01:19

today

01:24

today we are going to talk about third

01:26

industrial revolution uh

01:29

dates between 1950s and 2000s so it is

01:33

after uh second world war to

01:37

the recent

01:38

dot net

01:42

revolution so

01:44

today's internet age and dot com

01:47

revolution starts with 20

01:49

year 2000 so today we are going to focus

01:52

on that time between 1950s and 2000

01:58

when we go back to

02:02

first and second industrial revolutions

02:05

first industrial revolution mechanical

02:07

production and steam

02:09

engine

02:11

was the landmark then

02:13

automobile and electricity

02:16

determined the second industrial

02:18

revolution the third industrial

02:19

revolution is related to

02:22

electronics and automation

02:25

so automation and electronics

02:28

uh is was the key factor

02:31

first in fourth industrial revolution is

02:34

more digitization

02:37

artificial intelligence and cyber

02:39

physical cyber physical systems

02:41

and biotechnology etc

02:44

determine the

02:47

forth industrial

02:49

revolution

02:54

when we

02:57

when we

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

02:58

focus on this is a really nice graph

03:02

when we focus on

03:04

gross national gross domestic product of

03:08

different countries

03:10

since

03:12

the jesus jesus time

03:14

since year one

03:18

and

03:19

through the middle ages

03:21

we see that

03:23

india and china

03:25

are very significant in the old times

03:29

in terms of

03:30

uh

03:32

world production

03:34

then because this is the ratio

03:37

percent

03:40

then

03:41

[Music]

03:43

starting with

03:45

1900

03:47

20th century

03:49

united states

03:52

increased

03:53

significantly

03:56

and after year

03:58

after 1980 probably

04:00

here

04:03

china is expanding

04:05

again

04:08

where germany is

04:11

declining

04:13

to some degree

04:15

japan is

04:16

increasing

04:19

and others are also

04:22

steadily

04:26

at the steady level

04:29

united states is

04:32

seeing some

04:34

diminishing decline

04:37

in the amount of

04:40

countries gdp

04:43

over world gdp

04:54

right

04:57

[Music]

05:22

foreign

05:30

at some point

05:32

there was a more detailed

05:34

graphics

05:35

at some point

05:37

related with cities

05:39

the ottoman empire and istanbul was also

05:41

in the list

05:43

in terms of world production

05:53

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

third revolution the digital that is

05:56

digital revolution starting with 1950s

06:01

uh

06:02

it brought semiconductors mainframe

06:04

computing personal computing and

06:05

internet

06:09

taking us to digital revolution and

06:11

furthermore to fourth industrial dollars

06:14

which we'll be discussing which we will

06:16

be discussing next week

06:20

with the third industrial revolution

06:22

things that used to be analog

06:24

moved to digital technologies like old

06:26

television

06:28

that we use analog television to digital

06:30

television

06:32

internet connected tablet and streaming

06:34

movies so that is also

06:36

third industrial revolution so

06:38

digitization

06:45

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

that

06:47

that movement from analog to digital

06:50

technology dramatically

06:52

changed industries especially

06:55

telecommunications

06:56

and internet

06:59

internet is a telecommunication industry

07:01

so a digital revolution enabled digital

07:04

communication digital communication

07:07

allowed

07:08

in internet

07:11

electronics and information technology

07:13

began to automate production and take

07:15

supply chains

07:16

globally

07:25

information technology

07:28

products are used to

07:32

provide

07:34

global

07:36

production

07:39

for all areas like animal production

07:43

farming

07:44

industrial production

07:46

digital technology was used

07:50

with the third industrial revolution

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

07:58

these are

08:00

examples uh

08:02

using

08:03

using digital technology

08:06

we can

08:08

control fabrication

08:10

of

08:11

certain items in the industrial setting

08:14

industrial mime

08:21

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

one

08:22

[Music]

