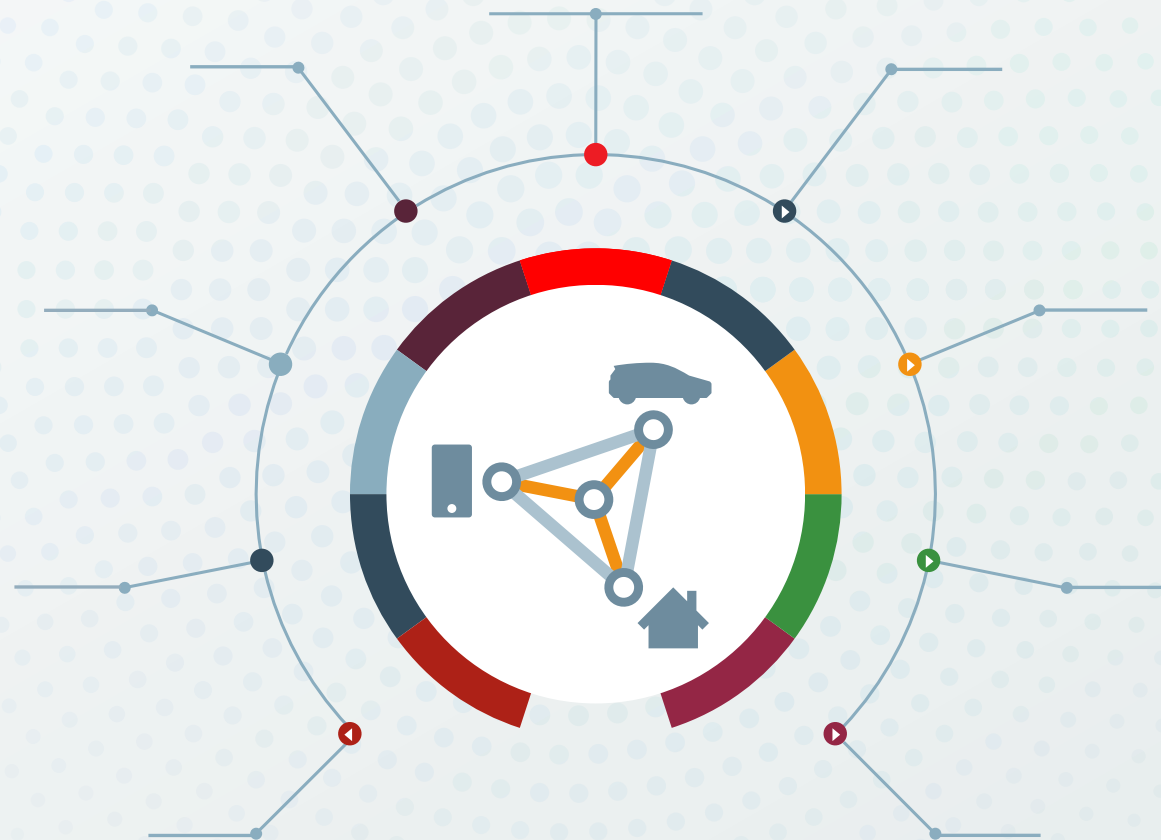


A photograph of two women in a modern office environment. One woman, with short blonde hair and glasses, is seated and looking at a tablet. The other woman, with brown hair, is standing and pointing at the tablet. The background is blurred, showing office furniture and large windows. A large red diagonal graphic element is on the left side of the image.

