

# Mentor Pamphlet

Going to Be Given to Mentors

- Background Information
- Different Items needed to make the solution (Possible Solutions)
- Tools used back in the day
- Culture
- Actual solutions?

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As a mentor, you play a crucial role in guiding your mentees to success in this design challenge. This pamphlet provides you with all the necessary information to support and inspire your mentees effectively. Let's walk through the contents and how you can navigate this guide.

## Pamphlet Navigation

### Background Information:

- Understand the historical context and the key problem at hand.

### Issue Summary:

- Get an overview of the problem your mentees will be addressing in addition to key issues.

### Design Prompt:

- Review the specific challenge your mentees need to solve.

### Technology and Tools Available in the [Decade]:

- Learn about the technological landscape and tools available during the specific period. These are the only tools/materials your mentees can use to construct their solution.

### Actual Solutions Used in the [Decade]:

- Discover real-world solutions that were implemented during the time.

### Potential Ways to Tackle the Issues:

- Explore innovative approaches and ideas for solving the problem.

### Cultural Aspect:

- Consider the cultural elements that may influence or impact the design solution.

This pamphlet is your comprehensive guide to mentoring in the MEPO program. Use the **red notes to caution and highlight crucial points**, and the **blue text as guides to inspire and direct your mentees**.

# 10s: Spanish Flu

## Background Information:

The Spanish flu or the “Great Influenza flu” was a disease that plagued the United States from February 1918 to April 1920. In its duration, it claimed the lives of 675,000 people which is about half the population of Hawaii. It is possible that the Spanish flu could have derived from domesticating birds and pigs. It quickly spread due to overcrowding in unsanitary conditions. The only treatment during the flu was to social distance and quarantining. The only effective solution was a vaccine that was created in the 1930’s but was approved to the public 1940’s 10+ years after the pandemic.

## Issue Summary:

- **Global Conflict and Displacement:** The 1910s witnessed World War I which led to widespread displacement of populations, strained healthcare systems, and weakened economies. The movement of troops and civilians facilitated the rapid spread of the Spanish flu across continents.
- **Limited Medical Understanding:** Medical knowledge and technology were relatively primitive compared to today. The understanding of viruses, their transmission, and methods of treatment were in their infancy.
- **Inadequate Healthcare Infrastructure:** Healthcare systems were ill-prepared to handle a pandemic of such magnitude. Hospitals were overwhelmed with patients, and there were shortages of medical supplies, hospital beds, and trained healthcare professionals.
- **Crowded and Unsanitary Conditions:** Overcrowding and poor sanitation in urban areas facilitated the rapid transmission of the virus. Close living quarters, lack of clean water, and inadequate waste disposal systems contributed to the spread of infection.
- **Lack of Effective Treatments:** There were no effective treatments or vaccines available to combat the Spanish flu during the initial outbreak. The primary means of prevention and control were limited to non-pharmaceutical interventions such as quarantine and isolation.
- **Delayed Vaccine Development:** While vaccines were eventually developed, they were not available until well after the pandemic had subsided. The first effective flu vaccine was not developed until the 1930s, and it was not widely distributed to the public until the 1940s.

**\*\*NOTE: All the issues below are not inherently related to the design prompt. They could aid in cultural impact research or serve as a jumping point for more innovative design solutions.\*\***

## Design Prompt:

The 1910s was a decade marked by a world war and a pandemic caused by the Spanish Flu. During the Spanish Flu's duration, it claimed the lives of over 675,000 people (about half the population of Hawaii). Your challenge is to design a solution that addresses one of the critical issues of the pandemic. You may choose to focus on the improvement of \ sanitization infrastructure, creation of medical devices, improved vaccine development, or improved emergency response systems. Your solution should be feasible with the technology of the time. Consider the long-term benefits and community impact of your solution.

