

HORIZON SCANNING

Emerging issues for EU policymaking

Issue 9

This is the ninth report from the ESPAS horizon scanning process which looks at “signals of change” - emerging trends and issues – that appear to be marginal today but could become important for the EU in the future. From the 14 signals of change presented below, three emerging issues were perceived as potentially most impactful by policymakers:



TIME POLICIES FOR SUSTAINABILITY AND DEMOCRACY

Photo by Hungarian on AdobeStock



DESIGN FOR UPGRADABILITY

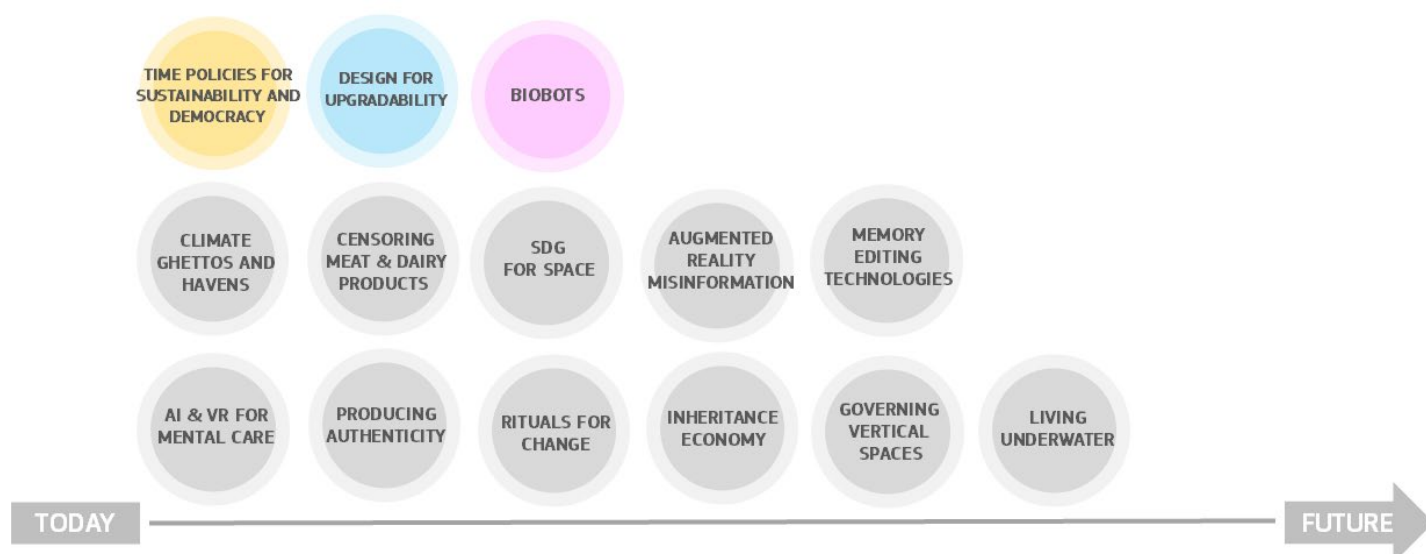
Photo by miss irine on AdobeStock



BIOBOTS

Photo by Evhen Pylypchuk on AdobeStock

The European Strategy and Policy Analysis System (ESPAS) launched the horizon scanning process, led by the Joint Research Centre and the European Parliamentary Research Service, in 2022. The signals of change were identified and developed via a series of sense-making workshops with participants from across the EU institutions and bodies looking at recent developments in multiple domains. The identification of the three most impactful signals was performed through a survey among the horizon scanning community and a targeted set of EU policymakers followed by a workshop to explore and assess the issues in more depth. A summary of this evaluation is presented on the following pages. The selected signals should be viewed as original lenses offering different perspectives on the challenges and opportunities the EU is facing now and could be facing in the coming years. Beyond these three, other signals of change identified in the latest horizon scanning sessions are presented briefly below.



