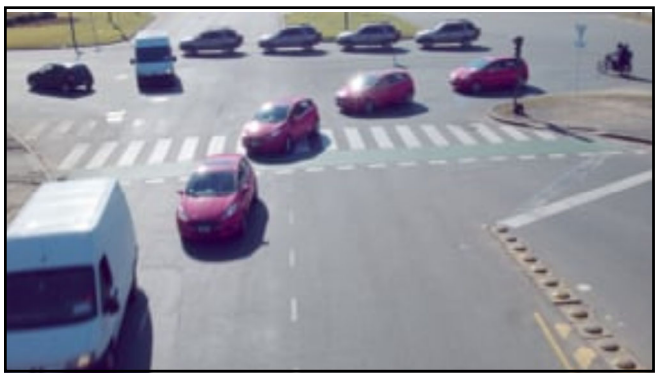

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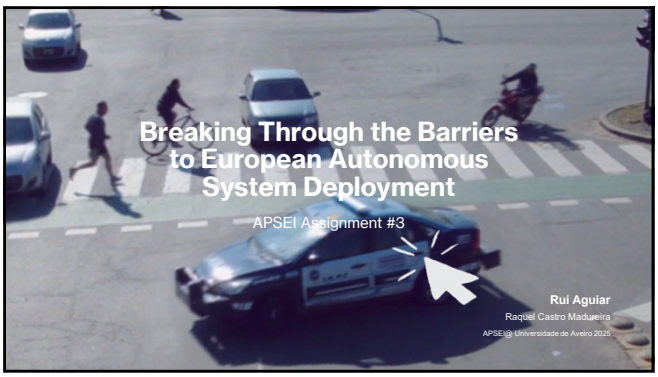
Breaking Through the Barriers to European Autonomous System Deployment
APSEI Assignment #3
Rui Aguiar
Raquel Castro Madureira
APSEI @ Universidade de Aveiro 2025

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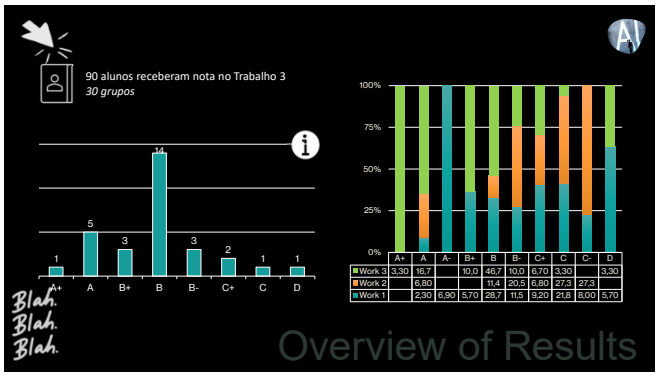
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Overview of Results

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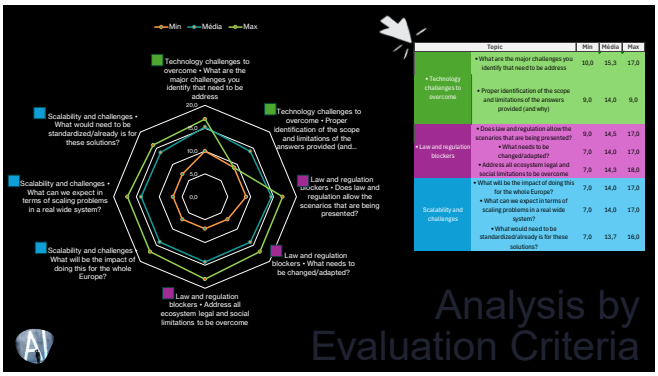
Min
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Technology challenges to overcome • What are the major challenges you identify that need to be address
Technology challenges to overcome • Proper identification of the scope and limitations of the answers provided (and...
Law and regulation blockers • Does law and regulation allow the scenarios that are being presented?
Law and regulation blockers • What needs to be changed/adapted?
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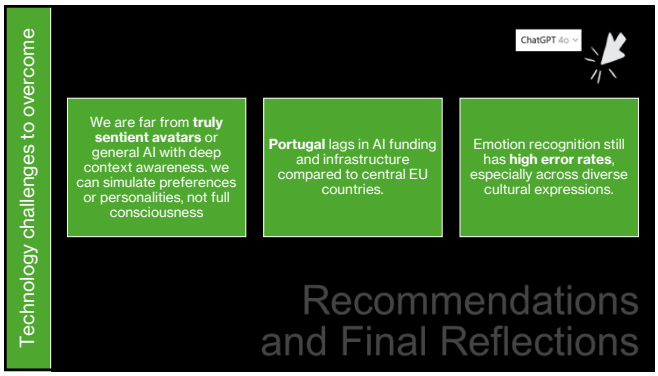
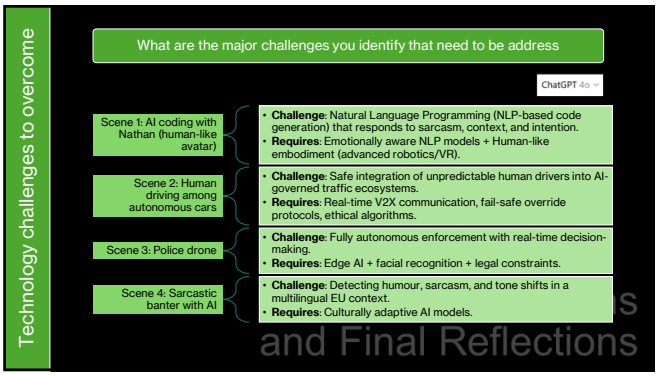
Scalability and challenges • What will be the impact of doing this for the whole Europe?
Scalability and challenges • What can we expect in terms of scaling problems in a real wide system?
Scalability and challenges • What would need to be standardized/already is for these solutions?
Analysis by Evaluation Criteria

