

Colliding S-Curves and Their Integration for Two-Year Colleges

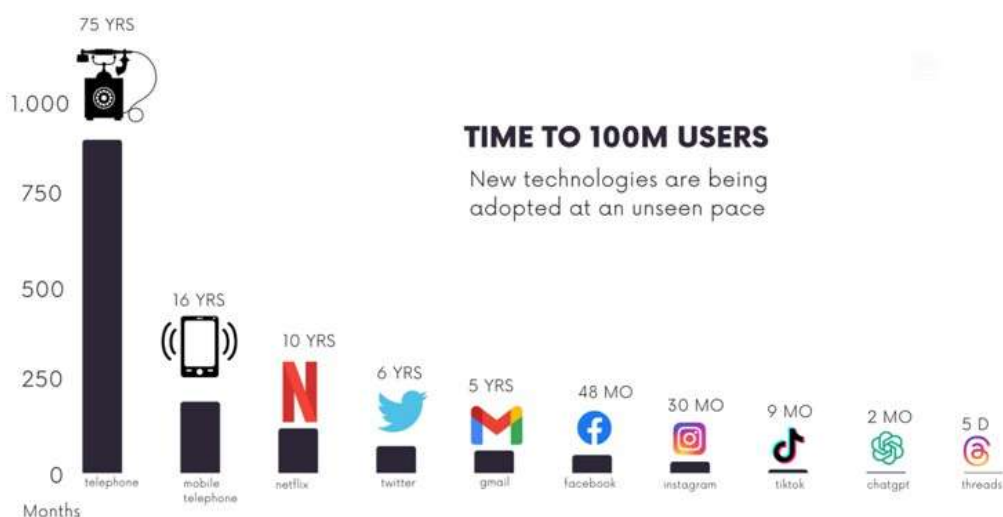
Dr. Rick Aman

Aman & Associates – Futuring and Strategic Leadership

September 15, 2025

Introduction: Exponential Growth and Colliding S-Curves

Exponential growth is no longer the exception. It is the defining pattern of our time. Technologies that once took decades to reach mass adoption now scale globally in just months. This acceleration is not the product of a single breakthrough but the convergence of multiple S-curves of innovation advancing together.



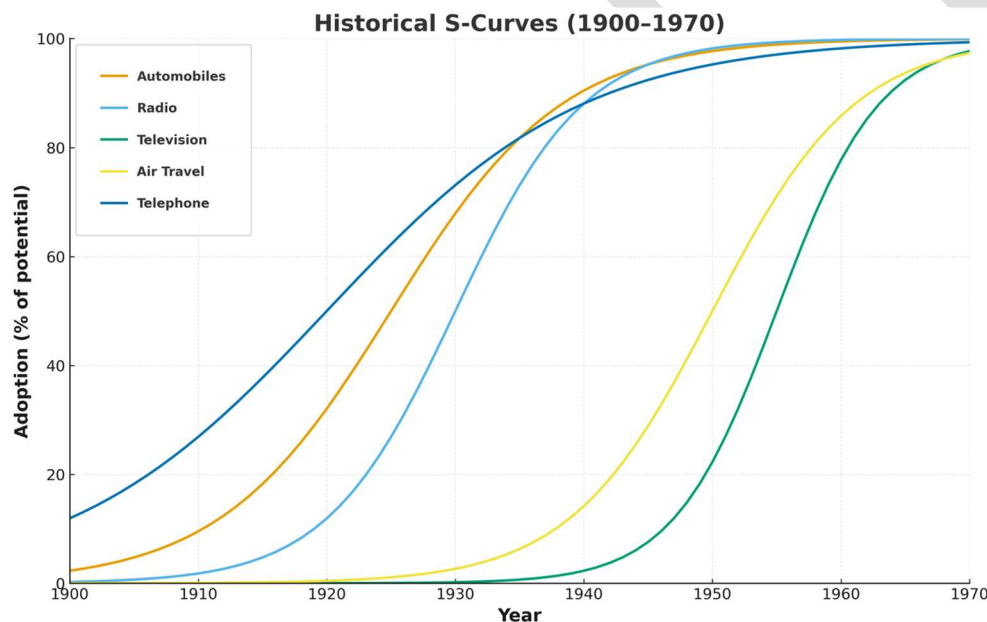
An S-curve describes the life cycle of innovation: slow beginnings, rapid mainstream adoption, and eventual maturity. In the past, these curves emerged one at a time—the automobile, radio, and television each reshaped society in their own eras. Today, however, artificial intelligence, clean energy, advanced manufacturing, and cybersecurity are rising simultaneously, reinforcing and amplifying one another.

For community colleges and workforce institutions, these curves are not abstract theory. They are strategic signals. Recognizing where innovations sit on their adoption curve enables leaders to anticipate disruption, pivot resources, and invest where opportunity is expanding. As Wayne Gretzky advised, the challenge is to “skate to where the puck will be,” positioning programs and partnerships on the front edge of tomorrow’s economy rather than clinging to the past.