To learn more about the Horizon Scanning project or be part of it, please visit: espas.eu/horizon.html

Time policies for sustainability and democracy

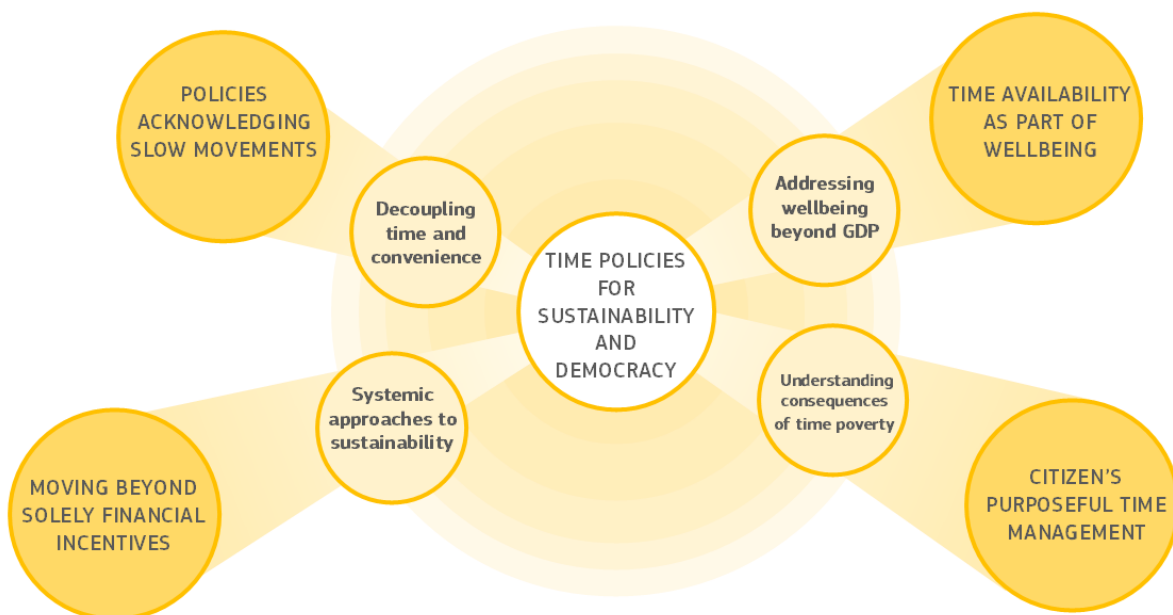
As governments start looking more holistically at wellbeing, beyond just economic considerations, interest in time policies has grown¹. The 2021 Barcelona Declaration on Time Policies conceptualises the availability of one's own time as a right of all citizens and calls to *"develop and implement time policies that advance towards a healthier, more equal, more productive, and sustainable society"*². As policies aim at changing the behaviour of citizens, they need to consider time as an element of wellbeing and as a scarce resource and to address time poverty as an important constraining issue³.

Better understanding how policies affect the availability of time and acting on this information at all levels of policymaking to reduce time poverty can bring large benefits⁴. Policies that aim at more flexibility and availability of time can improve outcomes in terms of health (reducing psycho-social risk factors, sport and active leisure, management of stress), sustainability (pro-environmental lifestyle and mobility choices), productivity, equity, care and education⁵. Inequalities in time availability and diversity in experience of time can also affect participatory and deliberative democracy practices⁶.

How can it change our perspective?

The main current focus of policies is to fulfil the assumed material needs of citizens for their wellbeing. Developing and applying new analytical tools and instruments for policies on time availability and management to improve wellbeing could create significant positive outcomes.

Futures Wheel: An indication of potential consequences



What if the EU...?

...were to include the right to time as a fundamental right?

¹ Laura M. Giurge & Ashley V. Whillans & Colin West, 2020. "Why time poverty matters for individuals, organisations and nations," Nature Human Behaviour, Nature, vol. 4(10), pages 993-1003, October.