4


Technology challenges to overcome
We are far from truly sentient avatars or general AI with deep context awareness. we can simulate preferences or personalities, not full consciousness
Portugal lags in AI funding and infrastructure compared to central EU countries.
Emotion recognition still has high error rates, especially across diverse cultural expressions.
Recommendations and Final Reflections

5


Technology challenges to overcome
What are the major challenges you identify that need to be address
Scene 1: AI coding with Nathan (human-like avatar)
Challenge: Natural Language Programming (NLP-based code generation) that responds to sarcasm, context, and intention.
Requires: Emotionally aware NLP models + Human-like embodiment (advanced robotics/VR).
Scene 2: Human driving among autonomous cars
Challenge: Safe integration of unpredictable human drivers into AI-governed traffic ecosystems.
Requires: Real-time V2X communication, fail-safe override protocols, ethical algorithms.
Scene 3: Police drone
Challenge: Fully autonomous enforcement with real-time decision-making.
Requires: Edge AI + facial recognition + legal constraints.
Scene 4: Sarcastic banter with AI
Challenge: Detecting humour, sarcasm, and tone shifts in a multilingual EU context.
Requires: Culturally adaptive AI models.
and Final Reflections

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Technology challenges to overcome

Proper identification of the scope and limitations of the answers provided (and why)

Scene 1: AI coding with Nathan (human-like avatar)

Scope:
Illustrates **human-AI collaboration in software development**, with a **realistic human avatar** acting as the interface.
- Suggests a future where coding is **conversational** and emotionally intelligent.
- Some current tools exist (e.g., GitHub Copilot, ChatGPT), though without visual avatars.

Limitations
- The AI does **not understand meaning or intention** – it predicts text/code based on probabilities.
- Emotionally responsive avatars are **aesthetic simulations**, not conscious beings.
- Overreliance can lead to **code errors, biased suggestions, or false sense of companionship**.

Why?
- AI lacks **true understanding or self-awareness**.
- Sarcasm, empathy, and logic flow are complex cognitive constructs – current systems simulate, they do not comprehend.
- Human trust in AI avatars may outpace **actual system reliability or accountability**.

Recommendations and Final Reflections

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Technology challenges to overcome

Proper identification of the scope and limitations of the answers provided (and why)

Scene 2: Nathan driving among autonomous cars

Scope
- Portrays **mixed traffic environments** with both **human-driven and autonomous vehicles**.
- This is a plausible near-future scenario – some pilot programs exist in Germany, Sweden, and the Netherlands.

Limitations
- Human drivers introduce **unpredictability** that autonomous systems struggle to interpret.
- No **shared protocol** exists in the EU for real-time coordination between humans and AI in traffic.
- Portugal has minimal infrastructure for mixed-autonomy testing.

Why?
- Autonomous vehicles rely on **predictable behaviour and V2X communication** – human input disrupts this.
- Ethical dilemmas (e.g., in an accident, who is liable?) remain unresolved.
- Standardization across Europe is still evolving, with wide regional discrepancies.