08:25

one interesting thing is

08:28

thomas edison was the first person

08:31

that established a

08:34

research laboratory

08:39

aside from universities

08:42

so

08:43

invention and innovation

08:47

with the first third industrial

08:49

revolution

08:50

became

08:51

less the domain of the

08:53

lone inventor

08:56

in the early days

08:58

when you are an inventor

09:00

people

09:01

think that you are a crazy guy

09:05

and you invent things at your home or at

09:07

your castle etc you are rich or any a

09:10

rich person is funding you so you are an

09:13

inventor

09:15

then with the edison’s Menlo Park

09:18

research laboratory

09:20

research becomes a

09:22

business

09:24

research becomes a business

09:26

so then

09:28

organizations like bell laboratories att

09:31

bell laboratories

09:32

where the transistor is found

09:35

invented and miniaturized for electronics

09:40

so

09:41

that's the

09:43

i have a picture of it that's a very

09:45

important

09:47

step

09:49

research as a business

09:53

this is

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

09:55

this is the

09:56

picture of the bell laboratories the old

09:58

building

10:00

in new jersey

10:03

by the year 2007 it is

10:06

acquired by nokia

10:08

and now it is nokia bell laboratories

10:11

the book

10:12

where we

10:14

continue to follow today in this class c

10:17

programming language book

10:19

is written in that

10:21

laboratory

10:23

in

10:24

1970s

10:29

and they established the laboratory in

10:32

1925 and it was

10:35

[Music]