² [Barcelona Declaration on Time Policies — TUI](#)

³ Rodgers YVDM. TIME POVERTY: CONCEPTUALIZATION, GENDER DIFFERENCES, AND POLICY SOLUTIONS. Social Philosophy and Policy. 2023;40(1):79-102. doi:10.1017/S0265052523000389

⁴ Time policies toolkit: <https://timeuse.barcelona/wp-content/uploads/2025/08/Time-Policies-Toolkit.pdf>

⁵ [Good Practices — TUI](#)

⁶ [Democracy Takes Time: Intersectional Temporalities in Participation and Deliberation](#)

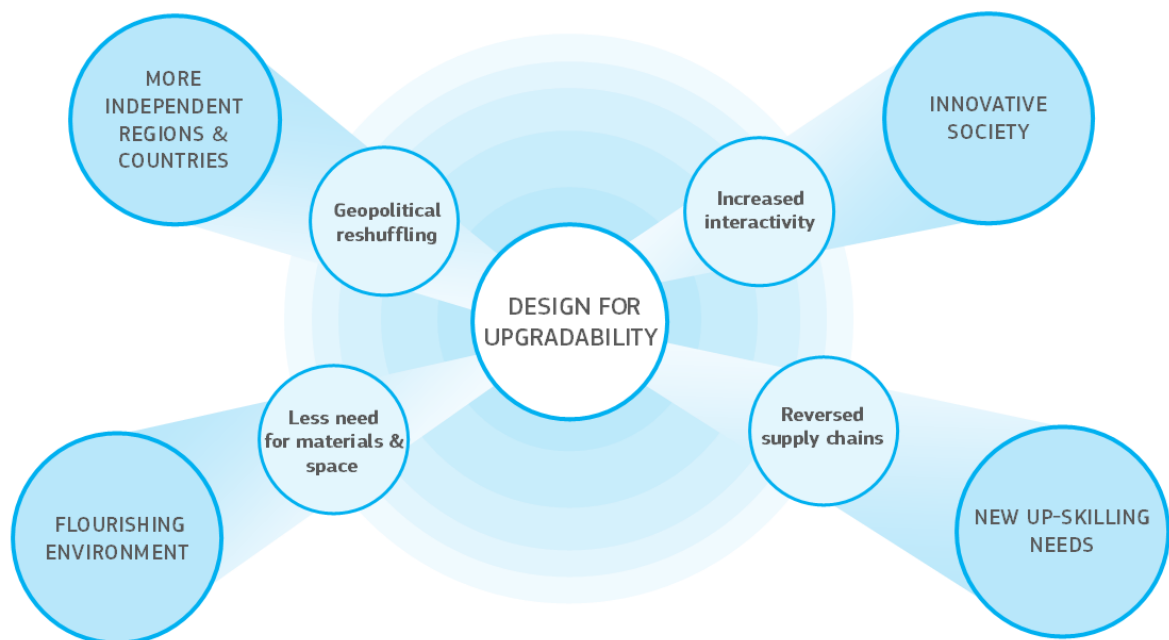
Design for upgradability

Retrofitting and repurposing are increasingly popular in creating circular approaches and adapting to new circumstances. In cities, there is an increasing trend towards converting commercial and office spaces into residential spaces as a practical solution to the housing crisis^{7,8}. As work and retail shift online, this maximizes the re-use of existing infrastructure, reduces urban sprawl, and revitalizes communities. This creates a confrontation with the fact that when these buildings were designed, there was no consideration that they will need to be adapted. This is usually the case with new products or services. Designing for upgradability embeds future modification capabilities from the very early stages of its conceptual development – through modularity and changeability⁹. Current approaches of repairability and durability could in the future be replaced by adaptability and upgradability.

How can it change our perspective?

New standards are needed for upgradability, which might call for more a holistic approach to design as new products or services might end up being completely re-purposed. Upgradability calls for massive behavioural change towards minimalism and modular lifestyles.