Recommendations and Final Reflections

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Technology challenges to overcome

Proper identification of the scope and limitations of the answers provided (and why)

Scene 3: Police drone enforcing the law

Scope
- Depicts a **fully autonomous aerial law enforcement unit** capable of identifying and intervening in crimes.
- Theoretically feasible with current drone and facial recognition technologies.

Limitations
- Raises serious **privacy, surveillance, and use-of-force concerns**.
- Not allowed under **GDPR and European Convention on Human Rights** (e.g., Article 8: privacy).
- Public resistance in Portugal and across Europe would likely be high.

Why?
- EU law requires **human accountability in public decision-making**, especially in law enforcement.
- AI-based criminal identification is **error-prone** and **non-transparent**.
- Such systems would clash with core democratic values – **they're technically possible, but legally unacceptable**.

Recommendations and Final Reflections

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Technology challenges to overcome

Proper identification of the scope and limitations of the answers provided (and why)

Scene 4: Sarcastic dialogue between humans and AI

Scope
- Suggests an AI capable of **sarcasm, humour, and socially appropriate tone**.
- NLP models today can simulate sarcasm in text, but **true understanding is limited**.
- Implies a future where **AI can handle social complexity in communication**.

Limitations
- AI may **misinterpret tone, intent, or cultural nuance**, especially in multilingual environments like the EU.
- Sarcastic responses from AI can be **inappropriate, offensive, or misleading** in sensitive contexts.
- Lacks **emotional intelligence and situational awareness**.

Why?
- Sarcasm depends on **context, shared experience, and emotional cognition** – which AI does not possess.
- A sarcastic AI could cause **interpersonal tension or misunderstanding**, especially in education, law, or healthcare.
- No regulation currently governs **AI tone or emotional simulation**, which increases social risk.

Recommendations and Final Reflections

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Law and regulation blockers

Does law and regulation allow the scenarios that are being presented? ChatGPT 4o

No. Current EU and Portuguese laws do not legally recognize digital entities as persons.

GDPR strictly limits the use of biometric and personal data, especially posthumously.

There's no legal framework for "conscious" AI agents or uploaded humans.

New legal categories: e.g., **"digital identity extensions"** or **"post-mortem data entities"**.

Update the **Civil Code** to define digital inheritance and consent.

Establish rules for **AI accountability** – who is liable if an uploaded personality causes harm?

Why it matters: Overestimating current capabilities leads to misguided policy and public expectations – especially in countries like Portugal, where public digital literacy may lag behind

Recommendations and Final Reflections

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Law and regulation blockers

Does law and regulation allow the scenarios that are being presented? ChatGPT 4o

Scene 2 & 3 are the most legally problematic:

Human override in autonomous traffic can **breach traffic automation standards**.

Police drones performing enforcement actions challenge **surveillance laws and civil liberties**.

Scene 1 & 4 (AI collaboration) could be partially allowed under **AI sandbox regimes**.

Recommendations and Final Reflections

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Law and regulation blockers

What needs to be changed/adapted?

Scope: The technology discussed is largely speculative or prototypical. Today, we can simulate preferences or personalities, not full consciousness.

Limitations: Ethical boundaries, data integrity, and algorithmic bias limit how far current AI can authentically recreate a human mind.

Why it matters: Overestimating current capabilities leads to misguided policy and public expectations – especially in countries like Portugal, where public digital literacy may lag behind

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Law and regulation blockers

Address all ecosystem legal and social limitations to be overcome

Required legal and regulatory adaptations:

Amend EU traffic laws to **formally define mixed autonomy zones**.

Legal framework for **AI "companions" or work collaborators**.

Define limits on **AI sarcasm/imitation of human tone** – important in areas like counselling or law.

Legal/social limitations to overcome:

Ethical discomfort with AI that mimics personality too closely.

Low public trust in automated policing.

Risk of **job displacement** and increased digital dependency.

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Scalability and challenges

European-wide impact:

Portugal would need to heavily invest in 5G, AI training, and ethical oversight.

Could revolutionize: **Remote collaboration** (human-AI teams).

Traffic safety (if mixed systems managed well).

Law enforcement efficiency (but with severe privacy concerns)

Expected scaling problems:

Linguistic diversity makes sarcasm/humour recognition a nightmare.