## Technology and Tools Available in the 1910s (Medical Equipment):



Thermometer: measures body temperature



Stethoscope: listens to internal sounds in the body like the heart and lungs



Syringes: injects medicine into blood, and can withdraw fluid from the body (usually made with glass and used metal plungers)



Hospitals (overcrowded): used cots



Oxygen Therapy: would be oxygen ventilators in today's time



## Actual Solutions Used in the 1910s:

1. **Services (ex. Ambulances, travel doctors) Telemedicine Consultations:** Implement telecommunication systems, such as telegraphs or landline phones, to enable remote medical consultations between doctors and patients. This would allow individuals to receive medical advice and treatment recommendations without the need for in-person visits, reducing the risk of virus transmission.
2. **Mobile Clinics:** Deploy mobile medical clinics equipped with basic diagnostic tools and treatment supplies to underserved areas. These clinics could travel to different communities to provide medical care, including flu diagnosis, symptom management, and basic healthcare services.
3. **Sanitation Improvements:** Implement public sanitation initiatives, such as clean water supply projects and waste management programs, to improve hygiene and reduce the risk of infection. Access to clean water for drinking, handwashing, and sanitation purposes would be crucial in preventing the spread of the flu.
4. **Health Education in Schools:** Integrate health education into school curricula to teach students about infectious diseases, preventive measures, and personal hygiene practices. Educating children about the flu and how to protect themselves and others could empower them to become agents of change in their communities.

## Potential Ways to Tackle the Issues: Remember to think about Marginalized groups.

- **Rapid Deployment and Coordination (Travel doctors and Ambulances):** Establishing a more organized system for deploying ambulances and travel doctors to areas experiencing outbreaks could have improved response times. Coordination between hospitals, public health authorities, and emergency services would have been crucial.
- **Training and Preparedness (Mobile clinics, Travel doctors and Ambulances):** Providing specialized training to travel doctors on recognizing flu symptoms, administering basic treatments, and implementing infection control measures could have enhanced their effectiveness in the field.
- **Equipment and Supplies (Mobile clinics, Travel doctors and Ambulances):** Ensuring ambulances were well-equipped with essential medical supplies such as thermometers, basic medications, oxygen tanks, and personal protective equipment (PPE) would have enabled more effective patient care and protection for medical personnel. E
- **Communication and Information Sharing (Mobile clinic, Ambulances):** Utilizing telegraph and telephone networks more effectively to communicate between

ambulances, hospitals, and public health officials could have facilitated quicker decision-making and resource allocation.

- **Public Education and Awareness (Health education):** Working with community leaders and local authorities to educate the public on symptoms, preventive measures, and when to seek medical assistance could have helped reduce transmission and alleviate strain on emergency services.
- **Temporary Hospitals (Hospitals):** Establishing temporary hospitals or makeshift wards in alternative locations such as schools, community centers, or tents to accommodate the overflow of patients. This helps to segregate influenza cases from other patients and reduce the burden on existing hospital facilities.
- **Field Hospitals (Hospitals):** Setting up field hospitals near existing healthcare facilities or in strategic locations to provide additional beds and medical care for patients with milder symptoms, freeing up space in hospitals for more severe cases.
- **Improved Respiratory Support (Medical Equipment):** Develop more effective methods for providing oxygen therapy to patients with severe respiratory distress. This could include better-designed oxygen delivery systems and ventilatory support devices.
- **Diagnostic Tools (Medical Equipment):** Enhance diagnostic capabilities for identifying influenza cases more quickly and accurately. This could involve advancements in laboratory testing methods or portable diagnostic equipment for use in field hospitals or remote locations.
- **Research and Development:** Increase investment in research and development of medical technologies specifically tailored to infectious disease outbreaks, including vaccines, therapeutics, and diagnostic tools.

**Cultural Aspect:** The cultural aspect here is, the accessibility of medical treatment to people of color and, the treatment of people of color within hospitals when cared for. To further explain:

- **Segregated Healthcare:** Many hospitals and medical facilities were segregated, with African American patients often relegated to poorer quality facilities compared

to their white counterparts. This segregation led to disparities in access to medical care and contributed to worse health outcomes among African Americans.