Futures Wheel: An indication of potential consequences



What if the EU...?

...becomes the champion in radical upgradability, highlighting social fairness in all the new processes, services and products it generates?

⁷ <https://www.forbes.com/sites/chriswestfall/2024/12/09/from-retail-to-rentals-how-empty-malls-became-housing-solutions/>

⁸ <https://www.jll.com/en-in/insights/why-investors-are-banking-on-conversions>

⁹ Royo, M., E. Mulet, V. Chulvi, and L. Ruiz-Pastor. "A Metric for Assessing the Upgradability and Adaptability of Circular Concepts." Resources, Conservation and Recycling 205 (2024). <https://doi.org/10.1016/j.resconrec.2024.107512>

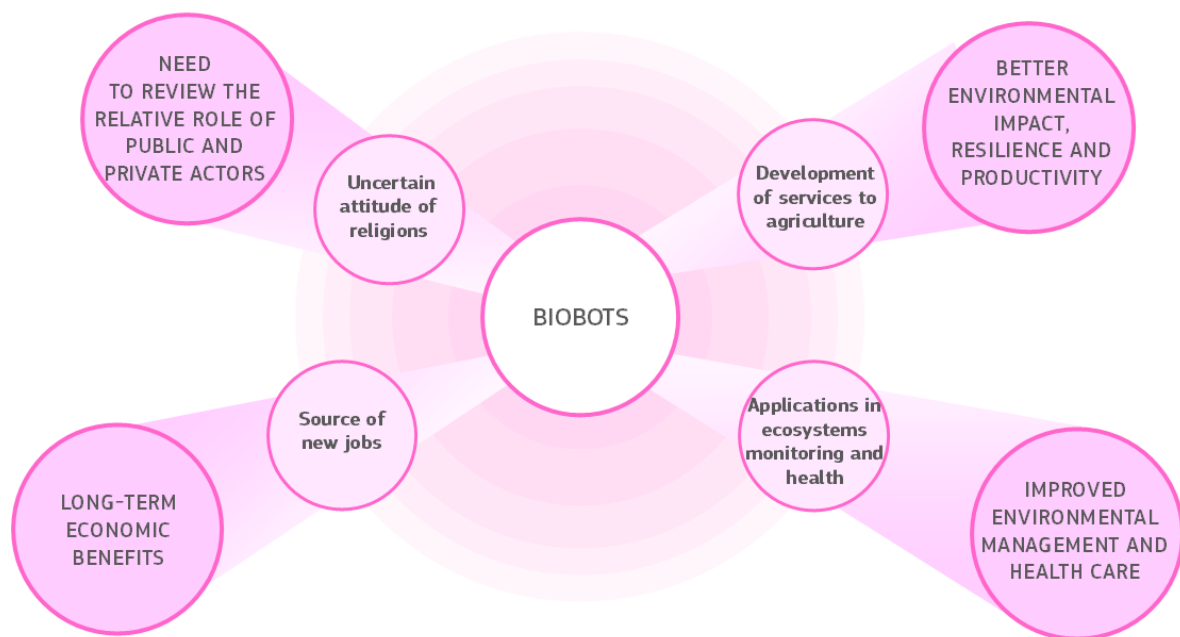
Biobots

Biobots are engineered devices/beings that combine living matter and biocompatible artificial materials. This gives them unique abilities, blurring the line between traditional robotics and biology¹⁰. This young technology is now mostly being developed for healthcare applications¹¹ (e.g. healing, drug delivery) but it is starting to be used in environmental monitoring and cleanup; future applications could emerge in domains such as research or defence¹². Biobots are already raising challenging questions of ethics. Typical types of biobots are “biohybrid robots” (constructed with e.g. muscle cells that deform fabricated structures to enable movement), “cyborg organisms” or “living biobots” (modified animals or plants integrating electronics to control or use their natural abilities for e.g. search and rescue, environmental monitoring, cell manipulation or drug delivery), or “organoid-based biobots” (e.g. multicellular assemblies of specialized human cells built to move autonomously and interact with their environment to heal or repair tissues).