Autonomous road systems must harmonise **vehicle brands, standards, and road policies**.

AI-human relations need local tuning – what is humorous in Lisbon may offend in Warsaw.

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Scalability and challenges

What will be the impact of doing this for the whole Europe?

Remote collaboration (human-AI teams)

Traffic safety (if mixed systems managed well)

Law enforcement efficiency (but with severe privacy concerns)

Portugal would need to heavily invest in 5G, AI training, and ethical oversight.

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Scalability and challenges

What can we expect in terms of scaling problems in a real wide system?

Autonomous road systems must harmonise **vehicle brands, standards, and road policies**.

Infrastructure bottlenecks: Energy demand, cooling, and cybersecurity threats.

Lack of harmonised digital laws across member states.

Language, cultural, and legal diversity in Europe makes uniform implementation complex.

Linguistic diversity makes sarcasm/humour recognition a nightmare.

AI-human relations need local tuning – what is humorous in Lisbon may offend in Warsaw.

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Scalability and challenges

What would need to be standardized/already is for these solutions?

AI Act (being finalized) will standardize risk classes, human oversight, and documentation.

eCall systems and smart traffic protocols (C-ITS) partially in place.

No standards yet for AI tone, humour, or legal use of avatars in professional roles.

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ETHICS

Scene 1: AI avatar assisting Nathan with coding

Deception & Anthropomorphism: Presenting AI in a **hyper-human form** may blur the line between real and artificial entities.

Dependence & trust: Users may **overtrust** the avatar due to its realistic appearance and tone.

Workplace ethics: If AI replaces collaborative human tasks, it **risks undermining interpersonal learning and job value**.

EU Ethical Framework Reference: Violates the **"Transparency" principle** in the EU AI Ethics Guidelines: users must understand they are interacting with a machine.

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ETHICS

Scene 2: Nathan chooses to drive manually on a highway of autonomous vehicles

Freedom vs. Safety: Should a person have the *freedom to drive* if that act puts others at risk in a fully automated environment?

Algorithmic bias: How does the system assess the risk of a human in traffic? Would it **discriminate against human choices**?

Digital inequality: Wealthier users may have **more control** over override privileges than others.

EU Ethical Framework Reference: Challenges the **"Human Agency and Oversight"** principle – balancing autonomy with protection.

Raises questions on **"Justice and Fairness"** if rules differ by status or ability to pay.

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ETHICS

Scene 3: Autonomous police drone

Surveillance & consent: Drones observing civilians without knowledge breaches ethical norms of **autonomy and consent**.

Lethal potential: If drones use force or issue fines, **where is the moral responsibility**?

Social control: Risk of **normalising a surveillance state**, especially troubling in post-authoritarian societies like Portugal.

EU Ethical Framework Reference: Strongly violates the **"Accountability"**, **"Privacy"**, and **"Non-maleficence"** principles – AI should do no harm.

Breaches the **"Fundamental Rights"** enshrined in the Charter of Fundamental Rights of the EU.

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ETHICS

Scene 4: Sarcastic AI dialogue with humans

Emotional manipulation: If an AI responds with sarcasm, can it manipulate mood or escalate conflict?

Cultural insensitivity: Sarcasm doesn't translate easily – what's humorous in one culture may be **offensive in another**.

Erosion of trust: If people are unsure whether AI is serious or joking, **communication breaks down**.

EU Ethical Framework Reference: Violates the **"Respect for Human Autonomy"** and **"Explicability"** principles – the AI's intention and logic should be clear. Undermines **"Dignity"**, especially in contexts involving mental health, teaching, or customer care.

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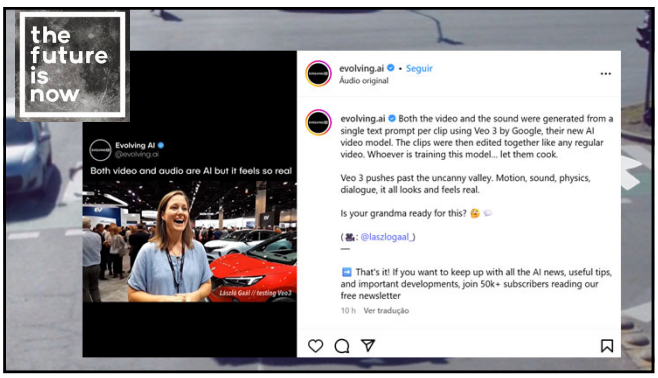

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