# Educator’s Guide
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Introduction to the Exhibit

*POPnology* is an interactive, engaging exhibition focusing on the connections between technology and pop cultural influences, such as movies, books, television, and art. The exhibition chronicles our culture’s progression *from science fiction to science fact* while also highlighting emerging technologies that are gaining attention. Students will learn about the past, present and future of technologies that have been, and continue to be, inspired by popular culture.

Futuristic and innovative thinking has been essential to our survival. It has driven the evolution of our civilization through technological advancements that have changed the quality of our daily lives and experiences. In this changing world, a culture of innovation has helped us meet the challenges we have faced and allowed us to simplify, expand and revolutionize processes for our continued progression as a society. Innovative thinking can take us on the paths we have not yet explored and allow us to visualize the future. Students will see the role of dreaming and innovating in determining both the near and distant future.

This Educator’s Guide has been developed as a resource for educators to use before and after the museum visit, as well as to enhance the visit itself. It will guide educators through the content and goals of the *POPnology* exhibit and provide more information on how to incorporate inquiry-based instruction into a classroom of future innovators.

The Guide is divided into several sections:

- The Exhibition Themes & Orientation section includes a brief overview of each exhibit within *POPnology*.
- The Curriculum Connections section outlines how the exhibition correlates to the Next Generation Science Standards.

The remaining sections include activities that can be used to prepare for a visit and/or to continue the themes of the exhibition post-visit as well as prompts and activities to engage students at a deeper level during their visit.
What to Expect

During your visit, your students will:

- Discover how science fiction elements from popular culture have become reality
- Learn about virtual reality, from its use in toys and games to new technologies
- Learn about revolutions in communication and transportation technologies
- Explore ideas and concepts through a variety of interactive displays and exhibits
- Discover how visual futurists have imagined and shaped technologies and even our visions of the future

When you leave the exhibition, your students will understand how:

- Popular culture has, and continues to, inspire technological advancements
- The uses and capabilities of current technologies, such as virtual reality and 3D printing, are continuously expanding
- Engineering and imagination are necessary and will continue to help us advance and shape our future reality

General Safety & Guidelines

- Students should be supervised at all times.
- Please mind the guardrails
- Some areas have higher than normal sound levels.
- Some exhibits use flashing lights
- No food or beverage allowed inside the exhibition
- Cameras are allowed and encouraged as there are several photo opportunities
Exhibition Themes & Orientation
As you move through the exhibition, you will find displays and interactive stations grouped thematically. The following overview will help you plan your visit.

The Creation Library
Learn how creative minds and futurists influence technological advancements.

Creation Tower
The past, present and future of futurists and the creative minds of our time are showcased in this interactive and engaging area.

cantilevers • circuitry • design • electronics • engineering • geometric shapes • physics • principles of balance • robotics • technology

Creation Cabinets
“How We Connect, How We Move, How We Live and Work, How We Play”. Each of the four areas of POPnology are showcased in their own individual Creation Cabinets, with stories and trinkets that preview what students will be learning about in POPnology.

design • engineering • technology

Futurist Bios
All of POPnology’s futurists are showcased in their own area of the “library”, explaining their histories - who they are, and what ideas or innovations they are known for, or are working on.

design • engineering • technology

Mind Maps of Exhibit Topics
Using Quid technology, see how connections can be drawn between ideas and topics and how that information can be visualized in one place.

technology

Wireless Information Stations
Using RFID technology, students can learn about iconic items in POPnology. Take an item and place it on the wireless pad, and preview information about those items, in this highly interactive and educational element of “How We Create”

design • electronics • engineering • physics • robotics • technology
How We Connect
This section explores the revolution in communications technology.