- **Discriminatory Treatment:** African Americans and other minority groups faced discriminatory treatment from healthcare providers. This included being denied access to hospitals or being treated in segregated wards with fewer resources and poorer quality care.
- **Public Health Campaigns:** Public health campaigns during the Spanish flu pandemic often neglected minority communities. Health information, prevention strategies, and access to vaccines or treatments were not effectively disseminated to African American, Native American, and immigrant communities, contributing to higher infection rates and mortality rates in these populations.
- **Medical Experimentation:** In some cases, minority groups were exploited for medical experimentation without their consent or adequate protection. This included unethical research practices and trials of new treatments or vaccines without proper informed consent or consideration for the well-being of participants.
- **Social and Economic Factors:** Beyond direct medical racism, social and economic factors exacerbated disparities during the pandemic. Minority groups often lived in crowded and unsanitary conditions, lacked access to adequate nutrition and healthcare infrastructure, and faced economic barriers that hindered their ability to seek medical care or take preventive measures.

# 30s: Great Depression

## Background Information:

- The 1930s was a decade marked by significant economic hardship and technological limitations, largely influenced by the Great Depression and the aftermath of World War I. The Great Depression, which began with the stock market crash of 1929, led to widespread unemployment, poverty, and social upheaval across the globe. In addition, technological advancements were constrained by the limited availability of resources, outdated infrastructure, and the lack of modern manufacturing techniques.

## Issue Summary:

**\*\*NOTE: All the issues below are not inherently related to the design prompt. They could aid in cultural impact research or serve as a jumping point for more innovative design solutions.\*\***

- Lack of Labor
  - At the Great Depression's peak in 1933, roughly 25% of the American workforce was unemployed. This massive lack of labor had several implications:
    - Reduced Workforce: Industries and businesses faced significant challenges due to a reduced workforce, which impacted production and efficiency.
    - Migration and Displacement: Many people left rural areas in search of jobs in urban centers, leading to overcrowding and further unemployment issues in cities.
    - Skill Mismatch: The economic downturn forced many skilled workers to take on lower-paying and less skilled jobs, leading to a mismatch between available labor and job requirements.
- Resource Scarcity
  - The economic collapse led to a severe shortage of resources.
    - Agricultural Struggles: The Dust Bowl made the situation worse, destroying crops and farmland, leading to food shortages.
    - Industrial Raw Materials: Factories struggled to secure necessary raw materials due to reduced trade and financial constraints.
    - Consumer Goods: With declining production, there was a scarcity of consumer goods, leading to rationing and black markets.
- Infrastructure Constraints
  - There was a decline in public and private investment in infrastructure, leading to various constraints:
    - Deteriorating Infrastructure: Roads, bridges, and public buildings performed poorly due to lack of funding and maintenance.
    - Transportation Issues: Poor transportation networks hindered the movement of goods and people, worsening economic difficulties.
    - Housing Shortages: Many people faced inadequate housing conditions as construction slowed and urban populations increased.
- Lack of Environmental Consideration
  - Environmental awareness and regulations were minimal during the 1930s, leading to widespread environmental degradation:

- Pollution: Industrial activities led to significant air and water pollution, affecting public health and the environment.
  - Deforestation: In the search for agricultural land and resources, large areas of forests were cleared, leading to loss of biodiversity.
  - Soil Erosion: Poor agricultural practices, combined with the Dust Bowl, caused severe soil erosion, making farmland unproductive.
- Social and Economic Factors
  - The social and economic landscape of the Great Depression was marked by great changes and challenges:
    - Poverty and Inequality: A large portion of the population lived in poverty, and the gap between the rich and poor widened.
    - Social Unrest: High unemployment and poverty led to social unrest, strikes, and protests.
    - Government Intervention: The New Deal programs introduced by President Franklin D. Roosevelt aimed to provide relief, recovery, and reform, but faced significant challenges and opposition.