Transformational Technology Industry Use Cases

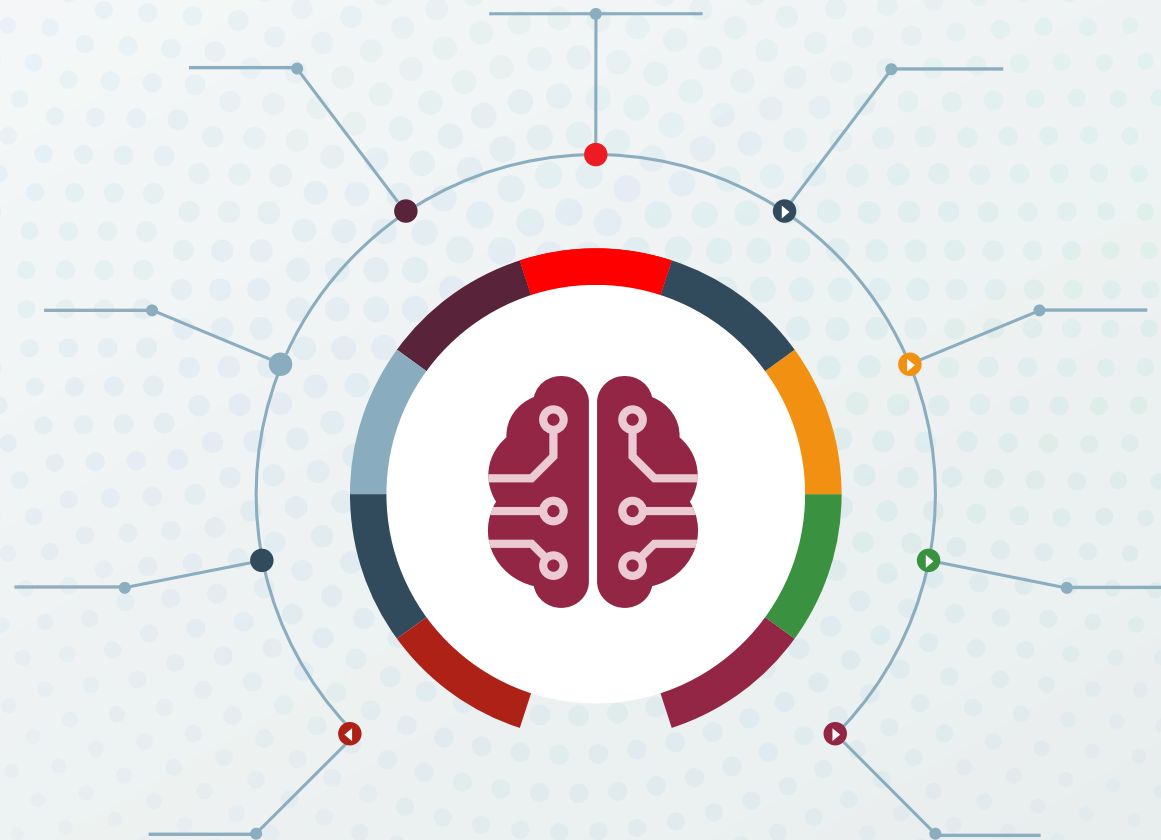
Transformational Technology

Industry Use Cases—Internet of Things (IoT)