Why S-Curves Matter

Most innovations or new technologies follow the same predictable pattern: slow beginnings with early adopters, rapid scaling as mainstream markets accelerate, and eventual leveling off as the technology matures or is displaced. Economists and strategists call this the “S-curve” of adoption.

For leaders, the power of the S-curve lies not just in describing the past, but in forecasting the future. Recognizing where a trend sits on its curve helps decision-makers know when to enter, when to expand, and when to exit. Investing too early risks wasted resources; moving too late cedes advantage to faster competitors. The steep slope of adoption—the inflection point when a technology tips into the mainstream—is often the most fertile period for growth, partnerships, and talent development.



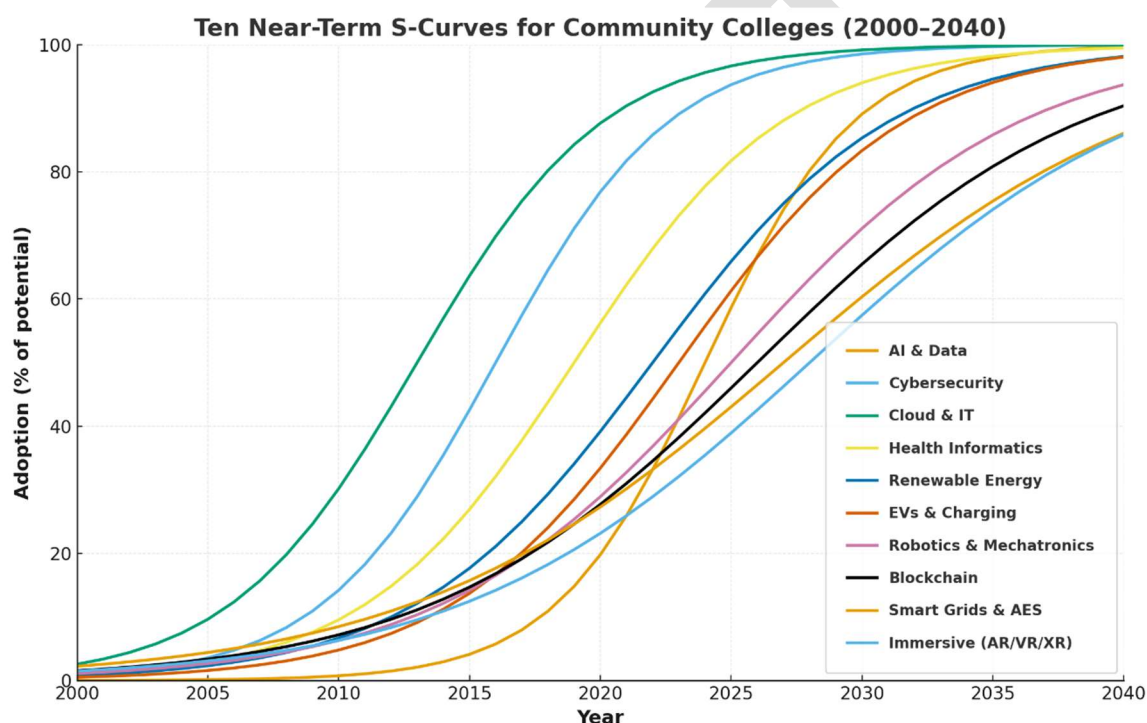
History shows the consequences. The automobile disrupted entire sectors, from horse-drawn transport to urban planning. Television redefined communication, politics, and culture within a generation. In each case, organizations that pivoted during the steep slope of adoption thrived, while those tied to mature or declining curves struggled to remain relevant.

For higher education, these lessons matter deeply. Colleges that align programs with rising curves like artificial intelligence, cybersecurity, or renewable energy position themselves as engines of workforce opportunity and regional competitiveness. Those that remain tied to mature industries risk stagnation, declining enrollment, and loss of public trust. The

challenge for boards and presidents is not whether S-curves will reshape their institutions, but how intentionally they will respond.

Evidence and Implications

The next wave of S-curves is already upon us—artificial intelligence, cybersecurity, renewable energy, advanced manufacturing, robotics, and skills-first credentials are all accelerating into mainstream adoption. As the Rocky Mountain Institute notes, “*clinging to mature curves risks irrelevance*,” while pivoting to rising curves transforms colleges into workforce anchors (Speelman & Numata, *A Theory of Rapid Transition: How S-Curves Work*, RMI, 2022).



What the Data Signals (2000–2040)

Between 2000 and 2040, technology adoption follows three distinct patterns:

- **Fast, steep growth:** AI, 5G and edge computing, satellite systems, cybersecurity, need for energy production.
- **Moderate adoption:** Electric vehicles, immersive and simulated learning, internet of things.
- **Slower, extended curves:** Smart grids, robotics, advanced manufacturing, blockchain.

The message for colleges is clear: institutions that cling to mature curves will fade, while those that pivot to rising ones will position themselves as regional anchors for workforce

development and innovation. As Levine and Van Pelt emphasize in *The Great Upheaval*, “colleges that fail to adapt to the forces reshaping the economy and society will be left behind, while those that anticipate change will define the future of higher education.”