## Design Prompt:

The 1930s was a decade marked by economic hardship and social upheaval across the globe due to the Great Depression. Your challenge is to design an innovative solution that addresses one of the critical issues of this era. You may choose to focus on creating affordable and resilient housing for the homeless. Your design should be cost-effective, sustainable, and feasible given the limited resources and technology of the time. Consider the long-term benefits and community impact of your proposed solution.

## Technology and Tools Available in the 1930s:

1. Construction Materials and Methods
  - a. Wood and Timber: Techniques included simple joinery and the use of nails.
  - b. Corrugated Metal Sheets: Used for roofing and sometimes walls due to their durability and availability.
  - c. Bricks and Stone: Used for foundations and sometimes for walls. Bricklaying tools included trowels, levels, and plumb lines.
  - d. Salvaged Materials: Reusing materials from demolished buildings or scrap was common. Tools included hammers, saws, and pry bars.
2. Architectural Designs
  - a. Bungalow Style: Simple, affordable designs featuring single-story, open floor plans, and porches.
  - b. Cabin Style: Small, simple structures often built with wood logs or planks.
3. Community Planning Strategies
  - a. Centralized Communal Areas: Designated areas for community gatherings, shared facilities like kitchens, and washrooms.
  - b. Garden Spaces: Incorporation of small garden plots for residents to grow food, promoting self-sufficiency.

4. Tools
  - a. Hand Tools: Saws, hammers, chisels, screwdrivers, wrenches, and hand drills were commonly used.
  - b. Measuring Tools: Tape measures, levels, and squares ensured accurate construction.
  - c. Basic Machinery: Hand-cranked cement mixers for small-scale concrete production.

## Actual Solutions Used in the 1930s:

- New Deal
  - The New Deal was a set of domestic policies enacted under President Franklin D. Roosevelt that dramatically expanded the federal government's role in the economy in response to the Great Depression.
  - Historians commonly speak of a First New Deal (1933-1934), with the “alphabet soup” of relief, recovery, and reform agencies it created, and a Second New Deal (1935-1938) that offered further legislative reforms and created the groundwork for today's modern social welfare system.
- WWII
  - WWII facilitated economic recovery from the Great Depression by mobilizing vast resources, stimulating industrial production, and expanding the workforce, ultimately reducing unemployment and revitalizing the economy. Government spending on defense-related industries and infrastructure projects played a central role, while technological advancements and global trade further contributed to the nation's economic resurgence.
- Reconstruction Finance Corporation
  - The 1932 Reconstruction Finance Corporation (RFC) authorized the lending of \$2 billion to banks, railroads, and other privately held companies, and in July 1932 the federal government appropriated \$300 million for the nation's first relief and public works projects.

## Potential Ways to Tackle the Issues:

### Social Housing Development Challenge (Hooverilles):



- Design affordable and resilient housing solutions for families affected by homelessness and poverty during the Great Depression. Propose innovative architectural designs, construction methods, and community planning strategies to provide safe and ethical housing for vulnerable populations.
  - Possible Solutions:
    - Micro-Housing Units
      - Design compact housing units with efficient layouts to accommodate single individuals or small families.
    - Self-Sustaining Housing Communities
      - Develop housing units that integrate systems for water collection, waste management, and energy production.
    - Communal Kitchens and Dining Areas
      - Design housing with communal kitchens and dining areas to reduce individual household costs and promote social interaction.
    - Water-Efficient Housing
      - Design housing units with systems for water conservation and reuse, such as greywater recycling and rainwater harvesting.
    - Emergency Relief Shelters
      - Develop temporary shelters made from inexpensive materials like wood, canvas, and corrugated metal (look up other easy materials). These shelters can be quickly assembled in response to immediate housing needs and later repurposed or dismantled as permanent housing solutions are constructed.