10:36

it was named as bel telephone

10:39

laboratories

10:40

until 1984. so it's a huge time

10:44

then all the transistor inventions etc

10:47

communication inventions digital

10:49

communication were invented in those

10:51

years

10:52

at

10:53

1984

10:55

bell is divided into a tnt

10:58

name is changed a tnt bell laboratories

11:01

between 84 and 96

11:05

in 96

11:07

it is separated by labs

11:10

and by 2007 it is sold to sofia

11:16

same

11:17

campus

11:22

this is a picture from 1970s

11:28

and

11:32

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

after the second world war

11:36

research-based technological development

11:39

was based not only

11:41

on group projects but also on science

11:45

so

11:46

science is

11:49

supported by the united states

11:51

government

11:52

so scientific revolution scientific

11:54

innovations not business innovations

11:57

scientific innovations

12:00

enabled technological innovations

12:03

such as nanotechnology etc because

12:05

nanotechnology for example was

12:08

uh

12:11

studied by

12:12

physics departments

12:14

so physics department

12:16

works in

12:17

or chemistry department or physics

12:19

department they work in universities

12:22

they work in research labs and they work

12:24

in science they don't think about

12:26

products at the beginning

12:29

therefore

12:30

they support science to enable

12:34

steps for the technology

12:37

so

12:39

that was the origin of research-based

12:42

technological development

12:44

like

12:45

silicon technology

12:47

transistor technology vacuum technology

12:50

etc

12:51

robotics

12:55

first

12:56

after the second world war

12:59

research efforts

13:01

increased resulted in electronics

13:04

computers jet engine radar rockets

13:07

nuclear power after the nuclear bomb

13:11

after the nuclear bomb they invented

13:13

nuclear power stations

13:16

all of them demonstrate the help of

13:18

science in technological change

13:22

so

13:23

when we teach something scientific

13:26

when we think when we teach for example

13:28

derivatives

13:32

as i said

13:33

in the previous lecture

13:35

momentum

13:39

inertia

13:41

neutron

13:42

or

13:44

maxwell equations

13:49

these are

13:50

science

13:51

and scientific

13:52

advancement

13:54

helps technological advancement so that

13:57

is that was very significant

13:59

in the post warfare post-war period

14:06

and

14:06

since science

14:11

is supported by government

14:17

it is supported by govern because it

14:20

doesn't create money immediately

14:23

since it doesn't create money

14:24

immediately

14:26

companies don't support

14:30

therefore

14:31

important role of the government

14:33

supporting

14:35

new costly and complex technology for

14:37

the science is very

14:39

important and that happened

14:42

in western western countries starting

14:46

with united states

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

14:48

i'm going to talk about that

14:55

these are

14:56

the

14:58

factors

14:59

shaping technology at the end of the

15:01

world war two

15:04

those accelerated rate of technological

15:06

change and increased dependence on

15:08

technology in the western world before

15:10

that

15:11

technology was only seen in production

15:15

and the life was not only the life was

15:17

not dependent on technology but later

15:20

after the first after the second world

15:22

war

15:23

life depended on technology

15:27

management of trains etc for example

15:31

for power generation

15:35

mainly by power of electricity and

15:38

petroleum

15:39

this mid-century technology touched more

15:41

and more people

15:43

and their dependence

15:45

that is capitalism maybe

15:47

dependence on those technologies

15:50

increased

15:52

without cars you couldn't travel to home

15:58

when i first went to

16:00

united states for master's study

16:04

someone else

16:07

dropped me in the campus

16:09

my house was

16:11

40 miles away from the campus

16:13

i couldn't get back to

16:16

home from the campus

16:19

because i had i didn't have car for that

16:21

day

16:22

so i i was dependent on

16:25

transportation private transportation

16:27

technology for going between school and

16:31

home

16:34

if if that didn't happen

16:37

i probably would

16:39

be

16:40

studying in a city school

16:44

where i can walk from home to school but

16:47

with the technology

16:48

people started to travel

16:50

for work

16:52

by cars

16:54

therefore

16:55

dependency on that technology

16:58

increased

17:00

at that time after 19 after 1940s 50s

17:04

1940s

17:06

1950s the united states built

17:11

highways

17:12

in the country so that people can travel

17:15

and the houses were built houses were

17:17

built

17:19

in suburban areas

17:21

before that people were rich people were

17:24

living

17:25

in closer districts in the city but

17:28

after 1950s

17:30

richer people started to move away from

17:32

the center of the cities where public

17:34

transportation is not available

17:37

for bigger houses and bigger gardens

17:40

electrical lighting and appliances

17:43

electrical power automobiles aircraft

17:45

consumer culture created the century of

17:47

pervasive technology (her tarafa yayılmış)

17:49

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

18:00

when did electronics

18:05

so we say electronics

18:11

when did electronics

18:12

started term electronics and thrown from

18:15

electron

18:18

the transistor

18:21

is developed in

18:23

bell laboratories by shockley

18:27

shockley experiments

18:30

at 1947

18:34

shockley

18:35

bardeen and brettane nobody remembers

18:39

those

18:40

second and third names people know

18:42

shockley

18:45

uh that was

18:47

first designed for communication as an

18:49

alternative to tubes

18:51

that we have seen last week

18:54

but it was a very big step in the

18:58

development of technology

19:01

the transistor

19:04

then electronic device allowed for

19:06

smaller

19:07

improved and more reliable products such

19:09

as handheld radios

19:11

portable radiators

19:13

television

19:14

and sound reproduction systems as well

19:17

as as well as

19:18

computers so this is so important so

19:20

computational devices

19:23

are

19:24

made in

19:26

significantly

19:28

smaller in size lowering

19:31

power and therefore more powerful

19:34

for the same amount of money

19:41

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

these are the guys

19:43

who invented transistors

19:46

shockley bardin and brettain

19:49

they

19:51

were awarded for the nobel prize in 1956

19:56

for

19:57

their contribution in semiconductors and

20:00

the

20:01

transistor you see at the bottom image

20:04

is the transistor they worked

20:07

for the first time

20:08

in the museum

20:14

first transistor 1947.

20:21

Then

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

20:25

after 1947 it is quickly ( transistor)

20:32

it quickly

20:33

expanded and produced in larger

20:35

quantities

20:41

this is the

20:43

very common

20:45

way

20:46

of production

20:52

type transistor

20:56

when you zoom

20:58

you have a plate

21:02

have junctions from each different sizes

21:05

and there is a

21:06

there is a bottom connector and there

21:08

are wires

21:09

at the top

21:11

there is a cover

21:12

that is this cover this cover is at the

21:14

top and here is the

21:18

plate

21:22

that was produced that kind of

21:24

transistor technology was

21:26

still

21:27

used but

21:29

produced in this way for over

21:32

40 40 years

21:35

later

21:36

they started to use plastic

21:40

cases and other other materials but

21:42

still today power powerful transistors

21:45

come in that

21:47

packaging

21:52

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

this is the first

21:54

transistor radio sony tr63 like released

21:58

in 1957

22:00

this is the first transistor radio works

22:02

with the

22:04

battery

22:05

it is quite vintage and nice right and

22:07

the original original

22:11

emblem of the

22:12

tony is

22:14

actually

22:16

really different

22:20

that is

22:21

that is a

22:25

sold in mass markets to many people

22:34

and

22:35

the brand sony actually

22:38

was that

22:40

completely japanese

22:43

since it was after the war

22:45

company

22:47

[Music]

