64-424
Intelligent Robotics

https://tams.informatik.uni-hamburg.de/lectures/2019ws/vorlesung/ir

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Technical Aspects of Multimodal Systems

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Outline

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Evaluation

Please fill out evaluation now.

Please be honest and critical.

Its anonymous so your grade will not be affected ;)

Disclaimer

- I'm not an expert in ethics or philosophy
- Aims of this lecture
  - Give you perspective on the impact of your work
  - Make you reflect on what you're doing
  - Foster a debate rather then just present something
- Not aims of this lecture
  - Tell you what is right or wrong
  - Make you follow my opinion

What is "Ethics"?

- "A set of concepts and principles that guide us in determining what behavior helps or harms sentient creatures" - R.W.Paul and L.Elder
- "The science of moral duty" - R.Kidder
- A branch of philosophy that involves systematizing, defending, and recommending concepts of right and wrong conduct.
- What is good/evil, right/wrong, justice/crime
- Morality is believed to be developed by evolution

Internet Encyclopedia of Philosophy

Why Should I Care?

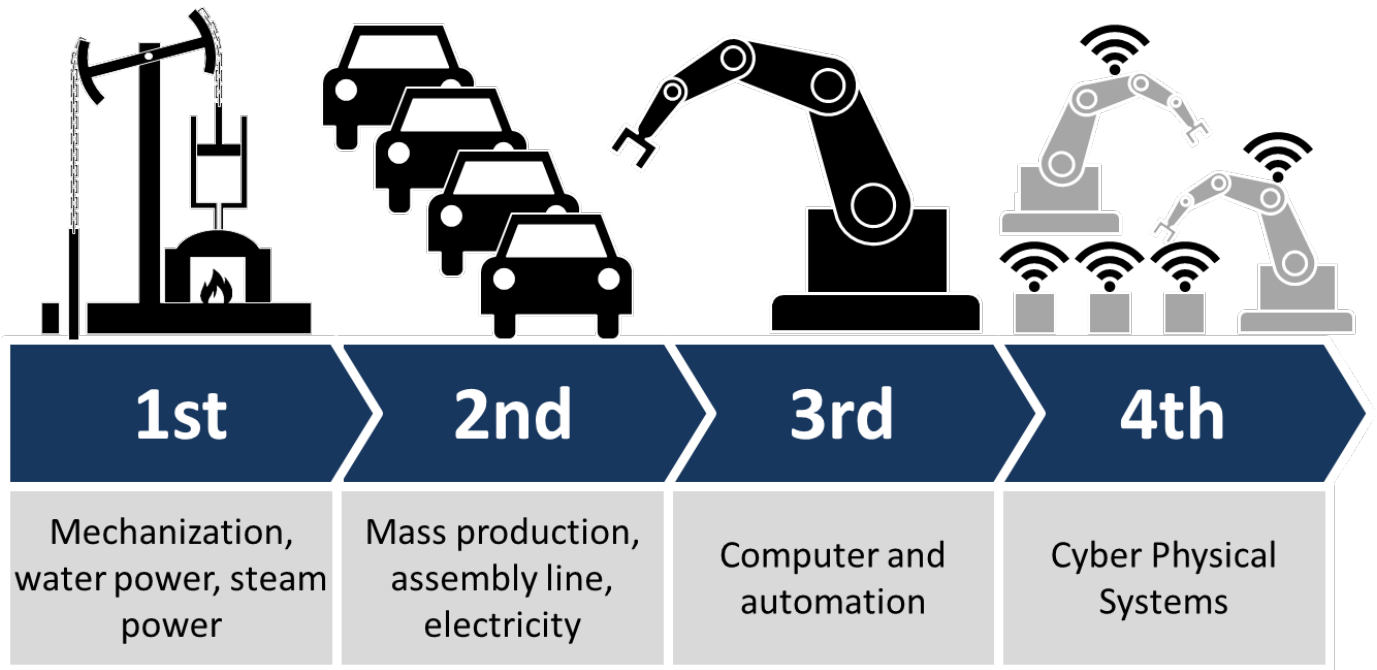
- "Ethics and morality are about knowing and doing the right thing and, by definition, doing the right thing is the right thing to do." - John Cahill
- "With ethics and morality, we ensure a society where life is easier and more pleasant for all." - Benoît Leblanc
- Think before you act to prevent regret. Some examples:
  - Ethan Zuckerman, creator of the pop-up ad
  - Mikhail Kalashnikov, creator of the AK-47
  - Alfred Nobel, inventor of dynamite
  - Dong Nguyen, creator of Flappy Bird
  - Robert Propst, inventor of the cubicle
  - ...
- Ethic misconducts can have dire consequences on your carrier
  - e.g. Jan Hendrik Schön