*Possible Materials*

- Wood, Paint, Fabric and Textiles, Adhesives and Fasteners, Corrugated Cardboard Sheets, Foam Core Boards, Tarps and Heavy-Duty Fabric, PVC Pipes and Connectors, Zip Ties and Bungee Cords, Rope and Twine

## Cultural Aspect

### Different Racial Demographics

- African American Experiences
  - Economic Hardships:
    - Job Discrimination: African Americans faced higher unemployment rates and were often the first to be laid off. [Explore how racial discrimination in hiring practices exacerbated their economic struggles.](#)

<b>Higher Unemployment Rates</b>	African Americans consistently faced higher unemployment rates compared to their white counterparts.
<b>First to be Laid Off</b>	In times of economic downturn, African Americans were often the first group to be laid off.
<b>Racial Discrimination in Hiring Practices</b>	Employers often exhibited bias, preferring to hire white candidates over African Americans, regardless of qualifications
<b>Economic Struggles</b>	Discriminatory practices in hiring led to increased economic instability and poverty among African American communities.
<b>Limited Job Opportunities</b>	African Americans were frequently relegated to low-paying, unstable jobs, further perpetuating economic disparity.

- Migration: The Great Migration saw many African Americans move from the rural South to urban centers in the North, seeking better opportunities. [Discuss how this movement affected urban demographics and race relations.](#)

<b>Reasons for Migration</b>	Seeking better economic opportunities, escaping racial segregation and violence in the South.
<b>Impact on Urban Demographics</b>	Significant increase in the African American population in northern cities such as Chicago, New York, and Detroit.
<b>Housing Segregation</b>	African Americans often faced housing discrimination, leading to the creation of segregated neighborhoods.
<b>Race Relations</b>	The migration led to increased racial tensions and competition for jobs, housing, and resources in northern cities.

- Cultural Contributions:
  - Harlem Renaissance: Despite economic hardships, the 1930s was also a time of rich cultural expression in African American communities.
  - Community Gardens: In urban areas, African American communities often created community gardens to grow food and manage water resources collectively, promoting self-sufficiency and resilience.
- Hispanic and Latino Experiences



- Labor and Migration:
  - Bracero Program: Although officially started in the 1940s, the precursors to the Bracero Program during the Great Depression saw many Mexican Americans and immigrants working in agriculture under harsh conditions. [Discuss the impact of labor exploitation and migration patterns.](#)

<b>Reasons for Migration</b>	Mexican Americans and immigrants were drawn by the promise of employment opportunities in agriculture despite the harsh conditions.
<b>Social Impact on Workers</b>	Workers experienced separation from families, cultural displacement, and limited access to social services and education.
<b>Labor Rights Movement</b>	The harsh conditions and exploitation eventually spurred labor rights movements and advocacy for better working conditions and wages.

- Repatriation: Many Mexican Americans were forcibly repatriated to Mexico during the Depression. [Explore the social and economic impacts of these repatriation efforts.](#)

<b>Labor Exploitation</b>	Workers often faced poor working conditions, low wages, inadequate housing, and lack of legal protections.
<b>Economic Impact on Repatriated Individuals</b>	Loss of property, jobs, and savings in the U.S. led to economic instability and poverty for repatriated individuals and families.
<b>Impact on U.S. Communities</b>	The sudden removal of large numbers of Mexican Americans disrupted local economies, especially in agriculture and other industries reliant on their labor.
<b>Legacy and Awareness</b>	The events led to increased awareness of the rights of immigrants and the development of more humane immigration policies in later years.

- Cultural Contributions:
  - Community Support: Hispanic communities often relied on mutual aid societies (mutualistas) to support each other during tough times. [Highlight these community-based support systems.](#)
- Native American Experiences
  - Federal Policies:
    - Indian Reorganization Act (1934): Also known as the Wheeler-Howard Act, this legislation aimed to reverse assimilation policies and restore some degree of self-governance to Native American tribes. [Discuss its impact and the mixed responses from different tribes.](#)
  - Economic Conditions:
    - Native American reservations were often severely impacted by the economic downturn, exacerbating already difficult living conditions. [Examine how federal relief efforts were implemented \(or failed\) in these communities.](#)

<b>Indian Emergency Conservation Work (IECW)</b>	A specialized branch of the CCC, the IECW focused on conservation and development projects on reservations, providing employment to many Native Americans.
<b>Implementation Challenges</b>	The resources allocated to reservations were frequently insufficient to meet the needs of the communities.
<b>Failures and Shortcomings</b>	Despite some success, many programs had a limited impact due to insufficient funding and mismanagement. Some programs failed to respect and incorporate Native cultural practices and governance structures.