How can it change our optics?

This promising technology, that can make use of AI, opens an immense field of potential applications at least in health, environmental monitoring and defence, powered by natural and ubiquitous nutrients as sources of energy. In a time of sharp geopolitical competition, being able to rely on nutrients to drive biobots removes any serious dependencies on foreign powers either for energy or critical raw materials.

Futures Wheel: An indication of potential consequences



What if the EU...?

...were to invest to master soon the full range of these technologies for strategic autonomy and competitiveness?

¹⁰ <https://www.meer.com/en/85188-biobots-life-beyond-death-and-new-possibilities>

¹¹ <https://www.asbmb.org/asbmb-today/science/102724/biobots-arise-from-the-cells-of-dead-organisms>

¹² Blackiston, Douglas, Sam Kriegman, Josh Bongard, and Michael Levin. “Biological Robots: Perspectives on an Emerging Interdisciplinary Field.” *Soft Robotics* 10, no. 4 (August 1, 2023): 674–86. <https://doi.org/10.1089/soro.2022.0142>.

Other signals of change

- **Censoring meat and dairy products**

Lately, the health risks associated with meat consumption have gained significant public attention. In addition, consuming meat is increasingly viewed as an ethical choice regarding animal welfare and the fight against climate change. This shift in societal attitudes is being reflected in children's literature, with authors adapting their stories to promote sustainable and compassionate lifestyles. For example, the creators of the popular Finnish children's book series "Tatu and Patu" have removed references to meat and dairy products from their new editionsⁱ. This move is notable, as it counters the marketing strategies employed by the food industry, such as product placement. Similar examples can be seen elsewhere, such as the removal of smoking from "Lucky Luke" comics in the 1980s, which was endorsed by the World Health Organization, and the recent removal of offensive language from Roald Dahl's booksⁱⁱ. These actions are reinforcing a trend towards reducing animal-based food consumption and mark a significant turn in the way we approach food and ethics. This has led to reactions from the meat industry in the EU that some compare to those of the tobacco industry in the past (e.g. discrediting research, funding biased research, delaying tactics, framing restrictions as censorship or reductions in freedom, etc.).

- **Governing vertical spaces**

Local governments in many Chinese cities have the power to sell air rights, which are essentially the right to build above a certain height on a specific plot of land. The government of Pingyin County, Jinan, Shandong Province for instance sold for 924 million yuan (approximately \$130 million) a 30-year concession to operate and maintain its low-altitude economic projects to a company called Shandong Jinyu General Aviation Co., Ltd., which could be a first for air rights actually being sold in a cityⁱⁱⁱ. As the sky above cities comes to be traded as a commercial commodity by local governments, such business will need to be subject to rules on how those vertical spaces are used by corporations^{iv}. This calls for the need to properly govern vertical spaces in the future.

- **Memory editing technologies**

Memory modification technologies (MMTs) have been developed to alter existing memories, including changing their emotional tone, implanting false memories, or even deleting them, using a range of methods such as psychological techniques, pharmaceuticals and devices^v. The ability to erase distressing memories and traumatic flashbacks holds significant potential for treating various mental health issues^{vi}. Recent advances in neuromodulation and optogenetic technologies, still in the animal testing phase, show promise but currently face challenges in targeting specific memories. A recent study has introduced a groundbreaking approach to weaken old aversive memories by reactivating newer positive memories during sleep. These technologies raise substantial ethical concerns^{vii}. For example, there are fears that memory modification could interfere with emotional development or alter personality traits. What if we can set our smartwatches in the evening not only to follow how well we sleep but also to reset our memories and change those that don't serve our objectives?

