2021 Communication Technology Update

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The Pandemic Year

2021

Zooming Through Life

Impact of Disruption

- Acceleration of change
- Demise of weaker competitors
- Consolidation of players
- Opportunities for new entrants

Pandemic Impacts

Pandemic = Network Demand

- Work from home
- Remote teaching
- Ecommerce
- Streaming Video
- Telehealth

Work from Home

- Telecommuting moves into high gear

- Issues
  - Equipment
  - Security
  - Control
  - Network

Remote Learning

- Synchronous
- Asynchronous
- Hybrid

- New techniques for:
  - Engagement
  - Assessment
  - Gamification
- Major issue: Access to devices and networks

Ecommerce

- Dramatic growth in ecommerce
  - 54% increase in 2020 (source: Forbes)
- Corresponding decline in brick and mortar revenues

- Restaurant impacts
  - Rise of delivery services

Streaming Video

- Drivers
  - More time at home
  - Closure of cinemas
  - Proliferation of content
  - Proliferation of new services

OTT/Streaming Today

Biggest Surprise

Cinema Catastrophe

- Global revenues declined from $42B to $30B
- Domestic revenues down from $11B to $2B

- Delay in release of blockbuster films
  - No Time to Die
  - Black Widow

- Shift to streaming window
  - Mulan
  - Wonder Woman 1984

Telehealth

- Remote diagnosis
  - COVID-19 effect
- Monitoring
  - Wearables
  - Fitness devices
  - Other
- Home health care
  - Cost savings

Telehealth (aka "eHealth")

Sources: Fitbit, Kardia, Doctors on Demand

Looking Ahead...

Work from Home

- Telecommuting issues
  - Control
  - Need for social interactions
  - Security and equipment

  - Cost savings
 - Worker empowerment
    - Time
    - Place

Remote Teaching

- Impact from pandemic will persist
    - More opportunities for remote teaching
    - Students can learn from home instead of infecting others

- Homework may evolve significantly

Ecommerce Projection

- Two types of shopping
  - Hedonic
  - Utilitarian

- Ecommerce growth will moderate, as hedonic motives revitalize some retail
  - High end
  - Fashion
  - Auto

Golden Age of Streaming Content
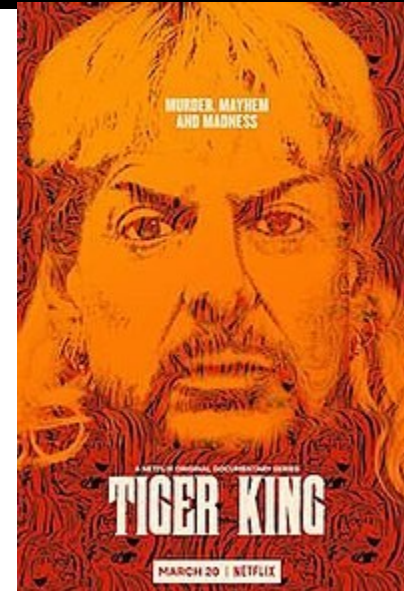
Too Many Streaming Options

