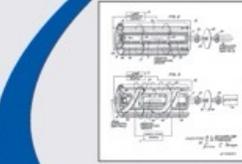


Grand Challenge
Impact of AI on Occupations

daniele quercia

Inventing the Future X Network

Creation of Bell Labs
The engineering departments of the American Telephone and Telegraph Company (AT&T) and Western Electric were consolidated into Bell Telephone Laboratories. Their mission was to research and design communication technologies for the rapidly expanding telephone network and to explore fundamental areas of science that could shape the future of the industry. Over the years, many cornerstone technologies of modern society have been invented at Bell Labs and 8 Nobel Prizes have been awarded to its researchers



1954 Solar cells

1950's

1956 **Transistor**
To replace the vacuum tube, Bardeen, Brattain and Shockley created a working point-contact transistor. This basic building block for all digital products is the foundation for our information society

1958 **LASER**
In their 1958 paper, Schawlow and his brother-in-law Townes described in detail a proof of concept for the LASER. The laser enables a wide variety of applications: fiber-optic communications, digital storage, barcode scanners, precision surgery and industrial cutting tools

1925

1930's

1937 **Electron Diffraction**
Demonstrating wave nature of matter

1940's

1948 **"A Mathematical Theory of Communications"**
By showing that all communications channels - of any type - have a fundamental capacity limit, Claude E. Shannon founded the field of information theory



1960's

1962 **Telstar**
Transatlantic live TV broadcast via satellite

1970's

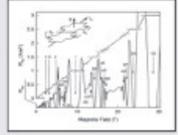
1973 **UNIX and C Language**
Thompson and Ritchie's elegant design made it an immediate fit with the programming community when it was released in 1974. UNIX would later on become the Internet's foundation

1976 **Fiber Optic Network**
First demonstration of 45 Mbit/s transmission

1995 **Integrated ADSL Chip**
After co-inventing ADSL technology, follow-up innovations like vectoring continued to generate world records for high speed data transfer over copper telephone lines, fueling the Internet



1998 **Wireless MIMO Spatial Multiplexing**
Invention of wireless transmission based on multiple spatial paths



1998 **Fractional Quantum Hall Effect**
Discovery of a novel collective quantum fluid state of matter



1997 **Laser-Based Cooling and Trapping of Atoms**
To understand the fundamental limits of materials and matter

1995 **Commercial DWDM**
Pioneering work on wavelength multiplexing in optical fibers



1980 **Demonstration of DSP**
Large-scale integrated circuit for digital signal processing



1978 **Commercial Cellular Network**
Invention of the cellular concept and creation of the first commercial network



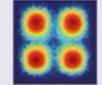
1978 **Cosmic Microwave Background Radiation**
Pioneering work on radio communications using the Holmdel Horn Antenna provides support for the Big Bang Theory



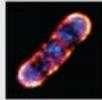
2009 **CCD**
Boyle and Smith's picture phone research realized the enormous potential of the Charge Coupled Device as an imaging device, leading to the invention of the digital photo, video cameras, scanners, satellite surveillance and ultra-sensitive astronomical telescopes



2009 **Coherent 100G Optics**
Invention of the future of high speed optical communications with coherent processing



2009 **World's first standard compliant LTE call**



2014 **Fluorescence Microscopy**
Ground-breaking work on sub-wavelength optical microscopy leads to super-resolution microscopy at cellular level

2015 **GreenTouch**
International consortium delivers new technologies to improve energy efficiency in wireless networks by more than 10,000X



2015 **Optical MIMO-SDM**
Pioneering work on utilizing the spatial dimension in fiber, showing greater than 10X increase in optical network capacity

2011 **lightRadio Cube**
First demonstration of building block of future small cell wireless networks



2014 **XG-FAST**
First demonstration of 10 Gbps over copper telephone wires



2015 **The Future X Network: A Nokia Bell Labs Perspective**
First Nokia Bell Labs book written



2016 **5G Massive Connectivity**
First demonstration of 1M simultaneous, ultra-low latency connections in a single cell for 5G and IoT

The Future
Nokia Bell Labs continues to solve the great industry challenges, producing disruptive innovations for the next phase of human existence





Grand Challenge
Impact of AI on Occupations

class material

researchswinger.org/teaching_grand_challenge.html

teaching



Lecture series on **Crafting Tech** at the Department of Computer Engineering at PoliTO.

timetable!

Timetable

Material
[\[live tentative timetable\]](#)

<projects>

Material

teaching



Lecture series on **Crafting Tech** at the Department of Computer Engineering at PoliTO.

timetable!

Timetable

Material
[\[live tentative timetable\]](#)

<projects>

Material

TIMETABLE

Date	Day of week	Dan's topic	Steven's topic
24 February 2026	Tuesday		
27 February 2026	Friday		
3 March 2026	Tuesday	Intro to Course (+Group Formation)	
6 March 2026	Friday	Measuring AI Impact on Jobs (Intro to tool)	
14 March 2026	Tuesday	Presenting to Win	
13 March 2026	Friday		Value Sensitive Design
17 March 2026	Tuesday		Value Sensitive Design Toolkit

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This course will be mostly **applied**
To succeed, you just need to do a good **project**

2 main deliverables (+2 small ones)

form a team & pick 1 project type among 3

AI EXPOSURE AND THE IMPACT ON WORK

Project brief and deliverables

BOLD. CLEAR. USEFUL.