Future of Work

Future of Work

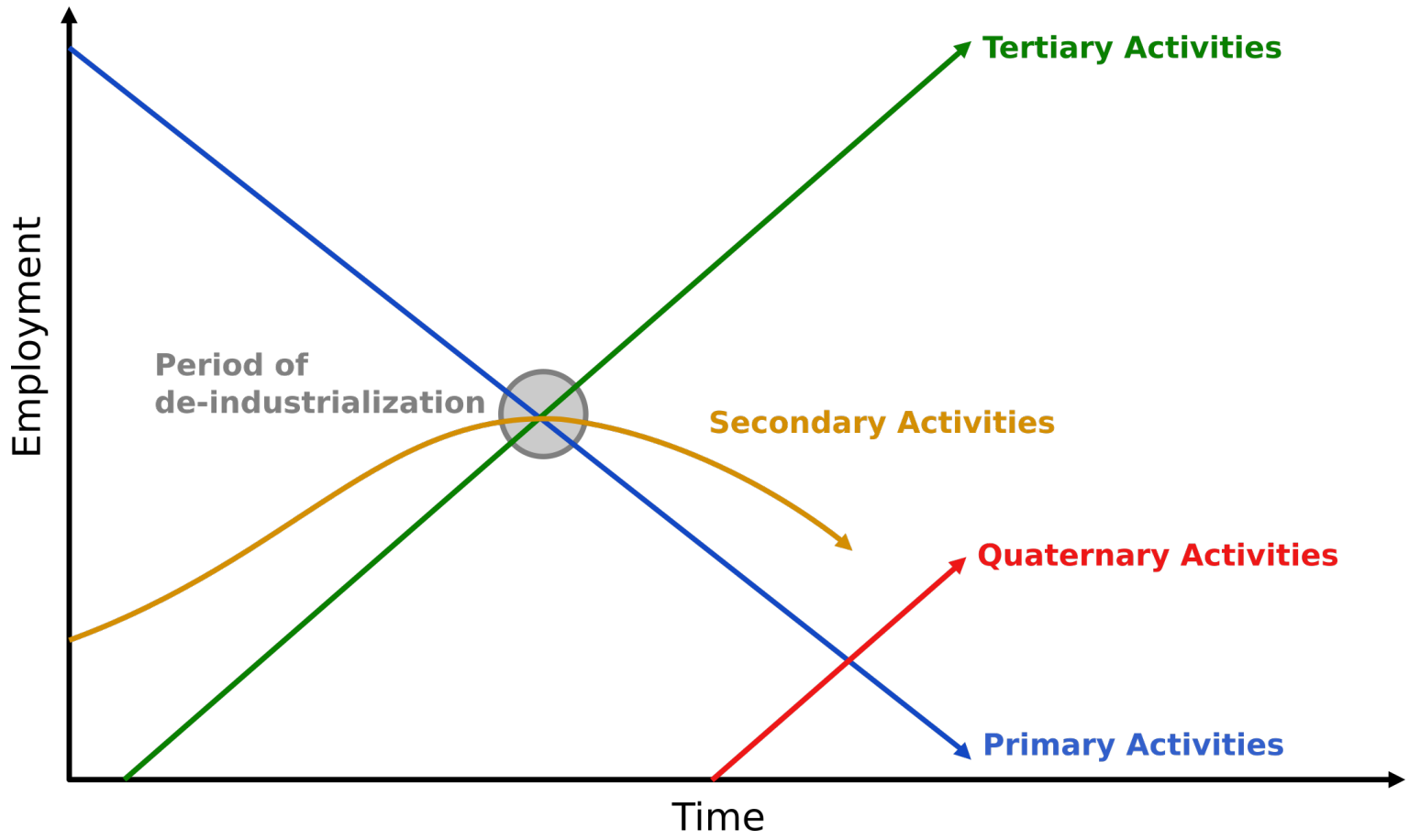
History

- Started with the industrial revolution in England