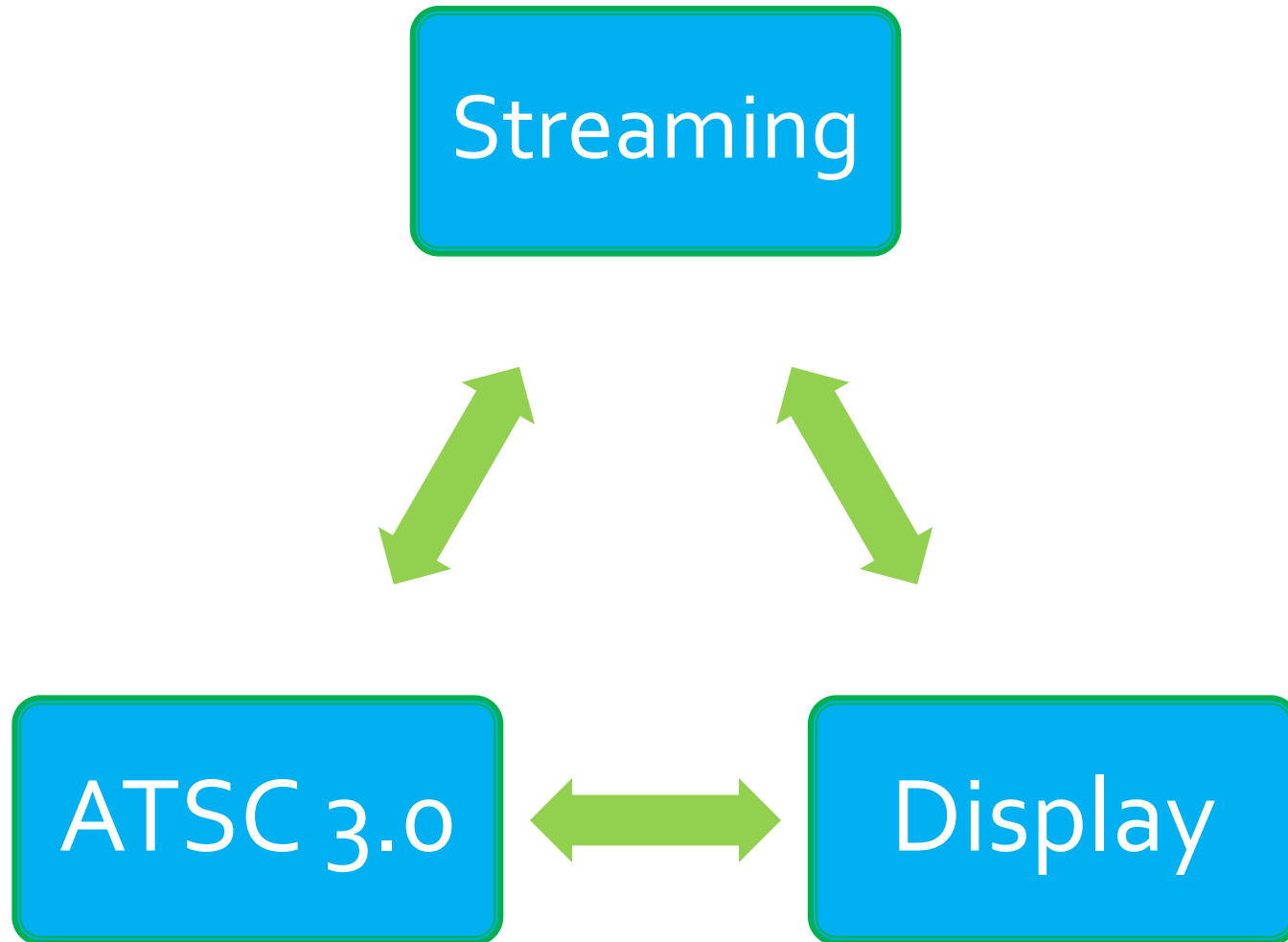Disintermediation

(2019-2021)

↓

Reintermediation

(2022-????)

Telehealth

- Significant investments in health-related technologies and services
  - Cost savings from shifting
    - Place
    - Administration

- Increased focus on prevention and intervention
  - Much less expensive than treatment

Television

ATSC 3.0 Broadcast Standard

- Delivery of 4K
- Up to 120 fps
- HDR
- Enhanced audio
- Mobile television
- Need for bandwidth
- Broadcast transition
- Targeted Advertising

ATSC 3.0 Challenges

- Incompatible with current TV
- Separate transmission channel needed
- User awareness

- Will enable spectrum repack

- Note: revenue opportunities with digital services and targeted advertising

High-resolution TV

FULL **HD**
1920x1080

4K
3840x2160

8K
7680x4320

Next waves in TV

- Higher quality display
  - OLED, Mini-LED, QLED
- 8K
  - Primary a display technology
  - Will be used extensively in digital signage and TV production
- Frame rate (30, 60, 120, 240)
- HDR
- Key issue: Content (Streaming first)

Addressable Advertising

- Native in streaming and digital audio
- ATSC 3.0 Broadcast: Use of bandwidth to deliver and store multiple ads
  - Algorithms select the most relevant ads
  - Enables highly targeted advertising
- Significant revenue potential
  - Development of industry standard
    - Adoption needed by manufacturers, networks, & advertisers