22:48

if i am correct it was heavily invested

22:50

by united states

22:56

united states

23:01

investment

23:13

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

first transistors were germanium

23:20

first transistors were made in with

23:22

germanium

23:24

material rather than silicon

23:26

but germanium was relatively expensive

23:29

and relatively less stable has certain

23:32

problems although it is

23:35

usable

23:37

silicon transistors are relatively cheap

23:40

and have different characteristics

23:44

invented in 1954 by talambang

23:51

from operating system sky

23:53

maybe his grandfather

23:58

first commercial silicon transistor was

24:01

produced by texas instruments in 1954

24:05

or silicon transistor

24:09

who was previously

24:11

worked at bell labs

24:14

so laboratories like bell labs in turkey

24:17

for example aselsan

24:19

those companies those research centers

24:22

are tübitak also

24:24

those research centers are

24:28

housed to other researchers at the

24:31

beginning so a person who

24:34

developed himself or herself in bell

24:36

labs

24:37

later moved to texas instruments and

24:40

continued their research in the other

24:43

companies so

24:44

those core research labs

24:47

also help

24:49

other companies

24:50

by providing people

24:53

by generating

24:55

people

24:56

in a school climate

25:01

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

after texas instruments

25:05

event

25:07

transistors

25:09

areas in computation analog computation

25:11

digital switching communications

25:14

making computers and automation in

25:16

factories and control systems

25:19

increased significantly and in very fast

25:22

in very fast fashion

25:25

these are for example power transistors

25:28

this is also power trusses this is

25:29

regular trans

25:32

each transistor has

25:34

emitter base collector so usually one of

25:37

them is the

25:38

base emitter collector or sometimes

25:46

it depends on the type of the transistor

25:49

sometimes the collector is on the left

25:51

sometimes collector is on the right

25:53

who knows

25:55

you need to you need to check the

25:56

catalog for the transistor

25:59

but usually in these types

26:03

case is the collector

26:06

that's what i do

26:08

case is the collector

26:11

this part

26:14

there are two

26:16

pins on the other side one of them is

26:18

base one of them is emitter and

26:20

collector is the

26:21

external case

26:31

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

then many transistors are placed on

26:35

silicon

26:36

vapors silicon place

26:38

we called them as integrated circuits

26:41

multiple circuit multiple transistors on

26:43

one silicon

26:44

if we can pack multiple things on one

26:46

silicon

26:47

that makes

26:50

an integrated circuit

26:52

also the resistors there are resistors

26:56

and transistors on

27:03

the silicon please

27:05

and these wires are gold

27:10

as we discussed

27:12

in the previous break

27:19

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

it wasn't a new idea

27:21

it was

27:24

it was the idea coming from

27:26

vacuum tube time in the vacuum trip time

27:30

german brand loya

27:33

thought that instead of producing three

27:36

tubes

27:37

and selling three tubes for a radio

27:40

receiver

27:42

let's

27:43

produce them in one tube but three

27:45

different chip circuit so three

27:48

different tube circuit is produced in

27:50

one tube

27:53

this is the

27:55

diagram for it so it is like three

27:56

transistors in one package three tubes

27:59

in one tube

28:01

um

28:03

it was similar to modern integrated

28:06

circuits

28:07

but it was

28:09

invented in 1920s

28:13

the actual

28:15

idea was

28:17

the text in the radius

28:21

calculated by

28:23

number of tubes inside

28:26

i remember it was the same in turkey

28:29

when we had when we had tv receivers

28:32

each tv receivers

28:34

had passport

28:36

registration for the

28:38

government

28:39

in our houses it was because it was

28:41

wireless device or it was very important

28:44

for war etc

28:46

and

28:47

inside

28:49

it was saying lambaste

28:51

number of tubes

28:53

so our tv was

28:56

domestic tv produced by gurundek

28:59

and it had it had five tubes

29:02

so i knew that our tv had five tubes

29:06

and in germany uh there was a tax issue

29:12

televisions and radios with lower

29:14

number of

29:15

radios at that time lower number of

29:18

trips paid less tax so instead of

29:20

producing

29:22

radios with three tubes

29:24

lower

29:26

generated one tube

29:29

to reduce the tax

29:31

taken for the radio receiver

29:37

like a car yes

29:39

so

29:40

smaller engine

29:43