WHAT THIS PROJECT IS

You will build a general framework for judging how AI changes work, then turn it into a general checklist through co-design.

KEY RULE

- Write a framework that travels across professions.
- Use profession-specific content only as examples or a worked use case.
- Choose one project type (Type 1, Type 2, or Type 3) and stay aligned.

form a team & pick 1 project type among 3

CHOOSE ONE PROJECT TYPE

TYPE 1

Task delegation decision

Research question:
What factors shape whether an AI-exposable task should be delegated to AI?

End product: a task decision checklist.

TYPE 2

Organizational adoption

Research question:
What shapes benefits, risks, mitigations, and readiness for a specific AI use?

End product: an adoption checklist.

TYPE 3

Worker trust in AI

Research question:
What determines whether a worker trusts AI to do a task (and trust calibration)?

End product: a trust checklist.

WORKED USE CASE (PROFESSION)

PROFESSION SELECTION

- Choose one profession from the provided tool/list.
- Use it only for examples and the worked use case.
- Tip: pick a profession where you can reach participants for co-design.

USE CASE VIGNETTE

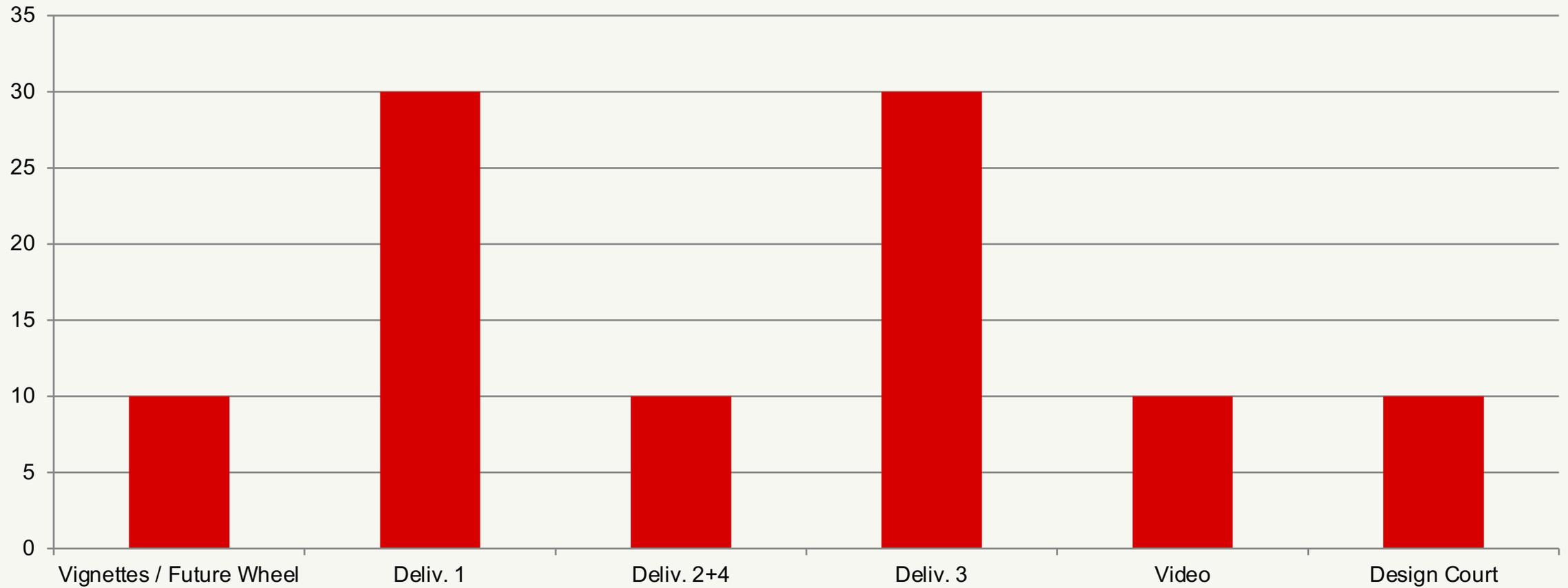
- Include a short vignette that applies your general framework.
- Show how the framework guides a real decision.
- Do not turn the full report into a profession report.

Rule of thumb: keep the core general; keep the example specific.

2 main deliverables (+2 small ones)

2 main deliverables (+2 small ones)

Official grading structure



Pass rule: score at least 18 out of 30 on each component.