Social Media Station
Students can take their photo and share it instantaneously on social media at this state-of-the-art station.

design • electronics • engineering • ethics • technology

E.T. Communication Device
An authentic replica of E.T’s communication device is on display, as well as information on current scientific approaches to communication with alien life.

circuitry • design • electronics • engineering • physics • technology

Close Encounters Activity Station
Students will experience the iconic scene from Close Encounters of the Third Kind as they take control of lights and sound to attempt to communicate with extraterrestrial life.

circuitry • design • electronics • engineering • physics • technology

Hal 9000 Photo Op
This area is a tribute to the “Siri” and “Watson” artificial intelligence that we carry in our pockets (e.g. our smartphones).

artificial intelligence • circuitry • design • electronics • engineering • technology

Smart Phones: Deconstructed!
This area is devoted to phones: the uses of phones, what phones have replaced in our lives, and what they might look like in 2030.

circuitry • design • electronics • engineering • physics • technology

Also featured is information on the history of communication and communication innovations.
How We Play
Learn about the future of toys and games and the role virtual play may have in our futures.

Pixel Pegs Board
At this engaging play station for visitors of all ages, students will learn about the evolution of television.

circuitry • design • electronics • engineering • physics • pixilation • resolution • technology

Virtual Reality Testing Facility
At this incredible demonstration of future interaction and entertainment, students will have an opportunity to try state-of-the-art virtual reality technology and experience what the future of play has in store.

circuitry • design • electronics • engineering • physics • technology

Projection Play Area
Students can kick, stomp, and slide across this engaging and fun play area.

augmented reality • circuitry • design • electronics • engineering • physics • technology

Tablet Band
Students can try four different instruments...no experience necessary!

electronics • engineering • music • patterns • technology

Pentiductor Play Area
Students will have a blast learning how to make sounds and music with just their hands.

circuitry • design • electronics • engineering • music • technology

Tic Tac Toe Robot
Students can play tic tac toe against state-of-the-art technology in this interactive and hands-on display.

circuitry • design • electronics • engineering • physics • robotics • technology
**Alien Photo Op**

H.R. Giger’s most famous creation, a sculptural rendering of the creature from the popular *Alien* movie series, is here celebrating the imagination and innovative minds in film and cinema.

*design • electronics • engineering • physics • technology*

**Back to the Future Display**

View conceptual art from *Back to the Future*, featuring the hoverboard and self-tying shoes.

Also in this area the future of music and play will be discussed/displayed.

*design • electronics • engineering • physics • technology*

**How We Move**

Explore ideas for the future of transportation on Earth and beyond.

**The Inventor’s Studio**

Take a peek inside the mind of a designer of future transportation.

*circuitry • design • electronics • engineering • physics • technology*

**Magnetic Ring Launcher**

The future of transportation is…..magnets? From trains to hoverboards, students will learn how magnets will change the way we get around and pave the way to the future.

*design • engineering • magnets • physics • technology*

**Spin Browser**

From countdown to splashdown, students will see a frame by frame study of a space shuttle launch.

*circuitry • design • electronics • engineering • physics • technology*

**Mars Rover Challenge**

Students will take the controls of a Mars rover and attempt to complete a mission on a Martian landscape.

*circuitry • design • electronics • engineering • physics • robotics • technology*
Mars Rover Vehicles

Authentic Sojourner and Opportunity Mars rover vehicles are on display here, with comparisons to the book The Martian by Andy Weir, and the hit 2015 movie.

circuitry • design • electronics • engineering • physics • robotics • technology

Disney Autopia Car

On display is an actual “Autopia” car body from the Disney theme parks. Celebrating Bob Gurr, one of the head designers of vehicles in the creation of Disneyland. Also, an NVIDIA display will illustrate the processes happening within a car as it is being driven.

design • electronics • engineering • physics • technology

3D Printed Car

Local Motors, the inventors of the world’s first 3-D printed car, will display the LM3D, the first 3-D printed car available to the general public – on sale in 2017!

design • electronics • engineering • physics • technology

Other areas of discussion in “How We Move” include: design concepts and those that never left the drawing board, autonomous cars and the future of transportation, and crowd sourced successes in the future of movement.