Video Games

Video Game Consoles

- Next-gen consoles indtroduced
  - Xbox
  - Sony PS5

- Most significant changes:
  - Higher quality graphics
    - More realistic RPGs
  - Transformation to cloud-based architecture
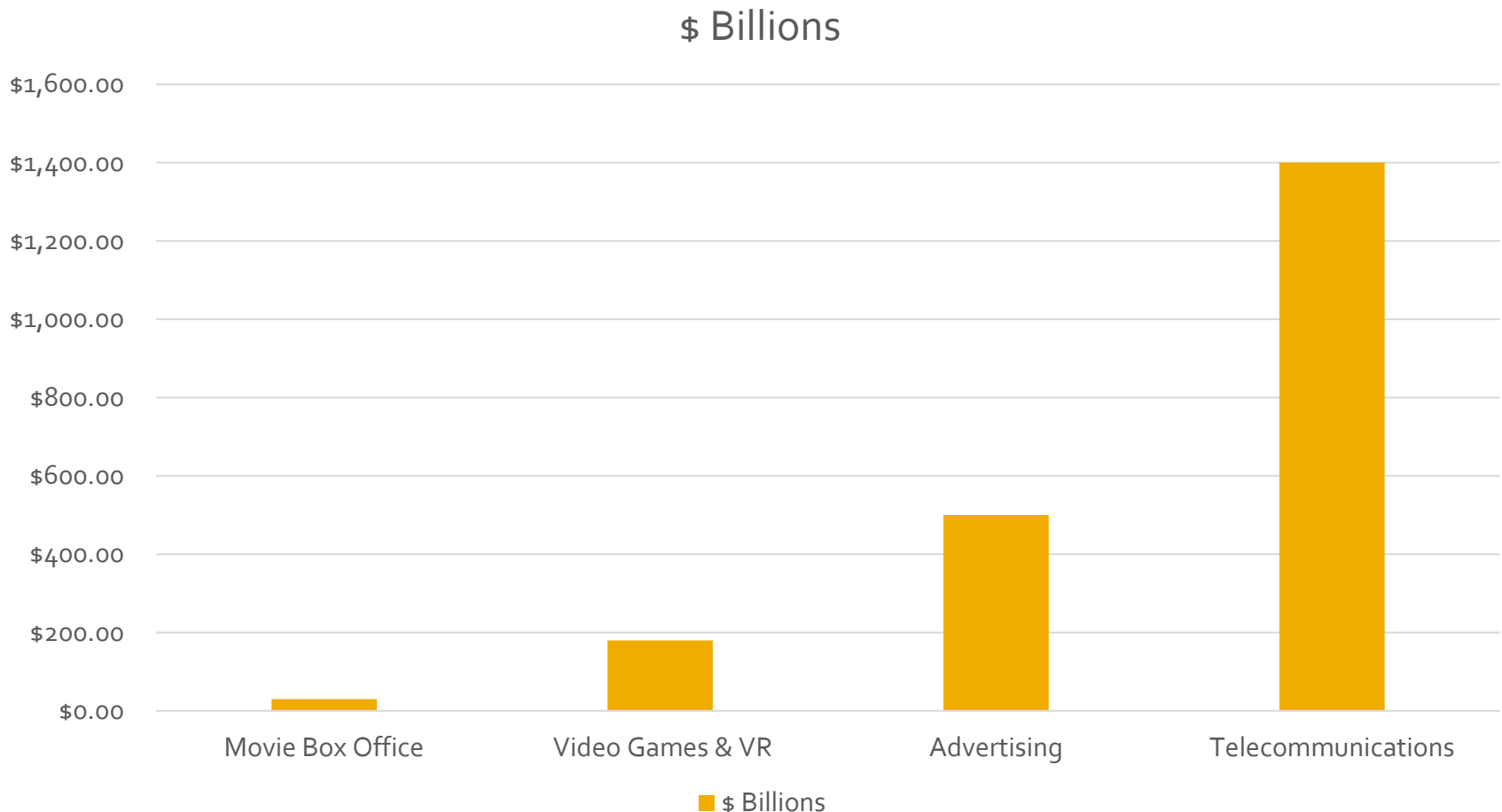
2020 Fortnite Developments

- All-time record:
  - 12.3 million concurrent players, April 2020 Travis Scott concert event
- Battle with Apple Store
  - 30% of revenue at stake
- Revenues kept flowing…

Video Games: Revenues

- Estimated 2020 global revenues: $180 billion (source: IDC)

Relative 2020 Global Revenues

$ Billions

Extended Reality

- XR
  - Virtual Reality
  - Augmented Reality
  - Mixed Reality
- 360° video

VR and its cousins

Virtual Reality Creeps Along…

VR Applications

- Games (limited)

- Training
  - Creation of experiences
  - Visualization
  - Examples: biology and physiology