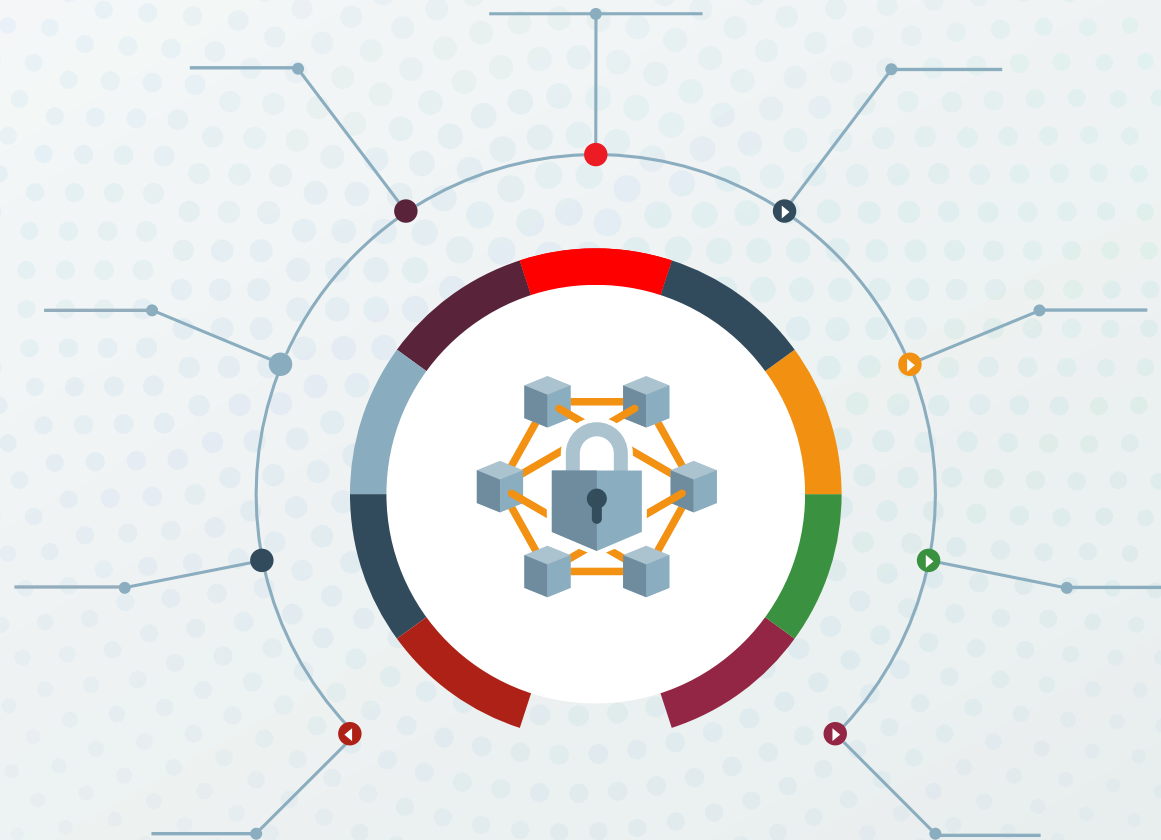
Transformational Technology

Industry Use Cases—Artificial Intelligence (AI)



Transformational Technology

Industry Use Cases—Blockchain



Transformational Technology

Industry Use Cases—Internet of Things (IoT)

IOT IN **AUTOMOTIVE**

CRASH AVOIDANCE

Monitoring driver eye movement and raising a fatigue alarm



72,000

accidents per year in US were caused by drivers who fell asleep.

FLEET MANAGEMENT

Managing vehicle location, fuel, maintenance, and speed



8.56M

fleet vehicles are in service in the US.

SMART FACTORIES

Connecting production process, which enables multiple vehicle configurations on one production line, and better informs just-in-time suppliers



US\$160B

Is the annual expected productivity gain by 2023 from adopting smart-factory technologies.

Transformational Technology

Industry Use Cases—Internet of Things (IoT)

IOT IN COMMUNICATIONS

CONNECTIVITY

Delivering a seamless infrastructure to connect hundreds of billions of IoT devices



12B+

of all internet-connected devices worldwide by 2020 will be machine-to-machine connections. CSPs must build 5G and NB IoT networks to support growth.

DELIVERY AND MONETIZATION OF IOT SERVICES

Becoming a one-stop IoT provider to consumers and businesses by leveraging connectivity and smartphones



US\$200B

is the amount of expected revenue from IoT solutions by mobile operators by 2025.

ASSET TRACKING AND REMOTE WORKER

Managing fleets dynamically using virtual reality to remotely guide workers, and enabling consumers to track installer arrival



70,000

AT&T technicians will enjoy optimized scheduling and dispatching through the use of IoT for fleet management and connected worker.

Transformational Technology

Industry Use Cases—Internet of Things (IoT)

IOT IN CONSUMER GOODS/RETAIL

FRictionLESS COMMERCE

Providing lineless, in-store shopping (e.g., Amazon Go) with downloaded apps that let you take the products you want and go



4,320

hours is the amount of time the average consumer spends waiting in line in their lifetime.

WEARABLE TECHNOLOGY

Providing users with data-input capabilities and real-time access to product/service info in a seamless fashion—smart watches, apparel, etc.



\$US150B

is the projected wearable technology market by 2026.

CUSTOMIZED SHOPPING

Analyzing customer traffic and intersections with loyalty schemes to offer 1:1 experiences, recommendations, and personalized services



62%

of consumers said the primary motivation for shopping in stores is to see/try products before purchasing.

Transformational Technology

Industry Use Cases—Internet of Things (IoT)

IOT IN EDUCATION/RESEARCH

FACILITIES MANAGEMENT

Monitoring of building and facilities remotely



350

buildings and facilities at Penn State are monitored and automated using IoT technology, saving 20% on electricity and increasing comfort and security.

PERSONALIZED STUDENT EXPERIENCE

Using location-based awareness services to suggest nearby activities or events based on student profiles and past behaviors



77%

of US students think that universities should use more of their personal information to enhance their college experience.

STUDENT SECURITY

Improving campus security by providing access to buildings, events, activities, etc., through use of wearable technology



46%

is the projected growth rate in wearable technology by 2020—primarily within the student-aged populations.

