# A brief description of 3D Printing

## What is 3D printing?

## Automated additive manufacturing

## How does 3D printing work?

## What is 3D printing used for?

### Healthcare

### Sports

### Jewelry

### Automobiles

### Aerospace

## Why is 3D printing important?

# Explanation of associated science

## The role of 3D printing in science

# Historical timeline of 3D technology

## Introduction as a rapid prototyping systems (1981 – 1984)

## Stereolithography and the use of digital data (1984 – 1998)

## Regenerative medicine and bio printing (1999 – 2010)

## 2010 to present day adaptive manufacturing and success stories

### Example success stories that have high potential for exposure to general population (hearing aids, etc.)

# Adaptive manufacturing in the context of:

## Industrial manufacturing

## Aerospace

## Healthcare

## Rapid prototyping

## Additive and subtractive manufacturing

## Supply chain management

## Sustainability and zero waste generation

# Political and legal influences

## Political influence needed to make technology widespread

## Creation and reform of laws

### How will new technology be governed? Who will govern?

## Healthcare applications and regulations

### Ethics and accountability regarding patient care

### Eligibility and insurance criteria

## Intellectual property issues

### Ownership of ideas and patent eligibility

## Security and safety concerns

### Gun control loopholes

### Ability to limit and control currently unknown objects

# Economic questions and considerations

## Effect on industry

## Job market outlook

### Will job opportunities grow or shrink due to emerging technology?

### Shift in world’s manufacturing centers

## Associated cost of technology

### High startup and investment costs

### Cost of materials unlikely to change

### Potential for future savings and growth

## Future economy and automatization of workforce

# Psychological effects and implications for:

## Individuals

### Quality of life

### Consumption of goods and personal fabrication

### Employment prospects and concerns

## Organizations and businesses

### Replace the factory floor with divisions of engineers

### Manufacturing efficiency (on demand production of complex parts, fixed equipment reduction and minimal tooling)

### Supply chain evolution

# Environmental impacts

## Manufacturing consumptions including electrical energy, material, and fluid

## Less waste

### Additive techniques allow for more efficient uses of resources

### Recyclable and reusable materials

### Higher potential for local distributions

### Eliminates the need for special tools (also reducing waste)

### Potential for lower carbon footprint

# Cultural context

## Impacts on the way manufacturing is perceived

### Proponents for and against aspects of the technologies

### Affecting improvements on the technologies

## Creation of new methodologies

### New research and models to effectively compare manufacturing techniques

### Better and more quantifiable systems of measurement

## Geographical implications

### Growing technologies around the world

### Impacts on competitiveness

### Shared interests for improvement of technologies

# Moral and ethical implications

## 3D organs made from human cells

## Pros and cons of using 3D printing in healthcare