- **Water Management Challenges:** Native American reservations were often severely impacted by the economic downturn, exacerbating already difficult living conditions. [Examine how federal relief efforts were implemented \(or failed\) in providing water infrastructure and support.](#)

## Gender

- **Women's Contributions and Challenges**
  - **Home Life:**
    - **Household Management:** Women managed households with limited water resources, finding creative ways to conserve and use water efficiently. [Discuss the communal efforts and knowledge-sharing among women in different cultural communities.](#)
    - **Community Kitchens:** In some communities, women organized communal kitchens where water and other resources were pooled and managed collectively to provide for families in need.
  - **Workforce:**
    - Women, particularly from marginalized communities, took on increased roles in the workforce, often in low-paying and unstable jobs.

## 70s: Energy Crisis

### Background Information:

Rising tensions in the Middle East led to increased gas prices in Western countries. members of the Organization of Arab Petroleum Exporting Countries (OAPEC) reduced their petroleum production and proclaimed an embargo on oil shipments to the United States and the Netherlands, the main supporters of Israel. OPEC raised prices from \$1.85 to \$11.65 per barrel which equates to \$14 to \$80 per barrel with inflation.

## Issue Summary:

- Due to conflicts with Israel and the US backing them, members of the Organization of Arab Petroleum Exporting Countries (OAPEC) lowered their petroleum production and embargoed oil ships to countries backing Israel.
- Embargos caused the prices of oil to spike from \$3 per barrel to \$12 per barrel.
- Americans faced price hikes and fuel shortages leading an energy crisis across the country.
- Even after the embargo was lifted oil prices remained high for the remainder of the decade.
- Led to oil reforms, greater emphasis on renewable resources and non-fossil fuel resources, and led to more oil being produced domestically rather than international trade.

## Design Prompt:

The 1970s was a decade marked by petroleum scarcity across the West due to reduced oil production and embargos on the West. Your challenge is to design a solution that addresses one of the critical issues of the crisis. You may choose to focus on creating fuel-efficient vehicles, energy conversion systems, or alternative energy sources other than petroleum. Your solution must be feasible for the technology of the time. Consider the long-term benefits of your solution and the community impact of your solution.

## Technology and Tools Available in the 1970s:

A lot of the technology was new and not yet adapted

- Renewable energy
  - Solar energy
  - Nuclear energy
  - Wind energy
  - Hydroelectric energy
- Transportation tools
  - Gas pipelines
  - Power lines
- Computing systems
  - Analog computers
  - Supervisory Control and Data Acquisition (SCADA) systems
    - Controls and monitors industrial processes
- Renewable energy equipment
  - Geothermal drilling equipment
  - Wind turbines
  - Solar panels

## Actual Solutions Used in the 1970s:

- Strategic Petroleum Reserve (SPR)
  - The U.S. government established the Strategic Petroleum Reserve in 1975 to store large quantities of crude oil. The SPR was intended to provide an emergency stockpile that could be used to mitigate future supply disruptions. It was used to reduce the impact of sudden energy shortages and stabilize oil markets.
- Energy Conservation Efforts
  - Corporate Average Fuel Economy (CAFE) Standards: Introduced in 1975, these regulations aimed to improve the average fuel economy of cars and light trucks (i.e., pickups, minivans, and SUVs) sold in the U.S.
- Alternative Energy Development
  - Investment in Renewable Energy: The government began investing in research and development of alternative energy sources, including solar, wind, and geothermal energy.
- Domestic Energy Production
  - Alaska Pipeline: The Trans-Alaska Pipeline System was completed in 1977, allowing oil to be transported from the North Slope of Alaska to the southern coast for shipping.
- Price Controls and Rationing
  - Price Controls: The government implemented price controls on gasoline and oil to prevent excessive price increases during the crisis.
  - Rationing: In some instances, gasoline rationing was introduced to manage supply shortages, including measures like odd-even rationing based on license plate numbers.