Transformational Technology

Industry Use Cases—Internet of Things (IoT)

IOT IN MEDIA/ENTERTAINMENT

SET-TOP BOX

Monitoring, detecting, fixing issues/patterns—proactively and remotely—that are associated with set-top boxes in the home



96.5% of US homes are connected to set-top boxes.

SELF-SERVICE

Enabling customers to install and configure their set-top box using AR/VR-based install guides and remote support via video



US\$100 is the average cost to install a set-top box.

SMART HOME GATEWAY

Providing a home ecosystem—media, lighting control, video surveillance, thermostat monitoring—through a set-top box



250% is the expected increase in the global smart-home market from 2017 to 2019.

Transformational Technology

Industry Use Cases—Internet of Things (IoT)

IOT IN FINANCIAL SERVICES/INSURANCE

WEARABLE TECHNOLOGY

Providing devices for life and health insurance, personalized policy management, and pricing



60% of leading financial institutions plan to make wearables a main payment device as part of their IoT business strategy.

INSURANCE AS A SERVICE

Providing automotive/property and casualty insurance as a service based on usage, driving habits, and monitored risk



1.7T observations are made by Progressive using IoT-based, onboard diagnostic devices to study driver behavior and adjust insurance pricing.

TRADE FINANCE

Automating validation of shipments, goods delivery, and credit letters



12B IoT sensors can potentially be used by financial organizations by 2025.

Transformational Technology

Industry Use Cases—Internet of Things (IoT)

IOT IN HEALTHCARE

REMOTE PATIENT MONITORING

Managing patients outside of clinical settings, increasing access to care, and decreasing healthcare delivery costs



US\$16B

is the annual US cost of hospital readmissions. Remote patient monitoring can reduce it by 50% for 30-day readmissions.

ASSET MANAGEMENT

Increasing asset utilization through locating, monitoring, and maintaining mobile medical equipment across facilities



US\$11M

is the cost of 383 pieces of medical equipment missing from a San Jose hospital over a four-year period.

MEDICATION ADHERENCE

Encouraging chronically ill patients to better manage their conditions to reduce the severity of their diseases



50%

of patients with chronic conditions do not take medications correctly.

Transformational Technology

Industry Use Cases—Internet of Things (IoT)

IOT IN HIGH TECHNOLOGY/INDUSTRIAL MANUFACTURING

SERVICE MONITORING

Monitoring connected products at a customer site to provide proactive service, automated firmware updates, and consumption-based billing



20.4B

connected products will exist by 2020.

PRODUCTION MONITORING

Monitoring all aspects of connected equipment on factory floor to optimize manufacturing performance, predict issues, minimize maintenance



67%

of industrial manufacturers have an ongoing smart-factory initiative.

PRODUCT INSIGHTS

Leveraging product usage data from sensors to identify potential quality issues, new product ideas, and enhancements to existing products



30%

of global 2,000 companies will be using data from digital twins of IoT-connected assets to improve productivity by 2020.

Transformational Technology

Industry Use Cases—Internet of Things (IoT)

IOT IN **PUBLIC SECTOR**

SMART CITIES

Increasing operational efficiency, reducing energy consumption, and delivering government services—while addressing citizen needs

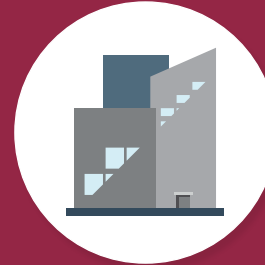


US\$45B

is the expected IoT-enabled smart-building market by 2020.

TRAFFIC MANAGEMENT

Managing traffic based on patterns, flow, and accidents



65%

of the population will live in cities by 2040.

SECURITY AND PUBLIC SAFETY

Improving surveillance and security through cameras, video analytics, and smart-lighting systems



US\$3B+

was the global market for city surveillance equipment in 2017.

Transformational Technology

Industry Use Cases—Artificial Intelligence

AI IN AUTOMOTIVE

AUTONOMOUS DRIVING



Enhancing self-driving/autonomous cars and connected autonomous factories

US\$127B is the annual expected productivity gain by 2023 from adopting smart-factory technologies.

DRIVER ASSISTANCE



Providing automatic braking/parking, collision avoidance, traffic/people alerts, and adaptive cruise control

2020 is when autonomous emergency-braking and forward-collision warning systems are mandated in all vehicles by the EU and US.