DELIVERABLES AT A GLANCE

TEAM DELIVERABLES

Deliverable 1: Scoping Review

(4 pages + appendix)

Deliverable 3: Co-design checklist+report

(4 pages + appendix)

INDIVIDUAL DELIVERABLES

Deliverable 2: Peer review of a scoping review (1 page; even ½ page)

Deliverable 4: Peer review of a co-design report (1 page ; even ½ page)

Formatting: pages exclude references and appendix; keep writing clear and direct.

DELIVERABLE 1 (SCOPING REVIEW)

WHAT TO INCLUDE

- One project type only.
- 15 to 25 sources; at least 8 empirical.

DELIVERABLE 3 (CO-DESIGN CHECKLIST)

CO-DESIGN REQUIREMENTS

- 3-6 participants from at least 2 stakeholder groups.
- One workshop (45 to 60 minutes) or three interviews.
- Show iteration: checklist v1, feedback, checklist v2.

Example structure

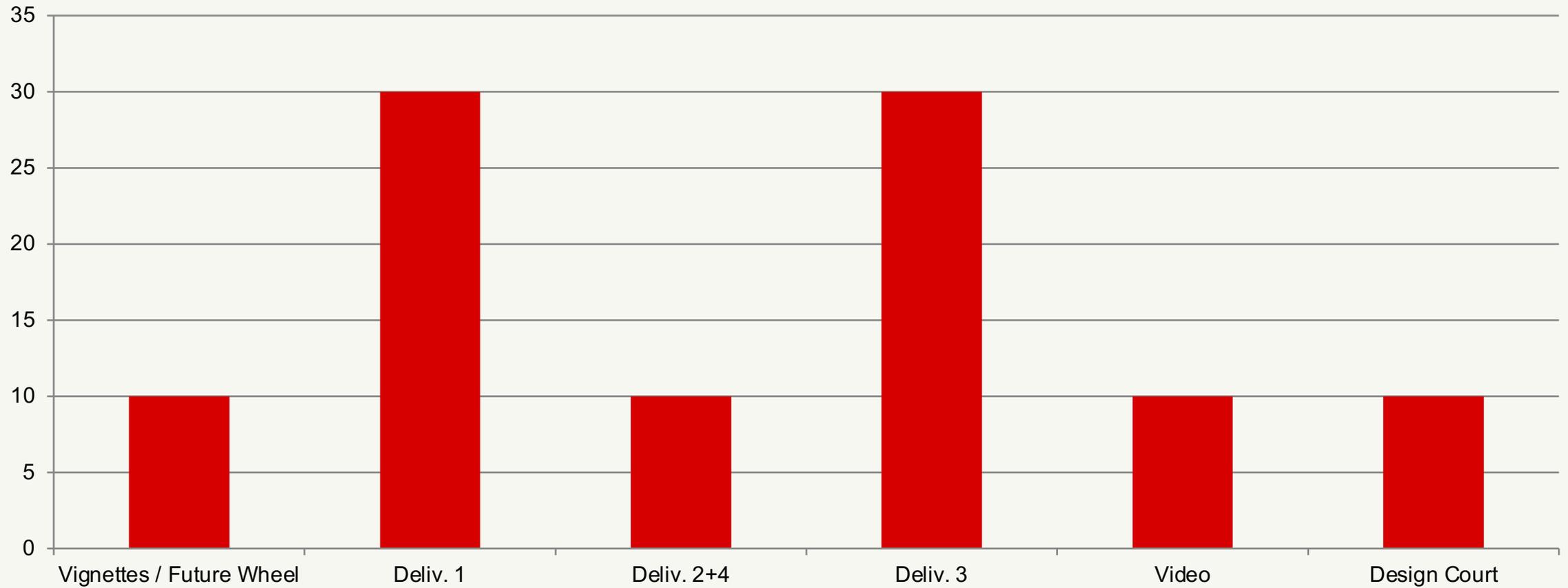
- Page 1: participants and method.
- Pages 2 to 3: final checklist (v2) with rationale.
- Page 4: worked use case and implementation plan.
- Appendix: guide, v1 and v2, anonymized notes.

PEER REVIEWS (DELIVERABLES 2 AND 4)

WHAT TO WRITE

- Top strengths (up to three).
- Top weaknesses (up to three).
- At least five actionable improvements.
- Check: generality, alignment, and use case quality.

Official grading structure



Pass rule: score at least 18 out of 30 on each component.

group formation

goal: form 8ish-member team

How?

1. Human Bingo
2. Speed-pitch round

human bingo (or corners activity)

You move to the corner (**type 1,2,3**) you prefer. Then, inside each corner, you cluster around **professions** you prefer.

speed-pitch round(or corners activity)

each “volunteer” will say what topic (s)he is drawn on, why, and what (s)he offers. others will raise their hands, if they want to join his/her team.

good news for volunteer: (s)he gets to choose who to work with

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CHOOSE ONE PROJECT TYPE & GO TO CORNER 1/2/3

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good news for volunteer: (s)he gets to choose who to work with

If no volunteer...

random rank of the day!

Random Rank

MATRICOLA

COGNOME

NOME

- 1
- 2
- 3
- 4
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