VR Limitations

- Health issues
  - Injury during use
  - Dizziness
- Accessibility
  - Visual impairment
  - Hearing impairment
- Time
  - 5-10 minute experiences
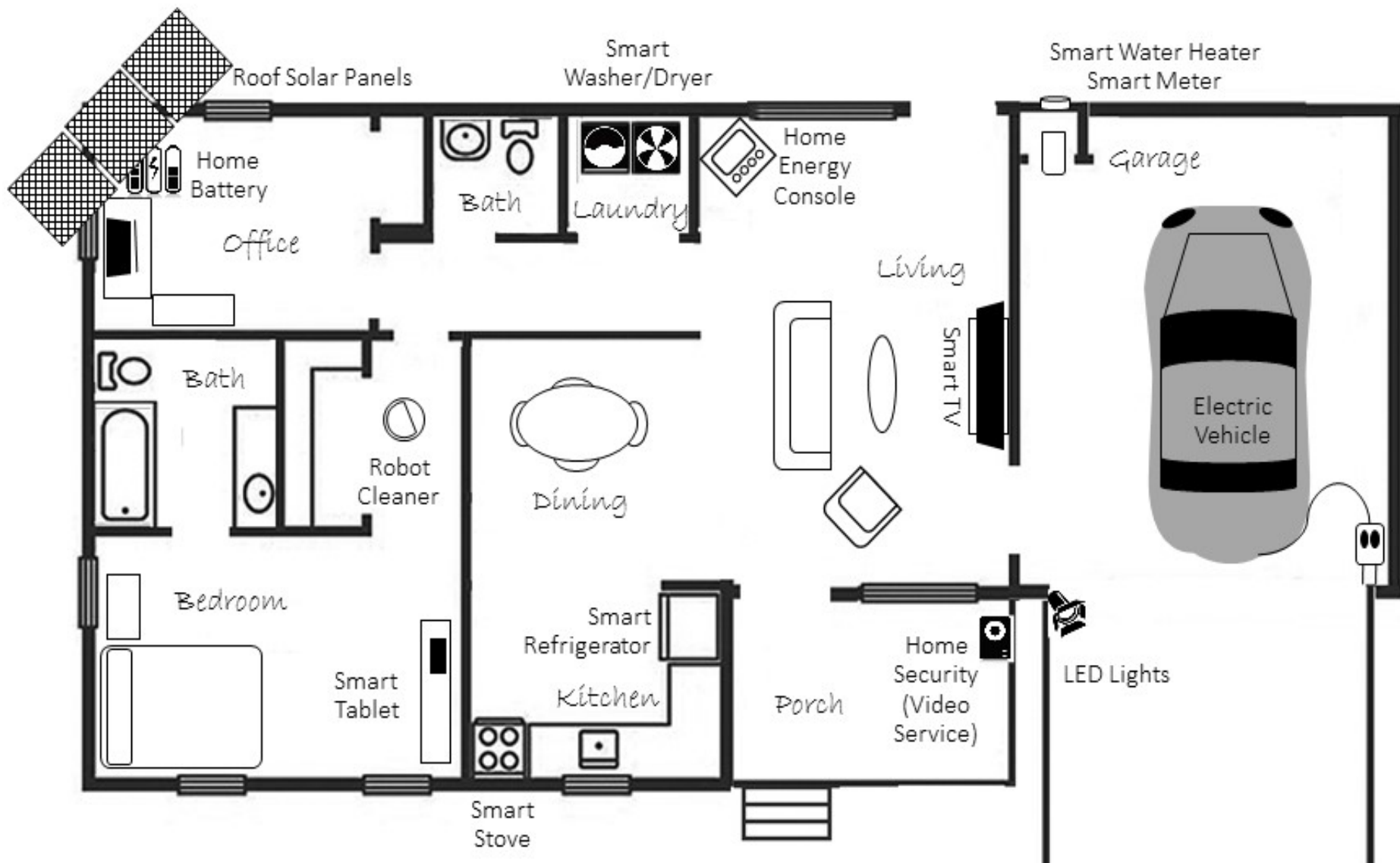
Augmented Reality

Internet of Things

Internet of Things (IoT)

- Smart homes
- Personal assistants/smart speakers
- eHealth
- Automotive telematics