VEHICLE-TO-VEHICLE COMMUNICATION



Broadcasting vehicle position, speed, steering-wheel position, and brake status to nearby vehicles to reduce accidents

500K accidents could be prevented in the US each year with vehicle-to-vehicle communication.

Transformational Technology

Industry Use Cases—Artificial Intelligence

AI IN COMMUNICATIONS

NETWORK MAINTENANCE AND TROUBLESHOOTING



Identifying and resolving network equipment problems, predictive maintenance

33% of CSPs are already using AI for network management—with 51% planning to do so over the next two years.

DYNAMIC RESOURCE ALLOCATION



Allocating network resources dynamically to respond to demand fluctuation

1,000 parameters must be configured in the highly dynamic 5G network and SDN/NFV environments. AI is imperative to manage this complexity.

CUSTOMER EXPERIENCE



Creating personal customer interactions with virtual assistants that know your needs, adapt to your behavior, and are ready on your device of choice

48% of CSPs said that their main driver for implementing AI is to deliver a better customer experience.

Transformational Technology

Industry Use Cases—Artificial Intelligence

AI IN CONSUMER GOODS/RETAIL

VIRTUAL ASSISTANTS



Combining AI with human interfaces to help customers get answers to their questions easier and faster

85% of customer interactions will be managed without humans by 2020.

REAL-TIME, CUSTOMER-DEMAND PREDICTION



Learning/analyzing customer buying, browsing, search, and consumption data to predict purchasing decisions

95% of customer experience applications will be driven by AI by 2025.

IMAGE RECOGNITION



Capturing/analyzing walking patterns, gaze direction, and gestures, combined with demographic profiles to adjust product marketing actions

30% year-over-year revenue growth is what brands with voice and visual search functionality can expect to see by 2021.

Transformational Technology

Industry Use Cases—Artificial Intelligence

AI IN EDUCATION/RESEARCH

STUDENT ENROLLMENT



Improving admissions by matching students to programs

US\$536 per student is what public universities spend on recruiting.

PERSONALIZED LEARNING PATHS



Personalizing student experience to improve student outcomes with virtual academic advisors and tutors

45% of undergraduate students do not earn a degree within six years of matriculating into a college program.

STUDENT SUCCESS



Identifying patterns of data that predict which students could become at-risk, enabling timely and personalized interventions

#2 priority among higher-education institutions is to improve retention and graduation rates for all students.

Transformational Technology

Industry Use Cases—Artificial Intelligence

AI IN MEDIA/ENTERTAINMENT

SMART SELF-SERVICE MEDIA



Subscribing to a complex media service without human interaction based on intelligent recommendations and bots

50% of transactions are digital today for large media players.

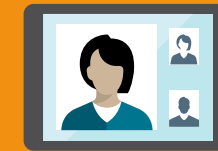
PERSONALIZED CONTENT



Recommending personalized content based on data from user or similar user activity to increase customer retention

US\$1B is what AI saves Netflix per year in keeping customers engaged, thereby reducing cancellations.

PERSONALIZED ADVERTISING



Delivering highly personalized digital video advertising based on specific individual preferences in a household

67% of the media industry believe highly targeted advertising has a high potential.

Transformational Technology

Industry Use Cases—Artificial Intelligence

AI IN FINANCIAL SERVICES/INSURANCE

RISK MANAGEMENT



Profiling, predictive scenario planning/analysis/underwriting

88%

of survey respondents see AI as a foundational change for risk management.

FINANCIAL PLANNING



Providing financial advice/online investment management via robo-advisors across multiple asset classes

50%+

of digital leaders are already using AI to increase productivity for wealth and asset management.

FRAUD PREVENTION



Facilitating financial institutions in know-your-customer and anti-money laundering screening

40%+

is the fraud rate for corporate cards—many sellers on the black market will back up the cards they sell with a reimbursement guarantee.

Transformational Technology

Industry Use Cases—Artificial Intelligence

AI IN HEALTHCARE

FRAUD DETECTION



Recognizing patterns to identify unusual claim activity and fraud

US\$68B

is the amount healthcare fraud costs the US each year.

PATTERN-BASED CYBERSECURITY



Increasing security of protected health information by identifying patterns in attempted cyberattacks and suspicious login attempts

89%

of healthcare organizations have experienced a data breach that involved patient data being stolen or lost.