so it allowed radio receivers to have a

29:46

single trip holder which is very nice

29:48

and the radio became smaller actually

29:55

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

how to

29:57

uh

29:58

push research

30:00

in a country

30:02

after the second world war

30:05

in the united states

30:06

national science foundation

30:09

is

30:11

formed

30:12

by

30:13

whom

30:19

the guy was

30:30

present was eisenhower

30:37

the guy's name is

30:39

forgot

30:41

anyway

30:43

so the

30:44

in the

30:46

original

30:47

idea of national science foundation

30:55

to promote progress of science to

30:57

advance to national health prosperity

31:00

and welfare

31:02

and to secure national defense so

31:04

defense welfare prosperity and health is

31:08

dependent on science

31:10

therefore we have to put money into

31:12

science

31:14

to

31:15

improve our conditions that is what they

31:18

said

31:18

in 1950

31:20

and started to give money

31:22

as government to private research

31:25

institutions and universities

31:27

just like trebitak in turkey

31:29

so they supported

31:31

science

31:33

physiologics

31:41

that is the the guy name is VANNEUAR BUSH

31:51

not george bush whenever bush

31:54

was the person who was responsible from

31:57

manhattan project the atomic bomb

32:01

after the manhattan project he was also

32:04

professor after the atomic

32:06

bomb project

32:08

he was the science advisor for the

32:11

american president

32:12

then he said we have to make a

32:14

foundation to push more money into

32:17

more resources and money into research

32:20

and they formed national science

32:22

foundation it's american to be tech

32:27

later he was the head of mit

32:31

electrical and electronics engineering

32:32

department one hour bush

32:35

or dean or something

32:40

nsf sukop expanded over years to include

32:42

many areas

32:44

including social and behavioral sciences

32:46

engineering science mathematics

32:48

education etc

32:50

nsf is the only

32:53

united states federal government agency

32:55

with the mandate to support all

32:57

non-medical fields of research

33:01

accept medical

33:04

why

33:07

all non-medical

33:14

because that happens

33:18

in turkey as well

33:19

and medical people and doctors when

33:22

medical doctors and engineers come

33:24

together

33:25

medical doctors

33:27

talk differently

33:28

and since their number is too many

33:31

for example

33:33

in a

33:35

university with medical faculty

33:38

when you have 500

33:40

doctors in the medical faculty

33:43

to all the rest of the departments may

33:45

have

33:46

300 professors but the medical faculty

33:49

has 500 professors

33:52

therefore

33:54

for the research decisions

33:57

progress

33:59

and projects

34:01

all dominated by

34:03

medical faculty in those universities

34:06

for example in our university there is

34:08

no medical faculty and engineering is

34:11

improving but if there is a medical

34:13

faculty all the money

34:16

and resources are spent on medical

34:24

facilities

34:25

i don't say research

34:28

therefore the progress

34:30

is affected therefore in united states

34:32

this is different and for the medical

34:35

research

34:36

they have national institute of health

34:39

NIH

34:41

so the organization is different

34:44

they separate to

34:46

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organization this is the Vannevar Bush

34:50

guy

34:54

on the founder of the national science

34:56

foundation

34:58

also

34:59

the director of the

35:03

manhattan project then later mit dean

35:07

has a book

35:09

on it and this frontier if you have

35:13

if you have

35:14

time to get this book and read it it

35:17

said it's a very important person

35:24

there is video of him on youtube short

35:26

video of him on youtube talking about

35:30

whether the atomic bump was

35:32

good or bad for the world

35:39

he says it was good because if they

35:40

didn't do it more people would have died

35:43

in second world war so

35:45

he said by killing 30 000 people at once

35:48

he prevented

35:50

many more hundred thousands

35:52

from dying

35:55

because he said

35:57

it ended the war

35:59

nuclear technology

36:04

in our case

36:07

[Music]

36:14

Tübitak is formed in 1963

36:17

not bad

36:20

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

it is bad but not bad

36:25

it has

36:26

different

36:28

sub

36:29

sections today

36:51

i repeat it yeah it's a repeat

36:59

to make it

37:00

to make it longer

37:03

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

in europe

37:27

there is a CERN

37:30

as a

37:32

as a

37:33

counter

37:35

as a counter

37:36

[Music]