- **Augmented reality misinformation**

Augmented reality (AR) technologies open a seamless window into our surroundings. They can integrate features into glasses, cameras and other gadgets. AR allows to curate what we see. For instance, the "Pride Vision" camera developed prior to the 2024 Upper House elections in Japan could detect candidates who support marriage equality by simply scanning their posters on the streets^{viii}. Another example is Instagram influencer @benfluncer, who explores how AR glasses could give us control over the adverts we see^{ix}. Potentially, AR glasses could block street ads and replace them with images we like^x. The AR world is so saturated with information that there are services designed to help us see the real world within the AR world. As AR progressively becomes an integral part of our world, a new frontier in protecting against disinformation emerges. Multiple, disparate augmented realities will have the power to influence users, particularly the youth, who are now the main users of this technology. It will become essential to address disinformation and misinformation in AR to ensure a safe and reliable experience for all.

- ## A new Sustainable Development Goal for Space

The UN "Space2030" Agenda aims at enhancing the role and impact of space while fostering its integration with other sectors. The United Nations Office for Outer Space Affairs (UNOOSA) emphasizes space's contribution to supporting the 17 Sustainable Development Goals (SDGs). As a result, people are discussing the need for a dedicated SDG for space, particularly with the increasing deployment of satellite constellations, the commercialization of Low Earth Orbit (LEO) and the dramatic rise in space debris^{xi}. Issues also include the brightening of the night sky and the expanding carbon footprint of the space sector. This calls for a "space for all" approach to ensure the sustainable use of Earth's orbit by governments, space agencies and industry. Assuming the SDGs continue beyond 2030, an SDG for space^{xii} must balance environmental, social, economic, and political issues, encouraging continued exploration and facilitating the inclusion of nations that may not yet have had the opportunity to engage in space activities^{xiii}.

- ## AI and VR mental care in the loneliness epidemic

AI-powered mental health support is taking off as people increasingly turn to large language models (LLMs) like ChatGPT for emotional support, guidance, and even self-diagnosis^{xiv}, ^{xv}. This is feeding off a growing public health crisis and an epidemic of loneliness. LLMs provide dynamic, unscripted interactions that feel more personal and responsive than traditional AI-driven mental health apps, mimicking human empathy at a moment when there is a growing distrust in traditional healthcare systems and long wait times for mental health services. In parallel, Virtual Reality (VR) is evolving into more immersive mental health treatments such as AI-driven VR therapists, interactive mindfulness spaces and virtual environments tailored to trauma recovery^{xvi}. New research suggests that combining LLMs with VR could create very powerful therapeutic tools offering both real-time emotional support and immersive healing experiences. However, these trends also raise concerns about misinformation, dependency and ethical oversight. The challenge will be to ensure the safe and effective integration of AI and VR into mental healthcare^{xvii}.

- ## Living underwater

For decades, the underwater living has fascinated science fiction enthusiasts^{xviii}. The Deep project is transforming this vision into reality, aiming at establishing a permanent human undersea presence by 2027^{xix}. Currently based in a former UK quarry, the project is developing subaquatic habitats. Vanguard, the first one, is set to launch soon, accommodating three people for short-term missions. It will provide valuable experience to develop the more ambitious Sentinel habitat, designed to support six people for extended periods at depths of up to 200 meters. The project's goal is to create a network of underwater bases, supported by submarines, paving the way for a new era of continuous human undersea presence. As global warming and extreme weather events render alternative living spaces increasingly attractive, the Deep project is timely, with the potential to revolutionise marine science and mirror humanity's achievements in space.

- ## Rituals for change

Beyond religion, rituals, seen as structured behaviours that have symbolic meaning, are an increasingly popular way of giving more purpose to routine actions. Digital detox and social media engagement is one area where rituals are a way to provide a meaningful structure to everyday interactions and leading to behaviour change^{xx}, ^{xxi}. They can be personal (reinforcing agency and achieving goals) or communal (for group cohesion and collective identity)^{xxii}, ^{xxiii}. Tapping into everyday rituals is already part of marketing structures of companies and experiments in the workplace^{xxiv}, ^{xxv}, ^{xxvi}. Understanding and shaping the rituals can help change behaviours to achieve desired policy outcomes.