Elements of IoT Applications

- Data
- Network
- Processing
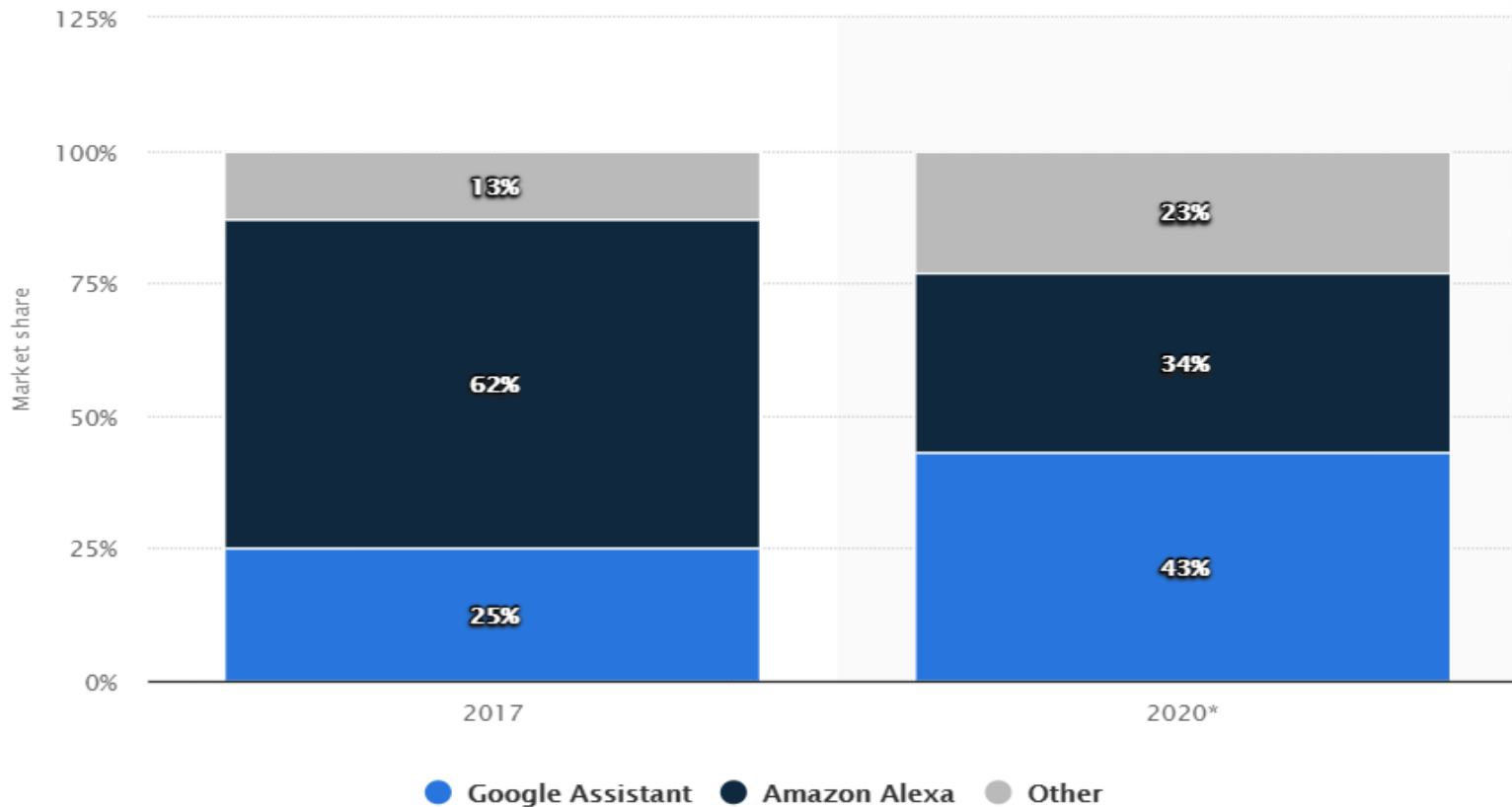 - Local
  - Edge
  - Cloud

IoT=Smart Houses

Personal Assistants

- Google Home and Amazon Alexa

Personal Assistant Adoption

Source: Statista

Other Trends

- 5G
- Autonomous vehicles
- AI
- Blockchain/ cryptocurrency

Three dimensions of 5G

- Network
- Users
- Marketing

Automotive Telematics

- Autonomous vehicles

- Assistive technology
  - Vehicle to vehicle
  - Vehicle to traffic control
  - Traffic control to vehicle
  - Charger networks

Autonomous Vehicles

Eventually, commuting time will become media time

Short term: Autos fully networked w/ assistive tech

Source: Mercedes Benz

Artificial Intelligence

- Different approaches to decision systems and action
  - Supervised learning vs. unsupervised learning vs. reinforcement learning
- Examples:
  - Speech recognition
  - Facial recognition
  - Data analytics
  - Robotics

Blockchain and Cryptocurrency

- Example:

Regulatory Issues

- Antitrust
- Security
- Privacy
  - GDPR (General Data Protection Regulations)
- Equity

Breakups coming?