Adoption Phases and Board Guidance

Understanding phases of adoption is only the starting point. The real challenge for boards and presidents is knowing which curves to pursue and when:

- **Early adoption:** Provides visibility and leadership but requires tolerance for uncertainty.
- **Steep slope:** The prime window for most colleges—when employer demand surges and funding streams are accessible.
- **Maturity:** Demands discernment—maintaining programs that still serve regional needs while avoiding unnecessary expansion.

The key is to continually scan the horizon, anticipate shifts, and align resources so the institution is positioned on the curves that matter most for its community and workforce.

The Community College Advantage

Community colleges are uniquely positioned to thrive in times of rapid change because agility is built into their design. Advisory boards connect them directly to local employers, surfacing near-term skill needs. Noncredit-to-credit pathways allow programs to pivot quickly and give learners flexible entry points. Their regional focus ensures training stays aligned with workforce demand, while affordable tuition lowers barriers for adults seeking career shifts.

In an era of colliding S-curves, this responsiveness makes community colleges the most adaptable engines of talent development, capable of anticipating disruption and preparing students for the opportunities emerging in their communities. Community colleges are built for agility:

- **Advisory boards** surface near-term skill needs directly from industry.
- **Noncredit-to-credit ladders** allow rapid pivots in programming.
- **Accessible entry points** reduce risk for adults seeking career changes.
- **Regional focus** ensures programs stay aligned with local workforce demand.

In a world of colliding S-curves, this responsiveness makes community colleges the most adaptable engines of talent development.

Ten Near-Term S-Curves for Community Colleges

Each of the following S-curves offers both operational opportunities on campus and workforce pathways for students:

1. **Artificial Intelligence & Data Analytics**
 - *Operational:* AI-driven advising, adaptive learning platforms.
 - *Workforce:* AI/ML technicians, healthcare data analysts.
2. **Cybersecurity**
 - *Operational:* Protecting student data and financial systems.
 - *Workforce:* Certified specialists to fill critical national shortages.
3. **Cloud Computing & IT Infrastructure**
 - *Operational:* Migrating services to scalable platforms.
 - *Workforce:* Cloud support, DevOps, IT administrators.
4. **Health Informatics & Digital Health**
 - *Operational:* Telehealth platforms, integrated health data.
 - *Workforce:* Health IT specialists, EHR technicians.
5. **Renewable Energy Systems**
 - *Operational:* Solar panels, microgrids, storage on campus.
 - *Workforce:* Solar, wind, and battery technicians.
6. **Electric Vehicles & Charging Infrastructure**
 - *Operational:* Campus EV fleets and charging stations.
 - *Workforce:* EV maintenance, charging station installers.
7. **Blockchain & Tokenization**
 - *Operational:* Credential verification, secure student records.
 - *Workforce:* Blockchain developers, smart contract programmers.
8. **Robotics & Mechatronics**
 - *Operational:* Campus automation in facilities and logistics.
 - *Workforce:* Smart factory technicians, ag-tech specialists.
9. **Smart Grids & Advanced Energy Systems**
 - *Operational:* Colleges as microgrid pilots.
 - *Workforce:* Power systems and energy distribution technicians.
10. **Immersive Technologies (AR/VR/XR)**
 - *Operational:* Virtual labs and instructional innovation.
 - *Workforce:* Simulation designers, AR/VR support specialists.

Board-Level Moves in the Next 90 Days

Boards and presidents can act now by focusing on a small number of high-impact moves:

- Approve **fast-start certificates** tied directly to employer demand.
- Invest in **faculty micro-credentials** in AI, cybersecurity, and simulation.
- Launch **stackable noncredit-to-credit onramps** for adult learners.
- Update board scorecards with **strategic indicators**: program launch speed, employer co-development rates, placement in high-demand sectors.

- Prioritize **capital investments** in labs and equipment that serve multiple curves.
- Shape a clear **public narrative** positioning the college as the region's skills engine.

Conclusion: The Board and Executive Imperative

For boards, CEOs, and executive teams, the lesson of colliding S-curves is clear: leadership today must be defined by anticipation, not reaction. The institutions that wait until technologies fully mature will find themselves struggling to catch up, burdened by outdated programs and declining relevance. Boards must commit to scanning the horizon for early signals, setting a culture of foresight, and empowering executives to pivot resources quickly toward emerging opportunities. This is not about chasing every trend but about discerning which curves align most closely with mission, region, employer demand, and regional economic vitality.

Presidents and their executive teams must also take bold steps to operationalize this foresight. That means building fast-cycle curriculum pathways, investing in faculty readiness, and strengthening employer partnerships so that innovation flows seamlessly into programming. Boards can support this by embedding metrics on agility, employer alignment, and program launch speed into their scorecards. Together, governing boards and executive leaders hold the responsibility to position community colleges as the trusted navigators of disruption ensuring their institutions are not simply adapting to change but shaping a preferred future for their students and their communities.

Preferred Future Series™ | Aman & Associates

Prepared by Dr. Rick Aman

rick@rickaman.com | rickaman.com/articles

© 2025 Aman & Associates. All rights reserved