How We Live & Work

Learn about inventions and ideas that shape our daily lives.

R2D2 KEVA Construction

Students of all ages will enjoy constructing futuristic robots in this building area.

cantilevers • design • engineering • geometric shapes • principles of balance

The ROBOX

Students will take a look at the past, present and future of robotics and how it affects our daily lives. See how a robot functions and pop culture inspirations in robotics.

circuitry • design • electronics • engineering • physics • robotics • technology
**Robotic Telepresence**
The most dangerous job in POPnology. Students can attempt to turn the Tyrannosaurus Rex’s eggs without the dinosaur noticing by operating a robotic arm via a camera feed (telepresence).

*cloning • DNA • electronics • engineering • robotics • technology*

**3-D Printing Live**
View an array of 3D printed objects and watch live 3D printing demonstrations throughout the day. A new object will be printed every day. Also, original artifacts from Made In Space and Exiii will be on display.

*design • electronics • engineering • physics • technology*

**5 Finger Robot**
Students can test their skills on a stacking and dexterity challenging with a robotic arm.

*circuitry • design • electronics • engineering • physics • robotics • technology*

**Rail Robot**
Here, students can attempt to complete a task in less time than our custom made worker bot!

*circuitry • design • electronics • engineering • physics • robotics • technology*

**Full Size Replica of Delorean Time Machine**
Examine one of the iconic movie props depicting time travel utilizing household items

*design • electronics • engineering • physics • robotics • technology*

**Rocket Builder**
Here, students can attempt to design and complete a rocket that can sustain a trip to Mars. Choose wisely your elements or your results may less than successful!

*circuitry • design • electronics • engineering • physics • robotics • technology*
**Mars Lander**

Execute a mission or two on the Mars surface, while managing your fuel consumption and the natural obstacles that exist on Mars.

*design • electronics • engineering • physics • robotics • technology*
Curriculum Connections

The content developed for POPnology supports student understanding of key ideas developed within the Next Generation Science Standards. The goals of these activities include students: 1) recognizing themselves as researchers and innovators; 2) developing critical thinking and problem solving skills; and 3) exploring new concepts through discovery.

Next Generation Science Standards  Dimension

1: Practices

- Asking questions (for science) and defining problems (for engineering)
- Developing and using models
- Planning and carrying out investigations
- Analyzing and interpreting data
- Using mathematics and computational thinking
- Constructing explanations (for science) and designing solutions (for engineering)
- Engaging in argument from evidence
- Obtaining, evaluating and communicating information

On-Line Resource

Next Generation Science Standards
http://www.nextgenscience.org

Dimension 2: Crosscutting Concepts

- Patterns
- Cause and Effect: Mechanism and Explanation
- Systems and System Models
- Energy and Matter: Flows, Cycles and Conservation
- Structure and Function

Dimension 3: Disciplinary Core Ideas

- Domain 1: Physical Sciences o Structure and Properties of Matter o Forces and Interactions
- Energy
- Waves and Electromagnetic Radiation
- Domain 4: Engineering, Technology and Applications of Science o Engineering Design
International Standards for Technology in Education (ISTE) Standards for Students

Creativity and Innovation: Students demonstrate creative thinking, construct knowledge, and develop innovative products and processes using technology.

a. Apply existing knowledge to generate new ideas, products, or processes
b. Create original works as a means of personal or group expression
c. Use models and simulations to explore complex systems and issues
d. Identify trends and forecast possibilities

Communication and Collaboration: Students use digital media and environments to communicate and work collaboratively, including at a distance, to support individual learning and contribute to the learning of others.

a. Interact, collaborate, and publish with peers, experts, or others employing a variety of digital environments and media
b. Communicate information and ideas effectively to multiple audiences using a variety of media and formats
c. Develop cultural understanding and global awareness by engaging with learners of other cultures
d. Contribute to project teams to produce original works or solve problems

Critical thinking, problem solving, and decision making: Students use critical thinking skills to plan and conduct research, manage projects, solve problems, and make informed decisions using appropriate digital tools and resources.