  - 1769 - Steam engine
  - 1786 - Automatic loom



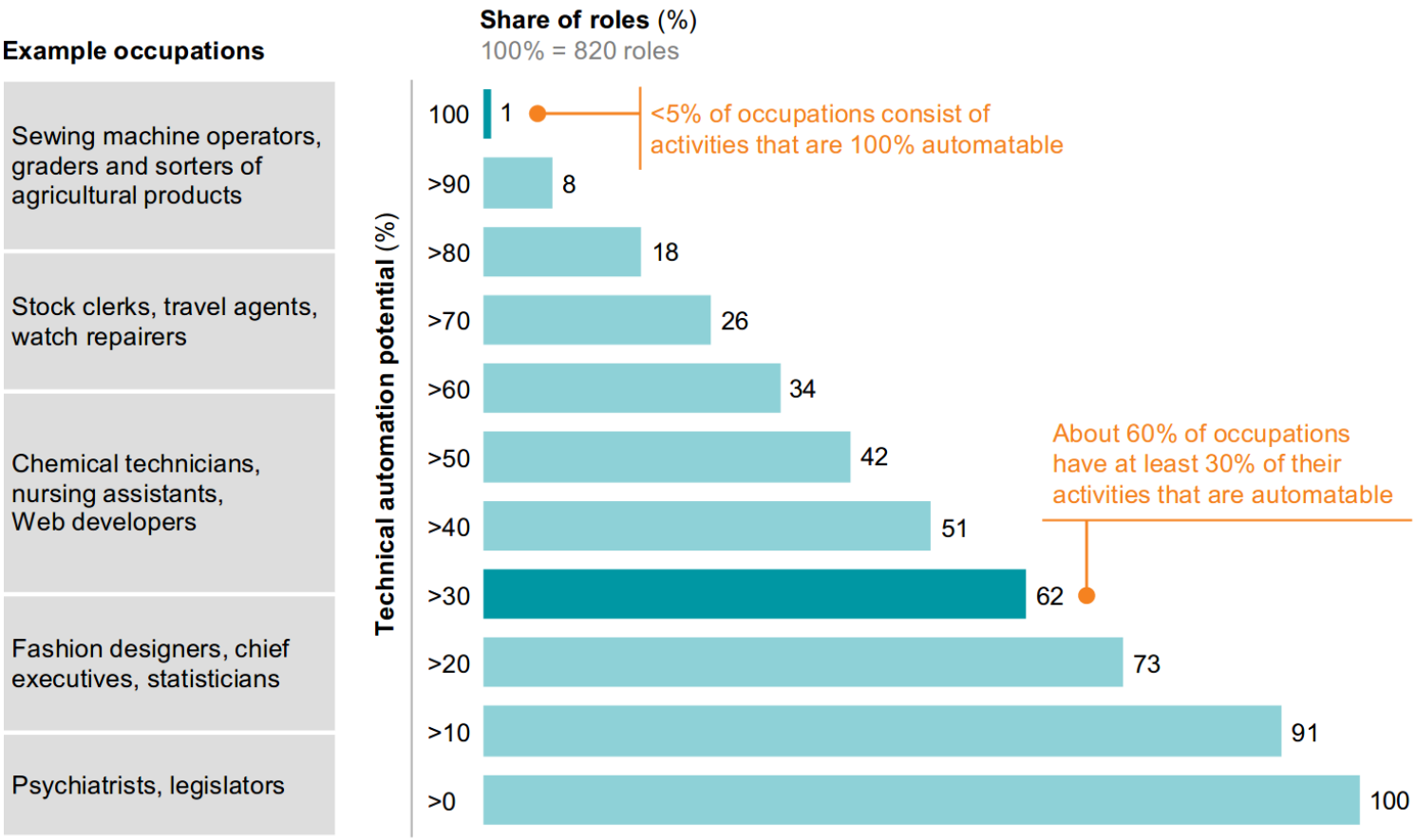
https://en.wikipedia.org/wiki/Industry_4.0