- Amazon/AWS
- Google
- Facebook

Social Media

Social media closer to a tipping point:

- Deceptive and misleading content
- Libel (section 230)
- Privacy
- Decline in use
- New competitors
  - TikTok
  - Parler

Back to the Network

- Almost all developments require bandwidth increase
  - New applications
  - Edge and cloud computing
- Challenge
  - Dependence on the network increases importance of network security

Magic Windows
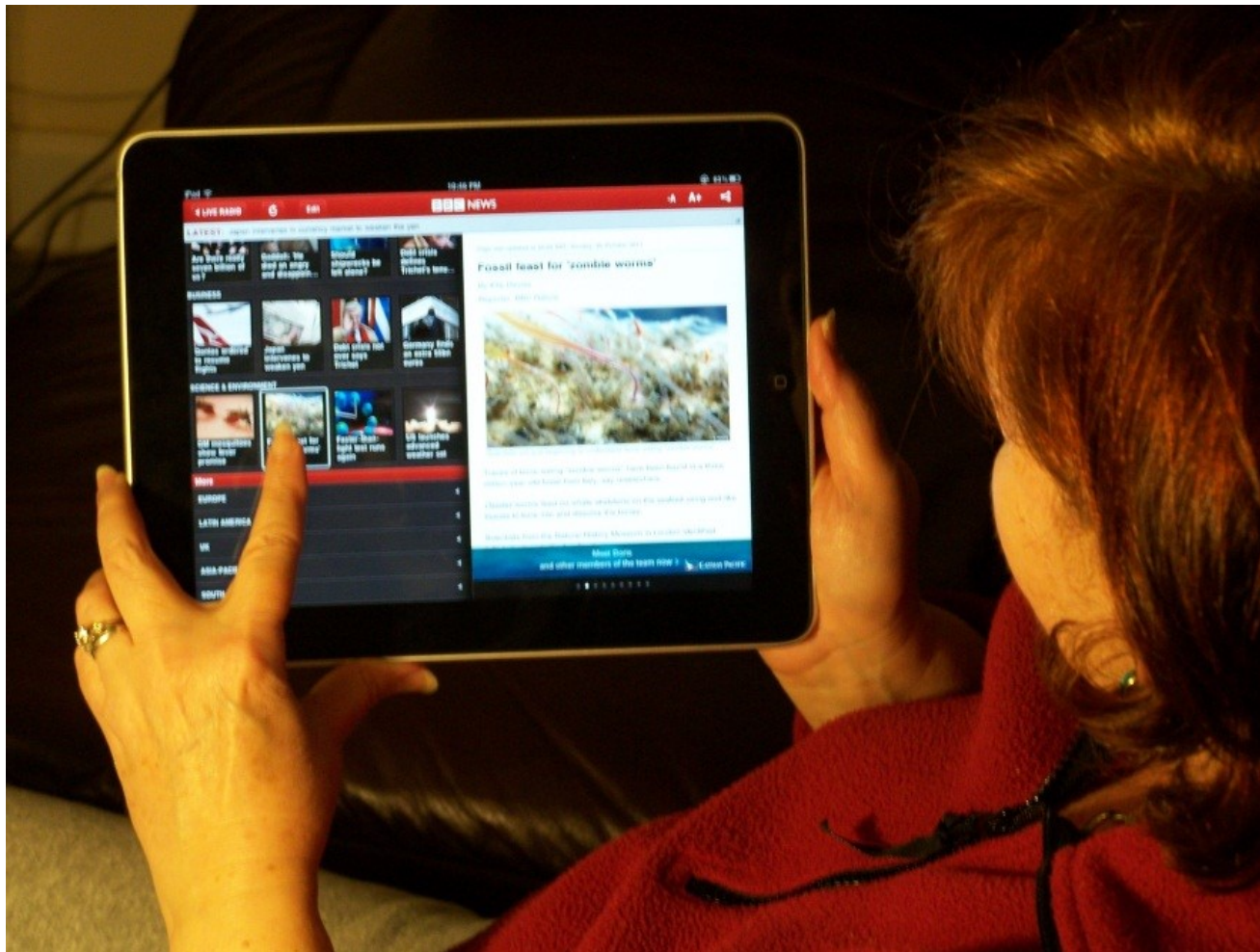
Conclusion:

It's 2025!!!!

Thank you!

More Info:
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Communication Technology Ecosystem