a. Identify and define authentic problems and significant questions for investigation
b. Plan and manage activities to develop a solution or complete a project
c. Collect and analyze data to identify solutions and/or make informed decisions
d. Use multiple processes and diverse perspectives to explore alternative solutions
Technology operations and concepts: Students demonstrate a sound understanding of technology concepts, systems, and operations.

a. Understand and use technology systems
b. Select and use applications effectively and productively
c. Troubleshoot systems and applications
d. Transfer current knowledge to learning of new technologies

Preparing for the Exhibition

Prior to your visit, review this guide and the (insert host facility’s name here) online information about the exhibition at (insert webpage URL here).

Classroom Activities and Resources

What is Technology?

Modify as appropriate to age group and course.

Have students discuss what they think technology is and generate a list of items. (Can be enhanced using a mind-mapping tool.)

Show one or both of these videos discussing what technology is:
https://www.youtube.com/watch?v=Giiz81_uzK8
http://www.youtube.com/watch?v=W7a4cp1BsUM

Possible Activities:

Technology In a Bag
What Is Technology? Guess the Technology

Futurism | fyū-chər-izəm
: a movement in art, music, and literature begun in Italy about 1909 and marked especially by an effort to give formal expression to the dynamic energy and movement of mechanical processes

Futurist | fyū-chə-rist
: one who studies and predicts the future especially on the basis of current trends

Pop culture | päp `kəl-chər
: cultural activities or commercial products reflecting, suited to, or aimed at the tastes of the general masses of people

Technology | tek-ˈnä-lə-jē
: the use of science in industry, engineering, etc., to invent useful things or to solve problems

: a machine, piece of equipment, method, etc., that is created by technology
Communications Technology & Development

Modify as appropriate to age group and course.

Discuss the definition of technology and ask students to identify how communications technology has changed and increased the ways in which people communicate.

1. In small groups or as a class, have students identify and discuss several examples of communication technology.
   a. What are the positive/negative aspects of those examples?
   b. How have those examples changed how we communicate?

2. Assign students to ask an adult (parent, guardian, teacher, etc.) about a communications technology that was developed during his/her childhood.

3. What, if anything, has changed as a result of that technology?
   a. Is that technology still widely used today? If not, what technology replaced it?
   b. Why do you think that technology was replaced or modified?

4. Ask students to identify a communications technology that they currently use and then ask them to imagine what that technology might look like in 5, 10, or 15 years.
   a. How will it look and function?
   b. Have students work in a group to draw or explain what they think technology communication will look like in 5, 10, or 15 years.
   c. What environmental, technological, and social factors lead you to believethat technology is possible in the future? (If they are not sure, they are still thinking like visual futurists.)
   d. What are the biggest changes to that technology?
   e. What breakthroughs/advances will be necessary to make those changes?

5. Ask students to brainstorm ways to communicate with others when there is no language or communications protocol in place.
   a. In science fiction stories/movies, humans are often attempting to communicate with alien species. What low- and/or high-tech communications technologies might be helpful to use?
**Transportation Innovations**

*Modify as appropriate to age group and course.*

Discuss the definition of technology and ask students to identify how technology has changed transportation.

1. In small groups or as a class, have students identify and discuss several examples of how technology has changed transportation.
   a. What are the positive/negative aspects of those examples?
   b. How have those examples changed how we think about and plan our travel?
   c. What forms of transportation do you and your friends currently use?

2. Assign students to ask an adult (parent, guardian, teacher, etc.) about a transportation technology that was developed during his/her childhood.
   a. What changed as a result of that technology?
   b. Is that technology still widely used today? If not, what technology replaced it?

3. Ask students to identify a transportation technology that is currently in use and then ask them to imagine what that technology might look like in 5, 10, or 15 years.
   a. How will it look and function?
   b. What are the biggest changes to that technology?
   c. What breakthroughs/advances will be necessary to make those changes?