Clark's Sector Model



https://en.wikipedia.org/wiki/Economic_sector

Current State



1 We define automation potential according to the work activities that can be automated by adapting currently demonstrated technology.

SOURCE: US Bureau of Labor Statistics; McKinsey Global Institute analysis

Current State

- Current technology enough to replace some jobs (partly)
- Degree of automation highly depends on country
- Primary sector
  - Semi-automatic planters / harvesters (depending on crop)
  - Food processing in assembly lines
- Secondary sector
  - High level of automation for mass products
  - Low flexibility of factories
- Tertiary sector
  - Most automation done by computer programs
  - Non digital part of work difficult to automate
- Quaternary sector
  - (Almost) no physical work
  - (Almost) no application for robots

Possible Influence of Intelligent Robots

- Intelligent robots may replace more jobs in the future
- Especially in tertiary sector
- Service robots
  - Cleaning
  - Caring
  - Cooking
- Autonomous cars
  - Logistic drivers
  - Taxis
  - Public transport
- Agricultural robots
  - Completely autonomous planters/harvester
  - Automation for difficult crops
  - Organic farming (automated weed picking)

Possible Influence of Intelligent Robots (cont.)

- Manufacturing
  - More flexible assembly lines
  - Higher automation for non mass product
  - Personalized products

Question to Discuss

Should be further automate work
or stop at some point?

Pro Arguments

- Increased productivity -> higher wealth
- Products are cheaper and have higher quality
- Dangerous, boring jobs not necessary to do
- New (better) jobs are created
- People can be retrained for new jobs
- History showed that it works out
- Less time spend on work
  - Better living conditions
  - More time for voluntary/social work

Contra Arguments

- Means of production ownership -> distribution of wealth
- Distribution of remaining work
- Work gives humans meaning and structure in live
- Change is to fast for the society to change
- Some people are not able to perform complicated jobs
- Humans will be subjugated by machines
- Quality of jobs decreases

Would You Like To Know More?

- "When will a robot do your job?" - Discussion ZAL Innovation Days 27-28.02 Hamburg
- European Group on Ethics in Science and New Technologies: Future of Work Future of Society

Future of Work

Lethal Autonomous Weapons

Definition

- Different names
  - Lethal autonomous weapon (LAWs)
  - Lethal autonomous weapon systems (LAWS)
  - Lethal autonomous robots (LARs)
  - Robotic weapons
  - Killer robots
- Different definitions of autonomy
- Human in/on/out the loop
  - In: wait for human commands to shoot
  - On: human can stop the system
  - Out: no human supervision
- Differentiation between defensive and offensive weapons

History

- Mines were first modern automatically triggered weapon
  - Land mines 1600s
  - Naval mines 1700s
- Springguns ("Selbstschussanlagen") were used to secure the German-German border
- Anti-personnel mines are banned in many countries since 1997
  - Not including USA, Russia, most of Asia and Middle East
- Mine fields still present in many countries
  - E.g. Croatia and even Germany

Current State

- Many different active protection systems
- Radar guided guns (since 1980)
  - Installed on ships and tanks
- Human on the loop to react fast on missiles

https://en.wikipedia.org/wiki/Phalanx_CIWS

Current State (cont.)

