The Chart Page

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The Twenty-Two Most Critical Technologies

Technology	Objective
1. Microelectronics Circuits and Their Fabrication	The production of ultrasmall integrated electronic devices for high-speed computers, sensitive receivers, automatic control, etc.
2. Preparation of Gallium Arsenide (GaAs) and Other Compound Semiconductors	The preparation of high-purity GaAs and other compound semiconductor substrates and thin films for microelectronic substrates.
3. Software Producibility	The generation of affordable and reliable software in timely fashion.
4. Parallel Computer Architectures	Ultrahigh-speed computing by simultaneous use of all processing capabilities in the next generation of computers.
5. Machine Intelligence/Robotics	Incorporation of human "intelligence" and actions into mechanical devices.
6. Simulation and Modeling	Testing of concepts and designs without building physical replicas.
7. Integrated Optics	Optical memories and optical signal and data processing.
8. Fiber Optics	Ultralow-loss fibers and optical components such as switches, couplers, and multiplexers for communications, navigation, etc.
9. Sensitive Radars	Radar sensors capable of detecting low-observable targets and/or capable of noncooperative target classification, recognition, and/or identification.
10. Passive Sensors	Sensors not needing to emit signals (hence passive) to detect targets, monitor the environment, or determine the status or condition of equipment.
11. Automatic Target Recognition	Combination of computer architecture, algorithms, and signal processing for near-real-time automation of detection, classification, and tracking of targets.
12. Phased Arrays	Formation of spatial beams by controlling the phase and amplitude of RF signals at individual sensor elements distributed along an array (radar, underwater acoustic, or other).
13. Data Fusion	The machine integration and/or interpretation of data and its presentation in convenient form to the human operator.
14. Signature Control	The ability to control the target signature (radar, optical, acoustic, or other) and thereby enhance the survivability of vehicles and weapon systems.
15. Computational Fluid Dynamics	The modeling of complex fluid flow to make dependable predictions by computing, thus saving time and money previously required for expensive facilities and experiments.
16. Air-Breathing Propulsion	Lightweight, fuel-efficient engines using atmospheric oxygen to support combustion.
17. High-Power Microwaves	Microwave radiation at high power levels for weapon applications to temporarily or permanently disable sensors or to do structural damage.
18. Pulsed Power	The generation of power in the field with relatively lightweight, low-volume devices.
19. Hypervelocity Projectiles	The generation and use of hypervelocity projectiles to (1) penetrate hardened targets and (2) increase the weapon's effective range.
20. High-Temperature/High-Strength/ Lightweight Composite Materials	Materials possessing high strength and low weight and/or able to withstand high temperatures for aerospace and other applications.
21. Superconductivity	The fabrication and exploitation of superconducting materials.
22. Biotechnology Materials and Processing	The systematic application of biology for end use in military engineering or medicine.

On March 15, the Department of Defense identified for Congress these twenty-two technologies as the ones most essential to "the long-term qualitative superiority of US weapon systems."

Source: *The Department of Defense Critical Technologies Plan*