4. Remind students that technologies are anything human-made that is used to solve a problem or fulfill a desire or need.
   a. Have students think about a need in their immediate community or in the world.
      i. Have them design an invention (draw out or construct) that would fulfill that need or solve that problem
      ii. Have them seek out advice (as an engineer would) from a peer and an adult to help them uncover any issues or adjustments they may need to consider making.
      iii. Have them share with the class their invention and the purpose it serves.
Additional Resources

Visionaries featured in POPnology

Look up one or more of the visionaries listed below. Has their invention or idea impacted your life or the life of someone you know? How? What modifications might you make to their work or idea?

Douglas Adams
(March 11, 1952 – May 11, 2001)
- Invented the idea of a notebook computer and universal internet for a 1977 BBC Radio show he called “The Hitchhiker’s Guide to the Galaxy.”
- The radio show subsequently developed into a series of five books that sold more than 15 million copies in his lifetime.

Interview someone who was an adult prior to notebook computers. Ask them how this invention has changed the way they do things or the way their children do things. What are the benefits and drawbacks?

Michael Crichton
(October 23, 1942 – November 4, 2008)
- A visionary writer, producer, and director, he was responsible for some of the most successful science based novels and films of the last 50 years, including Jurassic Park, Sphere, and The Andromeda Strain
- He was skilled at taking complex scientific concepts and presenting them in an easy to understand and entertaining way

What futuristic technologies did you read about in these novels (or see in the movie) that you are unsure we are capable of accomplishing with our current technology? What resources or technologies need to be invented for it to come to fruition?

Philip K. Dick
(December 16, 1928 – March 2, 1982)
- One of the “Prophets of Science Fiction,” several of his novels and short stories were adapted into very influential films including Blade Runner, Minority Report, Total Recall, and The Adjustment Bureau
- Many of these stories feature extremely accurate portrayals of current and emerging technologies

What futuristic technologies did you read about in these novels (or see in the movies) that you see benefits of for society? If you don’t already know, search for the technology to see if it exists and share a description of the technology and how it is currently being used.
Walt Disney  
(December 5, 1901 – December 15, 1966)  
- An innovative animator, he created characters such as Mickey Mouse and won 22 Academy Awards during his lifetime  
- He founded Disneyland and Walt Disney World  
- His concept of the Experimental Prototype Community of Tomorrow (EPCOT) was to serve as a “real city that would…be a blueprint of the future” and to spur innovations for urban living  

*How has Walt Disney impacted your life?*  

Thomas A. Edison  
(February 11, 1847 – October 18, 1931)  
- One of the most influential visionaries in history, he was only interested in creating practical items that people would buy  
- He developed devices that had a huge impact on life around the world, including the phonograph, the motion picture camera, and the long-lasting electric light bulb and held more than 1,000 patents for his inventions  
- He had the foresight to realize that the challenge of the future was going to be finding a way to power all the things he and his peers were inventing  

*Thomas Edison invented many devices. Research one of the devices and share about his failures in his development. What did he learn from his failures?*  

Ray Harryhausen  
(June 29, 1920 – May 7, 2013)  
- A visual effects creator, writer and producer  
- He was known as the titan of stop motion animation, a process he developed into a true art form with films such as The Seventh Voyage of Sinbad, and Clash of the Titans  

*Take out your cell phone and prop it in one place. Use props to create your own stop motion animated series of images. Place the images in a movie software program such as iMovie and create your own film. Try this site for fun: [http://www.toytheater.com/stop-motion-animation.php](http://www.toytheater.com/stop-motion-animation.php)*
Robert A. Heinlein
(July 7, 1907 – May 8, 1988)

- One of the “Big Three” science fiction authors (along with Isaac Asimov and Arthur C. Clarke), he wrote nearly 400 titles, include both short stories and novels
- He was one of the first science fiction writers to have work published in mainstream magazines
- One theme he explored was the influence of space travel on human cultural practices
- He was named the first Science Fiction Writers Grand Master in 1974

What did Robert Heinlein discover about space travel’s impact on human cultural practices? Do you agree or disagree with his thoughts and why?