- Sentry guns
  - Stationary deployed to defend area / border
  - First use at Korean-Korean border Samsung SGR-A1 (2006)
  - Human on the loop
  - Sensors
    - Laser rangefinder
    - Infrared camera
    - IR illuminator
  - Weapons
    - Light machine gun
    - Grenade launcher

https://en.wikipedia.org/wiki/SGR-A1

Current State (cont.)

- Iron Dome
- Radar based anti missiles defense system of Israel
- Human in the loop
- Effectiveness unclear
  - Israeli officials: 75-95%
  - T. Postol et al: 5%

https://en.wikipedia.org/wiki/Iron_Dome

Clay Dillow, "How Israel's 'Iron Dome' Knocks Almost Every Incoming Missile Out Of The Sky", Popular Science

Postol, Theodore A (15 July 2014). "An Explanation of the Evidence of Weaknesses in the Iron Dome Defense System". MIT Technology Review

Current State (cont.)

- Ukraine passenger jet shot down by Iran anti-air missile
- 9K330 Tor-M1 system (similar to Iron Dome)
- According to Iranian military:
  - System graded it as incoming rocket
  - Human in the loop had 10s to decide
  - Gave system okay
- Now major political implications
- 176 civilians dead

Current State (cont.)

- Many different partly autonomous drones
- In various sizes
- Mostly still controlled by human operator
- Widely used in conflicts and covered operations

http://mydronelab.com/blog/types-of-military-drones.html

Current State (cont.)

- Loitering munitions
- Small "kamikaze" drones that explode when reaching target
- Similar to guided rockets
  - But can wait in air a long time (loiter)
  - Have high resolution optical sensors
- Can detect faces and autonomously kill the person
- Turkey probably first nation to deploy this in Syria (KARGU system)

Current State (cont.)

- Discussion in the UN Convention on Certain Conventional Weapons (CCW) since 2014
  - Majority of countries for banning fully autonomous weapons
  - Minority against it, including Russia and the United States
  - Further discussions planned for 2020 and 2021
- Autonomous weapons seem to be in research. Allegedly in
  - China, Israel, Russia, South Korea, UK, US
  - Unfortunately information are classified, no clear sources

Question to Discuss

Should we ban lethal autonomous weapons?
Or some kinds of them?

Pro Arguments

- Less collateral damage
- No more crimes of war
- The other will have the weapons so we need them too
- Less dead people on our side
- Human-out-of-the-loop can perfectly enforce a "red line"

Contra Arguments

- Skynet/Terminator dystopia
- Could start a new arms race
- No more morality in warfare
- Concentration of power in a few hands
  - Coup d'état easier
- Could be hacked and turned against the owner
- More conflicts since soldiers are not at risk
- LAWs could also be used outside of war to suppress protests
- Difficulty to assign responsibility and accountability for actions
- Possible violations of International Humanitarian Law
  - Principle of distinction between Non-/Combatants
  - Principle of proportionality on civilian damage

Would You Like To Know More?

- International Committee for Robot Arms Control icrac.net
- autonomousweapons.org
- stopkillerrobots.org
- Current debate in the UN
  - The Convention on Certain Conventional Weapons
  - www.unog.ch
- "Slippery Slope - The arms industry and increasingly autonomous weapons", PAX

Further Things to Discuss

- Dual use
- Military research funding
- Surveillance by robots
- Open source / open hardware robots
- Android robots
- Cyborgs
- Moral decision making (e.g. trolley problem)

Further Information About Ethics in IT

- Academic
  - Lectures by workgroup "Ethics in Information Technology (EIT)"
  - The European Group on Ethics in Science and New Technologies (EGE)
- Popular
  - Black Mirror

You have more interesting sources? Please tell me!