## Potential Ways to Tackle the Issues:

### Fuel-Efficient Vehicle Design / Energy-Efficient Public Transportation System

- Adaptive Reuse of Existing Vehicle Models: Modify and improve existing vehicle models from the 1970s to enhance fuel efficiency using aerodynamic enhancements, lightweight materials, and engine optimizations.
- Electric or Hybrid Buses: Design a public transportation system featuring electric or hybrid buses that were technologically feasible in the 1970s, focusing on energy efficiency and reduced emissions.
- Route Optimization: Create a system for optimizing bus routes and schedules to minimize fuel consumption and maximize efficiency, using data and computational methods available in the 1970s.

### Home Energy Conservation System

- Smart Thermostat Design: Create a thermostat system that automatically adjusts home temperatures to optimize energy use.
- Insulation Improvements: New methods for improving home insulation using materials and techniques available in the 1970s to reduce heating and cooling energy needs.

- Heating Improvements: New methods for heating homes that don't require the use of fossil fuels

## Creating alternative fuel sources

- Design mini nuclear reactors that are smaller and more compact.
  - These nuclear reactors would be able to power cars or homes without the use of gasoline. They would be environmentally friendly and last long.
  - The downside is they would not be as powerful as regular nuclear reactors and how would you prevent radiation leaking.
- Design geothermal powerplants underwater
  - These underwater plants can tap into the energy inside underwater volcanos. They would be a great source of renewable energy.
  - The downside is getting power back to the surface would be difficult and the logistics of creating an underwater geothermal plant would be expensive.

## Strategic Petroleum Reserve Management System /Gasoline Rationing System

- Efficient Distribution Mechanisms: Design a gasoline rationing system to ensure fair and efficient distribution of limited fuel supplies during shortages. This could involve coupon systems, even-odd license plate rationing, or electronic tracking (as would be envisioned with the era's tech).
- Oil Storage and Release Optimization: Design a system to manage the storage and strategic release of petroleum reserves.
- Energy Saving Techniques: Develop strategies for conserving the stored oil, such as reducing evaporation losses and improving storage tank efficiency.

## Residential Solar Energy System (and other energy sources)

- Solar Panel Design: Develop a design for solar panels using 1970s technology, focusing on maximizing efficiency and minimizing costs. Consider the materials and manufacturing processes available at the time.
- Energy Storage Solutions: Propose methods for storing solar energy, such as battery systems or thermal storage, that could be implemented with the technological capabilities of the 1970s.

## Cultural Aspect

The energy crisis disproportionately impacted poor communities. People struggled to pay bills, heat their homes, and travel to work with the increasing energy costs. With the spikes in electricity prices, the energy crisis made it harder for people to maintain a decent standard of living. Prices of goods and services also increased because of the higher production and transportation costs. With the economy on a downturn, unemployment rates also went up for America forcing people into poverty.

# 80s: Exxon Valdez Oil Spill

## Background Information:

On March 24, 1989 the oil tanker, Exxon Valdez, ran aground in Prince William Sound, Alaska, spilling 11 million gallons of oil. Initial attempts to contain the spill failed. The spill spanned over 1300 miles of shoreline, affecting both the local ecosystem and economy. In total, it killed 100,000's of animals including 250,000 seabirds, 300 harbor seals, and 22 killer whales. To this day, there is still some lingering oil and the wildlife in the area is monitored to ensure a save and full recovery. Several species did return to its pre-spill populations within 5 years including mussels, barnacles, and seaweed. The sea otter population didn't return to pre-spill levels until 2014.