Howard Hughes
(December 24, 1905 – April 5, 1976)

- Business tycoon, inventor, aviator, aerospace engineer, filmmaker
- A fierce entrepreneur, he used his personal fortune to found his own aircraft company
- A notable innovation was the first retractable landing gear
- He designed a series of radical aircraft which he test piloted himself. After a plane crash in 1946, he became a recluse

Howard Hughes is an example of someone who is accomplished in multiple arenas. Develop your own unique technology. What experience or specific content knowledge would be helpful in the development of that technology?

Shigeru Miyamoto
(November 16, 1952 – present)

- Chief Designer for Nintendo at age 25, he created some of the most popular and long-lasting characters and video games in gaming history, including Mario, Zelda and Donkey Kong
- He also developed the revolutionary Wii entertainment system, which popularized motion control gaming

What are some jobs/fields of study that might find the invention of motion control gaming useful and how might it be used?
George Orwell
(June 25, 1903 – January 21, 1950)
• Born Eric Arthur Blair, he was an English novelist, essayist, journalist and critic
• His most famous works include Animal Farm and Nineteen Eighty-four, written over 60 years before The Hunger Games, Divergent, and The Maze Runner popularized “dystopian fiction”

Dystopian texts like those written by George Orwell portray a world where the characters seek to have a perfect or utopian society, but their plight results in a world that is worse than the world they changed. What are some of the technology advances that are a concern to you in how they could ultimately impact society and why?

Les Paul
(June 9, 1915 – August 12, 2009)
• Father of the modern electric guitar; inventor of much of the recording equipment and methods used in sound studios today
• Created the first multi-track recording console and was a pioneer in the use of overdubbing and many modern studio methods

Try creating your own multi-track recording using the following online tool: https://soundation.com/studio

Gene Roddenberry
(August 19, 1921 – October 24, 1991)
• A television writer and producer, he created the influential Star Trek television series, which has spawned feature films and re-boots of the original show
• As the creator of Star Trek, his is praised for his visionary use of new technologies
• Star Trek was the first television series to have an episode preserved in the Smithsonian Institution and NASA names one of its space shuttles after the show’s USS Enterprise

Which technologies were first highlighted on Star Trek that you or your parents have used?
Rod Serling
(December 25, 1924 – June 28, 1975)
• Screenwriter, playwright, television producer and narrator
• Executive producer and head writer for The Twilight Zone science fiction anthology series from 1959 – 1964

The Twilight Zone predicted driverless vehicles in more than one episode. List out in a mind map some of the issues you think will need to be resolved for all cars to be driverless.

Jules Verne
(February 8, 1828 – March 24, 1905)
• French novelist, poet and playwright, known for adventure novels and his influence on the science fiction genre. He authored 20,000 Leagues Under the Sea, Around the World in 80 Days, among other classics
• Called “The Man Who Invented the Future” and the “Father of Science Fiction”, he wrote about innovations and technological advances well before they were realities, including the submarine, space travel, and deep-sea exploration
• His works are the basis for the “steampunk” movement in fiction and design

What are three of Jules Verne’s inventions that came true? How has one of the inventions benefitted society today?

Wernher Von Braun
(March 23, 1912 – June 16, 1977)
• The German scientist, after surrendering to the American Army at the end of WWII, became an important member of the new National Aeronautics and Space Administration (NASA)
• He was a rocket developer and advocate of space exploration
• He was the chief architect of the Saturn V launch vehicle which propelled Americans to the moon
• He became a celebrity due to his starring role in a series of visionary films on space travel produced by his friend Walt Disney

Research current space travel developments and successes and share how that success or development will aid in future explorations in space.
H.G. Wells
(September 21, 1866 – August 13, 1946)

• Called “The Man Who Invented Tomorrow”, Herbert George Wells was a prolific writer best known for his science fiction novels, including The War of the Worlds, The Time Machine, and The Island of Dr. Moreau, among others

• He was the first novelist to feature time travel, genetic manipulation, interplanetary invasion and nuclear war

What benefits and drawbacks do you see to genetic manipulations both short term and long term? Give an example.