VIRTUAL NURSING ASSISTANTS



Assessing patient symptoms remotely and alerting clinicians when patient care is needed—reducing unnecessary hospital visits

10X

is how much more treatment provided during an emergency visit costs compared to similar care provided on an outpatient basis.

Transformational Technology

Industry Use Cases—Artificial Intelligence

AI IN HIGH TECHNOLOGY/INDUSTRIAL MANUFACTURING

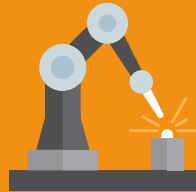
PRE-EMPTIVE MAINTENANCE



Predicting equipment maintenance problems to maintain service levels/operations and improving manufacturing processes

38% increase in manufacturers' adoption of machine learning and analytics to improve predictive maintenance is predicted over the next five years.

INTELLIGENT MANUFACTURING



Discovering patterns to predict yield and product defects early in the manufacturing cycle, and tracing products to analyze impacts

30% improvement in semiconductor manufacturing yields by reducing scrap rates and optimizing fab operations is achievable with machine learning.

DEMAND SENSING



Increasing forecast accuracy with intelligent segmentation and demand sensing using downstream data

20–50% reduction in forecasting errors is feasible with machine learning. Lost sales due to inadequate supply can be reduced by up to 65%.

Transformational Technology

Industry Use Cases—Artificial Intelligence

AI IN PUBLIC SECTOR

CITIZEN ENGAGEMENT



Implementing chatbots to make it easier and faster for citizens to receive assistance to a question or report an issue

50% reduction in email when Los Angeles Business Assistance Virtual Network deployed a chatbot on its website.

CRIME PREVENTION



Providing predictive policing to maintain safe communities

2X is how much more accurate an AI-infused mathematical model was at pinpointing crime hotspots versus professionals with machine learning.

FLOOD PREVENTION



Creating an early-warning, flood-management system to improve public safety and environmental destruction

90% of all US natural disasters declared by the president involve flooding.

Transformational Technology

Industry Use Cases—Blockchain

BLOCKCHAIN IN **AUTOMOTIVE**

VEHICLE TITLE MANAGEMENT

Authenticating and tracking of vehicle titles



500K cars were flood-damaged after Hurricane Katrina—many were title-washed.

COUNTERFEIT DETECTION

Eliminating counterfeit car parts, which is costly and unsafe



US\$45B is the estimated global loss to motor vehicle suppliers from counterfeit parts.

ORIGINATION VALIDATION

Validating and verifying supplier component sourcing



62.5% of North American content for autos is required by NAFTA to be duty-free.

Transformational Technology

Industry Use Cases—Blockchain

BLOCKCHAIN IN COMMUNICATIONS

ROAMING CHARGES SETTLEMENT

Accelerating and reducing the cost of clearing roaming charges between carriers via blockchain-backed TAP files



125M roaming consumers exist today with 750M roaming IoT devices expected by 2025.

MEDIA AND GAME STREAMING

Lowering transaction costs and increasing transparency in developing new product offerings with partners



58% of consumers subscribed to a streaming service in 2017—with more than 50M Netflix subscribers in the US alone.

SECURITY AND FRAUD

Assuring the integrity of downloadable software from public portals to prevent code injection



79% of cyberattacks in 2017 were injection-type attacks—up from 42% in 2016.

Transformational Technology

Industry Use Cases—Blockchain

BLOCKCHAIN IN CONSUMER GOODS/RETAIL

PRODUCT TRACEABILITY AND RECALL

Tracing contaminated products in the food supply chain and accelerating product recalls



48M Americans get sick from food-borne pathogens each year.

PRODUCT AUTHENTICATION

Ensuring consumers are buying authentic goods



US\$461B worth of fake goods are imported annually worldwide.

WARRANTY MANAGEMENT

Providing records of every item on which a warranty has been offered, including claims tracking and potential future costs



3–15% of all warranty claims are fraudulent for the majority of companies each year.

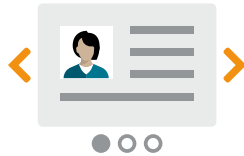
Transformational Technology

Industry Use Cases—Blockchain

BLOCKCHAIN IN EDUCATION/RESEARCH

STUDENT RECORDS

Capturing, authenticating, and storing student-owned, lifelong-learning records—including badges, credentials, degrees, and certifications



111 graduates from MIT were the first to receive digital diplomas via smartphone app based on blockchain technology in 2017.