37:38

i wouldn't say counter measure but

37:40

counteraction to united states united

37:42

states nuclear technology is a

37:44

counteraction CERN is formed

37:47

european research organization on

37:50

physics particles laboratory it's a

37:52

scientific research laboratory but it

37:54

will support

37:56

technology later

38:01

in eastern genoa

38:03

between france france and swiss border

38:06

and

38:08

has 23 member states including turkey

38:11

but turkey

38:13

to

38:14

prevent

38:18

giving money

38:19

changed its membership status to

38:21

observer rather than participator in

38:24

recent years

38:27

we hope that it will come back

38:30

because

38:34

as they do as they do

38:38

collaboration with the

38:42

nuclear experiments other

38:45

other collaboration and other pipe other

38:48

types of research is also done

38:50

together

38:51

and that will improve uh

38:54

technological advancements such as

38:56

worldwide web worldwide web html

39:01

language

39:02

was actually first used in cern

39:08

technology origins

39:10

origin of html goes back to cern

39:16

nsf

39:18

money

39:20

in 2020

39:22

500

39:23

million dollars

39:26

is distributed

39:28

in uh in tubitak

39:31

i'm sorry

39:33

500 million dollars so half a billion

39:35

right

39:36

0.5 billion

39:39

in

39:40

in united states

39:42

9 billion

39:46

9 billion

39:48

u.s dollars

39:53

churn 1.1 billion francs

39:56

swiss francs

39:59

crownhofers in germany

40:02

similar to tibitaco

40:04

turkey

40:06

3 billion u.s dollars

40:09

and it's a german research organization

40:12

with 72 institutes spread through

40:14

germany each focusing on different

40:16

fields of applied science for applied

40:18

science not theoretical science

40:20

so applied science

40:24

established in

40:26

1949 after the war

40:32

again in

40:33

for the theoretical research a max

40:35

planck society is there

40:45

again

40:49

it's an

40:50

independent non-government and

40:51

non-profit association of german

40:53

research institute

40:54

the society of

40:57

it's a collaboration between

40:59

different research

41:02

institutes

41:03

and all of them is called as max planck

41:05

society

41:10

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

in

41:11

france

41:15

3.5 billion usd each year

41:19

uh they established

41:22

their organization in 1939 well before

41:25

germany and

41:28

CERN

41:34

institute of chemistry ecology physics

41:36

nuclear et cetera et cetera et cetera

41:38

computer sciences

41:40

uh

41:42

national science national science

41:44

research center

41:46

of france

41:49

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

in uk

41:53

it is different

41:55

uk doesn't support research by

41:57

government

42:03

they have

42:04

it says the

42:08

uk government funds research and

42:10

universities through

42:11

“dual support” mechanism dual support

42:14

mechanism

42:17

annual grant from the funding courses to

42:19

support the research infrastructure and

42:21

specific project grants from the

42:22

research crossing to fund particular

42:24

piece of research

42:26

so there is an ongoing regular money and

42:29

there is an extra money

42:30

it is like university getting to tubitak

42:33

projects

42:34

our salaries are paid by

42:36

government but if we get additional

42:38

projects we get additional

42:40

money for the resources

42:44

but there is no single

42:47

foundation in united kingdom

42:50

to support research

42:52

it is different

42:55

it has a council science and science

42:58

research council science and engineering

42:59

research council

43:01

engineering physical science research

43:03

council names name has changed

43:06

but the

43:07

in terms of budget it doesn't distribute

43:10

money

43:11

as other countries does

43:13

it is just an organization

43:22

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

further developments

43:24

happened in third industrial revolution

43:27

during that time between 1950

43:30

between 50 and 2000

43:34

in united states germany japan united

43:37

kingdom france and china plus russia

43:41

after the soviet revolution

43:43

russia also

43:45

made scientific and technological

43:49

research and supported research

43:54

that's basically it

43:56

uh for today

44:00

next week

44:02

we will be discussing the things

44:05

that are related to fourth industrial

44:07

revolution today

44:09

and we will focus on today's

44:11

developments

44:12

later in the

44:14

uh

44:15

in coming weeks so we have four more

44:17

weeks

44:19

basically we will discuss about

44:22

fourth industrial revolution today's big

44:24

data change digital digital revolution

44:27

and then we might have additional

44:31

resources to read for the

44:35

remaining time

44:39

okay

44:41

that's good for today i think

44:59

any questions

45:06

you

English (auto-generated)

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