Orville Wright
(August 19, 1871 – January 30, 1948)

Wilbur Wright
(April 16, 1867 – May 30, 1912)

• Considered the fathers of modern aviation, their curiosity and love of science led them to develop the first successful airplane

• Their airplane design was influenced by observing how birds angled their wings for balance and control

How has aviation morphed over time? Present a timeline of changes and major influential people in its change over time. Try using a tool like http://www.dipity.com/ or http://www.readwritethink.org/files/resources/interactives/timeline_2/.

Authors that Predicted Future Technologies

Douglas Adams
Notable Work: The Hitchhiker’s Guide to the Galaxy
Predictions: E-readers, real-time automatic audio translation
Issac Asimov
Notable Works: I, Robot; The Bicentennial Man
Predictions: Credited for bringing robots and robotics to modern audiences through his writing; invented the “Three Laws of Robotics”

Edward Bellamy
Notable Work: Looking Backward
Prediction: The credit card
Influences: Marxism and Fourierism

Ray Bradbury
Notable Work: Fahrenheit 451
Predictions: Spy satellites, atm machines, ear-bud earphones, large flat screen TVs, and self-driving cars.

John Brunner
Notable Work: Stand on Zanzibar
Predictions: On-demand TV, satellite TV, laser printers, the proliferation of electric cars, and TiVo.
Influences: John Dos Passos, Charles Harness, Eric Frank Russell

Karel Capek
Notable Work: R.U.R.
Predictions: First to invent and use the word “robot”, in his play R.U.R. Influences: Henri Bergson, modern American philosophy

Michael Crichton
Notable Works: Jurassic Park; Westworld
Predictions: DNA manipulation; themes on the dangers of science and technology
Influences: Jules Verne, George Orwell, Arthur Conan Doyle, Mark Twain
Arthur C. Clarke
Notable Works: 2001: A Space Odyssey; The City and the Stars
Predictions: Communication satellites, immersive virtual reality video games, space tourism, lasers as weapons, global satellite TV broadcasts.
Influences: H.G. Wells, Jules Verne, Edgar Rice Burroughs, Olaf Stapledon, Stanley G. Weinbaum

Hugo Gernsback
Notable Work: 124C 41+; Gernsback is sometimes referred to as “The Father of Science Fiction” along with H.G. Wells and Jules Verne
Influences: Percival Lowell’s book, Mars As the Abode of Life

William Gibson
Notable Work: Necromancer
Predictions: Cyberspace and computer hackers, reality TV; influenced “cyberpunk”, The Matrix and Johnny Mnemonic

Robert Heinlein
Notable Work: Beyond This Horizon
Predictions: Waterbeds, a list of predictions for the year 2000 (Heinlein’s Predictions)
Influences: H.G. Wells, Edgar Rice Burroughs, Mark Twain, Ayn Rand, Rudyard Kipling, Alfred Korzybski, James Branch Cabell

Aldous Huxley
Notable Work: Brave New World
Predictions: The use of mood enhancing medicine, the use of genetic engineering
Influences: Thomas Henry Huxley (grandfather), Julian Huxley (brother), H.G. Wells, Charles Dickens, Yevgeny Zamyatin, William Blake, Thomas Robert Malthus

George Orwell
Notable Work: 1984
Predictions: “Big Brother” (NSA), and the “Memory Hole” (paper shredders, hard drive wipers).
Jules Verne
Notable Works: 20,000 Leagues Under the Sea; From the Earth to the Moon
Predictions: Skywriting, electric submarines, electric helicopters, video chatting, holographic performances, the electric chair, self-guided missiles, lunar modules launching from Florida and returning as splashdown capsules, and solar sails.
Influences: Edgar Allan Poe, Victor Hugo, Daniel Defoe, George Sand, Walter Scott, James Fenimore Cooper

