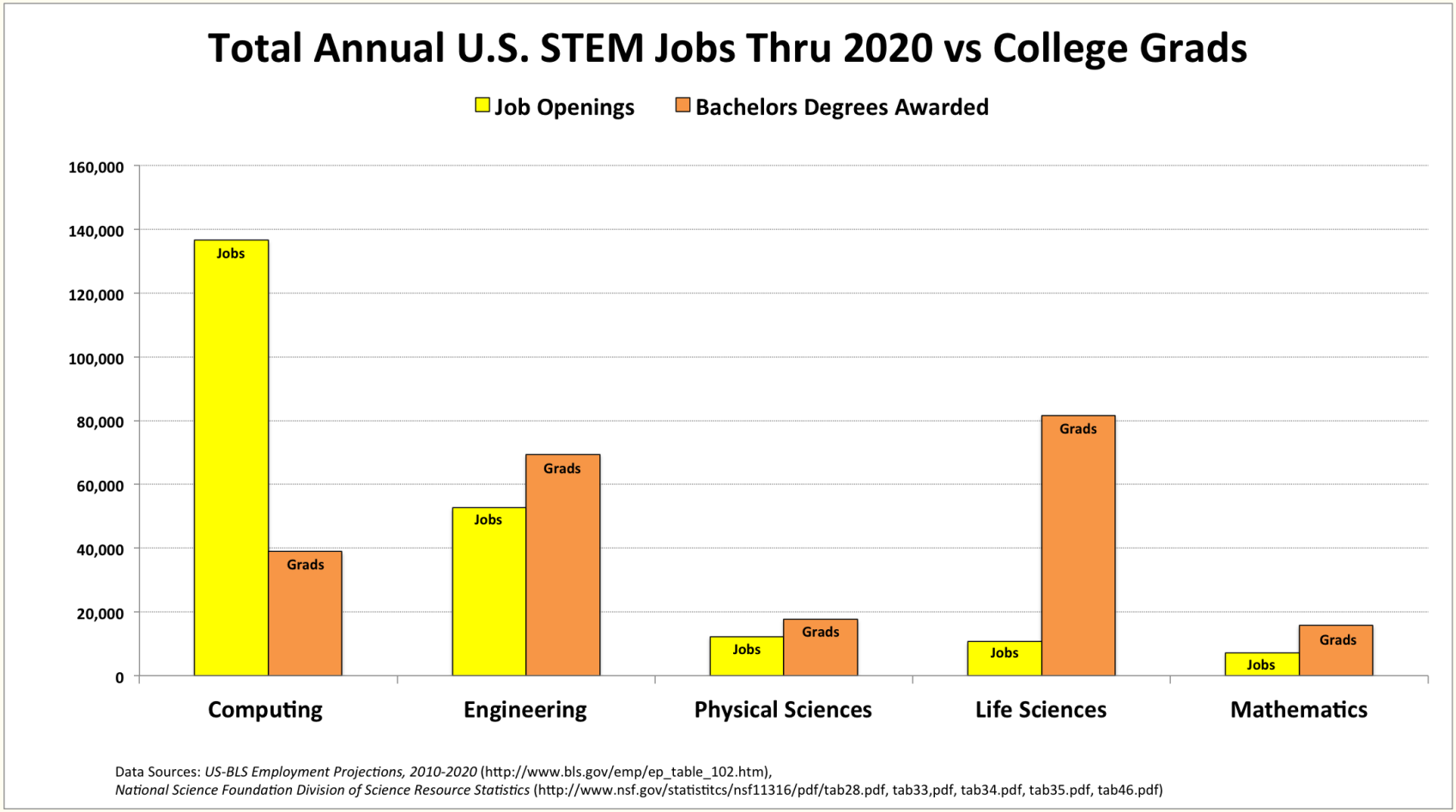
Computing Job Opportunities



2 Computing Job Opportunities



Computing Job Opportunities



Data Sources: *US-BLS Employment Projections, 2010-2020* (http://www.bls.gov/emp/ep_table_102.htm),
National Science Foundation Division of Science Resource Statistics (http://www.nsf.gov/statistitcs/nsf11316/pdf/tab28.pdf, tab33,pdf, tab34.pdf, tab35.pdf, tab46.pdf)

Success in Higher Education

There are many academic and career fields that are directly related to computing.

- Artificial intelligence
- Computer science
- Computer engineering
- Computational science
- Database engineering
- Computer graphics
- Human-computer interaction
- Information Systems
- Network engineering
- Operating systems
- Robotics
- Software architecture
- Software engineering
- System security

Success in Higher Education

Academic and career fields where knowledge of computing is beneficial are numerous.

- Aerospace engineering
- Bioinformatics
- Cognitive science
- Digital library science
- E-commerce
- Financial services
- Genetic engineering
- Information science
- Public policy and privacy
- Instructional design
- Knowledge engineering
- Management information systems
- Multimedia design
- Telecommunications

The Impact of Computing

Learning the algorithms that "makes stuff work" keeps computer science academically and intellectually interesting.

1. The Internet — Changed The Way We Live

> *When your Internet cable leaves your living room, where does it go? What is your mental map of the Internet? The Internet is everywhere and no where at all. Computing, communication, data storage, automation, and performance analysis have converged to design and coordinate this biggest machine ever created.*

2. Mobile Devices — Keeping Us Always Connected

Smart phones, tablets, GPS receivers, car dashboard displays, and apps that run on these devices through wi-fi or bluetooth keep us continuously connected.

3. Sustainable Energy — The Smart Grid

> *Computer science is working to enable distributed, adaptive, and market-based infrastructure for the generation, distribution, and consumption of electrical energy*

4. National Defense — Cyber Security

Computer science is filtering and summarizing documents, eliminating language barriers, supporting interagency collaboration, monitoring suspicious behavior, and enhancing our ability to detect and defeat specific threats

5. Health Care — Improving Life

Computer science enables medical imaging, mining of huge volumes of patient data, for instance, genetic analysis, facilitates monitoring and assisting patients' health activities (telemedicine), and supports robotic surgery

Florida Tech Outreach Efforts

- Dual Enrollment — $100/credit hour, 12 credit hour maximum
- Laser Day — November 14, 2012, 2:15 pm–8:15pm
- Summer Camp — Camp Alpha & Beta
- Science Fair Projects — Faculty Mentors
- Campus Visits — Attend Classes, Shadow Students
- Community Lectures — Talks on Emerging Technology
- School Visits — Possible Topics Include
  - Big data mining
  - Cloud computing
  - Computing Ideas/Impact
  - Cyber security
  - Networks
  - Robotics
  - Software Engineering
  - Vision

References

1. Peter J. Denning. Great principles in computing curricula. In SIGCSE '04: Proceedings of the 35th SIGCSE technical symposium on Computer science education, pages 336–341, New York, NY, USA, 2004. ACM Press.

2. Peter J. Denning. Who are we? Communications of the ACM, 2011.

3. Computing in the Core Coalition. Advocating for K-12 Computer Science Education. http://www.computinginthecore.org/.

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4. Allen Tucker, et al. A Model Curriculum for K-12 Computer Science, Technical report, The Association for Computing Machinery & Computer Science Teachers Association, 2003. http://csta.acm.org/Curriculum/sub/CurrResources.html

5. Cameron Wilson, et al. Running on empty: The failure to teach K-12 computer science in the digital age. Technical report, The Association for Computing Machinery & Computer Science Teachers Association, 2010. http://www.acm.org/runningonempty/