## Issue Summary:

**\*\*NOTE: All the issues below are not inherently related to the design prompt. They could aid in cultural impact research or serve as a jumping point for more innovative design solutions.\*\***

### Remoteness:

The spill first occurred in a remote part of the state and spread to even more remote places. This made it difficult for people and large supplies to reach these areas quickly

### Lack of people close to the spill:

The largest town close to the spill was Valdez, which had less than 4000 residents.

### Lack of infrastructure in Valdez:

Valdez only had one small airstrip. During the initial cleanup, the airstrip saw 10 times the traffic. Any larger cargo or equipment had to be flown into anchorage as a result.

### Lack of infrastructure in Cordova (the next closest town):

Could only be reached by boat or plane. Its only ferry was used in the response action.

## Design Prompt:

The 1989 Exxon Oil Spill marked a significant point in American and world history. Although not one of the larger oil spills, this one stands out as one of the most environmentally catastrophic. 100,000's of wildlife died due to the spill and some populations still haven't fully recovered. Industries along the coast crashed, leaving many without jobs. Your challenge is to find new methods to mitigate the environmental and economic impacts due to the spill. These can include new ways to contain the spill or new ways to clean the water, beaches, or wildlife. Your design should be cost-effective, sustainable, and feasible given the limited resources and

technology of the time. Consider the long-term benefits and community impact of your proposed solution.

## Technology and Tools Available in the 1980s:

Note: Although many technologies of this time are still used now, they are much less advanced

- Pressure washers/hoses
- Backhoes
- Dawn dish soap
- Bioremediation
- Simple drones
- Booms

## Actual Solutions Used in the 1980s:

- Overall took 4 summers with over 10,000 workers to clean *most* of the beaches
- Aggressive washing with high-pressure, hot hoses removed the oil, but did significant damage by killing the remaining plants and animals.
- Backhoes and other heavy equipment were used to expose oil underneath so it could be washed out
- Bioremediation: microscopic bacteria and fertilizer was spread across the beach which would break down the hydrocarbons in the oil
- Oiled birds and sea otters were cleaned using dawn

<https://evostc.state.ak.us/oil-spill-facts/q-and-a/#:~:text=Backhoes%20and%20other%20heavy%20equipment,oil%20was%20not%20to%20thick>

<https://www.epa.gov/archive/epa/aboutepa/bioremediation-exxon-valdez-oil-spill.html>

## Potential Ways to Tackle the Issues:

Development of improved booms (either fire-resistant, larger, less prone to failure in turbulent water)

- Design booms are heavier and less likely to be affected by turbulent waters. This design will still need to be easily transported and deployable. Students will also need to consider possible materials at the time (for fire-/heat- resistance).

## Improved monitoring and modeling of the spread of the oil

- The use of helicopters or early model of drones could provide improved and important data to aid in the clean up

## Precision application of dispersants

- Real time adjustments of how much dispersants to spray come from real time data from satellites and drones. With the lack of this technology, helicopters could provide much of the same data. Problems with the remoteness of the spill could be an issue. In addition, developing specialized nozzles that are better at producing finer droplets will maximize the effectiveness of the oil dispersion.

## Portable Incinerators

- Possible solution that would help in this more remote area. Less waste would have to be transported so more oil could be cleaned up at once. However, this could still cause environmental damages.

## Oil absorbing roller developed by the University of Texas (Paint Roller Technology)

- Thought of as a reverse paint roller, this device can be placed on the back of ships and driven around without any additional power source. The roller will be able to only absorb the oil, without picking up any water

### *Possible Materials*

Paint roller/pool noodle, oil/oil substitute/food coloring, cardboard, hose, mesh netting, weights/washers, small kiddie pool, shower head

## Cultural Aspect

- Indigenous Population
  - The 1989 Exxon Valdez oil spill had a disproportionate impact on the Indigenous communities in Alaska, particularly the Alaska Natives. These communities rely heavily on subsistence lifestyles, which include fishing, hunting, and gathering from the local environment. The oil spill severely affected the marine and coastal ecosystems, leading to long-term damage to fish populations, marine mammals, and other wildlife that are crucial for the subsistence and cultural practices of these Indigenous populations.
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