H.G. Wells
Notable Works: The Time Machine; The World Set Free; Men Like Gods
Predictions: Automatic motion sensing doors, tanks, atomic bombs, voicemail, a heat ray, cell phone technology, and invisibility.
Influences: Jules Verne, Mark Twain, Mary Shelley, Plato, Jonathan Swift, Thomas Henry Huxley, Henry George

Web Sites
History of Communications transition.fcc.gov/omd/history/
This website of the Federal Communications Commission highlights the history of a variety of communications technologies, including radio, television and the internet.

Invention Stories invention.si.edu/explore
This website of the Lemelson Center for the Study of Invention and Innovation highlights the stories of inventors, both famous and less well-known, whose creative endeavors began in childhood play and resulted in a variety of contributions.

Transportation Curriculum Resources for Teachers
Transportation.gov/womenandgirls/resources-teachers-mentors
This website of the U.S. Department of Transportation includes a variety of resources for teaching about transportation.

Children as Inventors & Futurists http://blog.ted.com/9-talks-by-impressive-kids/
https://www.ted.com/playlists/129/ted_under_20
Talks from scientists, musicians, innovators, activists -- all under the age of 20. Watch these amazing wunderkinds.
During Your Visit

Observation Worksheet

1. What is the name of this exhibition and what does that name tell you about the displays and activities here?

2. Who is one of the visual futurists and what did they predict that you found interesting? (To extend your learning, research this person to find out more about this futuristic thinker.)

3. Name 3 of the ways people communicated in the past and the years associated with that method.

4. Social media tools and use have grown over the past five years. What social media tools do you use?
   a. What capabilities do you like about each of those tools?

5. What new social media tool might you design and what components or capabilities will it have? (It is important to analyze why certain capabilities are important to add in your design.) Tell why you feel a social media tool would need those capabilities.

6. If you were to send up a message on a gold record like Carl Sagan did on the Voyager, what information about society and technologies today would you include for alien civilizations?

7. If an alien civilization landed on Earth today that couldn’t understand you, what ways might you try to communicate based on what you have seen in the exhibit or from your own ideas.

8. Spell out a word in Semaphore and have a friend decode it.

9. How many years were between the Star Trek communicator and the invention of the Motorola StarTAC flip phone?

10. Jurassic Park cloned dinosaurs. What do you see as the benefits and drawbacks of cloning?

11. If you had a robot today, what one task would you want it to be able to do?

12. What is one area in society where you think a robot would be extremely helpful? Why?
13. Pick a display in the exhibition.
   a. What did you learn by looking at/interacting with the display?

14. Choose another display in the exhibition that you find particularly interesting.
   a. Have you seen something similar to the technology/innovation being demonstrated before? If so, where?
   b. How would you describe this display and what you learned from it to a friend?
   c. Draw a picture/diagram that illustrates the technology highlighted in the display, including something about its history and its future.

**Innovations Worksheet**

As you explore this exhibition, you will learn about innovations in communication, transportation and design technologies.

1. Describe three innovations you learned about today and how you think they have impacted our day-to-day lives.

2. Choose a technology you saw in the exhibition and draw it. Describe how it has changed/improved our lives.

3. Choose another technology you saw in the exhibition. Describe how it might look 5, 10 or 15 years from now.

4. Describe a technology/tool that was influenced by popular culture (e.g., movies, video games, etc.).
Activities Reflection

1. Pick an exhibition activity that you participated in.
   a. What was the task you were trying to complete?
   b. What about it was easier than you thought it would be? What was more difficult?

2. Choose another activity that you participated in.
   a. How would you describe the activity to a friend?
   b. What skills did you use to complete the activity?

3. Choose another activity in the exhibition that you found particularly interesting.
   a. What did you learn by participating in the activity?