DIGITAL RIGHTS MANAGEMENT

Enabling secure publication, distribution, and content tracking—including rights management—in digital libraries and scholarly publications



145% is the cost increase to Harvard over the past six years for access to academic journals.

LEARNING MARKETPLACES

Creating an on-demand distributed learning ecosystem into a seamless network where students can earn/transact tokens of educational value



23M students signed up for a massive open online course (MOOC) for the first time in 2017.

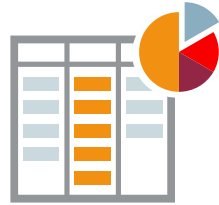
Transformational Technology

Industry Use Cases—Blockchain

BLOCKCHAIN IN MEDIA/ENTERTAINMENT

ROYALTY PAYMENT DISTRIBUTION

Capturing precise end user content consumption/usage based on smart contracts



90% of royalty reviews uncover underreported revenues due to clerical errors, accounting mistakes, or contract misunderstandings.

C2C/P2P CONTENT SHARING

Monetizing content sharing and usage through micropayments



72% of minors and 51% of adults in the EU have illegally downloaded or streamed some form of creative content.

NEWS CROWD-PEER REVIEWING

Creating super users to validate information via reputable peer-reviewer users to create “wisdom of the crowd”



70% is the likelihood of falsehoods versus true facts that will be retweeted on Twitter.

Transformational Technology

Industry Use Cases—Blockchain

BLOCKCHAIN IN FINANCIAL SERVICES/INSURANCE

CROSS-BORDER PAYMENTS

Streamlining and simplifying payments with fast, secure transactions and less-complex auditing



40%

of global payments transactional revenue comes from cross-border payments—accounting for more than US\$135 trillion in 2016.

IDENTITY MANAGEMENT

Standardizing identity management processes and know-your-customer requirements through permissioned shared ledgers, smart contracts, consensus, and privacy capabilities



US\$2.5B

is the annual cost of identity theft to consumers, banks, and credit-card firms in Canada alone.

SETTLEMENT TRADING

Facilitating/shortening settlement of financial instruments among trusted trading partners and providing greater trade accuracy



US\$2–7B

could be derived by reducing settlement of syndicated loans from 20-plus days to 6-10 days using smart contracts.

Transformational Technology

Industry Use Cases—Blockchain

BLOCKCHAIN IN HEALTHCARE

CLAIMS MANAGEMENT

Streamlining the claims adjudication process



20% of claims require six or more rounds of reworking.

MEDICAL TRACEABILITY

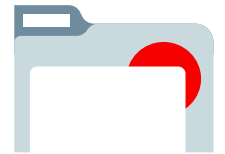
Increasing recall efficiency, identifying quality events, and ensuring authenticity of drugs/devices



4,500 drugs and devices are recalled annually—with approximately 10% having the potential to cause harm or death.

CREDENTIAL VALIDATION

Verifying qualifications of licensed medical professionals and assessing their background and legitimacy



85% of applications are missing critical information required for credentialing of medical professionals.

Transformational Technology

Industry Use Cases—Blockchain

BLOCKCHAIN IN HIGH TECHNOLOGY/INDUSTRIAL MANUFACTURING

COMPLIANCE MANAGEMENT

Confirming product compliance and checking for products from embargoed and/or conflict zones



90% of companies submitting conflict minerals are not able to ensure compliance.

IP MANAGEMENT

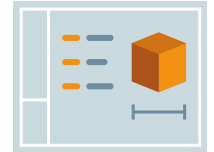
Providing a secure IP registry to increase efficiency of patent process



US\$100B in IP losses were incurred when products were “stolen” by thieves using 3D printers.

PRODUCT TRACEABILITY

Tracking product genealogy, production process assurance, and identifying counterfeit products across the value chain



84% of high tech companies outsourced some portion of their supply chain—with one in four subcontracting out more than half of their manufacturing processes.

Transformational Technology

Industry Use Cases—Blockchain

BLOCKCHAIN IN PUBLIC SECTOR

VOTING SYSTEMS

Securing mobile voting systems



1,132

LAND AND TITLE AUTHENTICITY

Securing land-ownership records



480% increase in wire-fraud scams was reported by title companies in 2016.

DATA PROTECTION

Protecting the digital identity of citizens, to include crime victims, witnesses, and defendants



US\$239M in suspect tax refunds due to identity theft was paid out by the IRS in 2016.