- Producing authenticity

Perceived authenticity is a valued and desired trait in politics, management, entertainment but also branding, as it relates to trust and loyalty^{xxvii}. With increasing mistrust, prevalence of digital media and virtual environments the quest for effectively eliciting authenticity is intensifying^{xxviii}. To improve political authority, measurement scales and indicators can be created around consistency, intimacy, ordinariness, and immediacy^{xxix}. Experiencing authenticity is a major contributor to self-regulation, interpersonal relations, psychological health and consumer behaviour^{xxx}. As people experience a growing lack of authenticity, there is a growing offer of authenticity and authenticity leadership trainings.

- Climate ghettos and havens

Increasingly frequent fires, floods and other extreme weather events linked to climate change are playing a growing role in people's perceptions of where to buy property and settle, and more broadly in the spatial dynamics of climate change effects and changes to human settlement patterns. "Climate havens" are geographical areas which are considered less affected by the effects of climate change. Some cities have already started to brand themselves as "climate havens" due to their lower risk to many climate impacts, such as sea level rise, access to freshwater resources and infrastructure to accommodate growth^{xxxi, xxxii}. This contrasts with "climate ghettos," where marginalised populations are often concentrated in areas of high climate risks, due to displacements, climate gentrification and socioeconomic inequalities^{xxxiii}. Although no place will be spared from the impacts of climate change, the uneven distribution of exposure at national and regional level may lead to increased social conflicts, pressures on climate adaptation policies and spatial planning^{xxxiv}.

- Inheritance economy

People in advanced economies are estimated to inherit around \$6trn in 2025 —about 10% of GDP – double, in percentage, what it was in the 1960s^{xxxv}. In France alone, inheritance until 2040 is estimated at € 9 trillion– € 667 billion per year^{xxxvi}. With slower economic growth and high asset prices (e.g. housing), the impact of inherited wealth is overshadowing that acquired by work. This may lead to increased inequalities, lower social mobility and lower effectiveness of economic policy instruments^{xxxvii}. This "*Great Wealth Transfer*" sparks interest from investment companies, but also governments – in terms of design of inheritance taxes^{xxxviii}. Some of the ideas include a recipient-based inheritance tax focusing on the personal circumstances of the recipient rather than on the overall amount of wealth left, a tax on lifetime wealth transfers taking into account the amount of wealth previously received by the beneficiary or universal inheritance, a one-off public payment of an agreed sum to each young adult citizen^{xxxix}.

ENDNOTES

- ⁱ <https://www.hs.fi/kulttuuri/art-200010873482.htm>
- ⁱⁱ <https://www.theguardian.com/books/2023/feb/18/roald-dahl-books-rewritten-to-remove-language-deemed-offensive>
- ⁱⁱⁱ <https://x.com/RnaudBertrand/status/1862726569040781505>
- ^{iv} https://www.cathaypacific.com/cx/en_PH/inspiration/travel/how-chongqing-built-city-in-sky.html
- ^v <https://bmcmethics.biomedcentral.com/articles/10.1186/s12910-020-00532-z#:~:text=Before%20discussing%20the>
- ^{vi} <https://www.pnas.org/doi/10.1073/pnas.2400678121>
- ^{vii} <https://medium.com/inking-press/should-we-edit-our-memories-the-complex-ethics-behind-memory-altering-technologies-f8fd84b8aefd>
- ^{viii} <https://www.designboom.com/technology/pride-vision-ar-camera-candidates-support-marriage-equality-japan-elections-tbwa-hakuhodo-10-25-2024/>
- ^{ix} <https://www.instagram.com/reel/DFFVATjRmGR/>
- ^x <https://arblock.fr/>
- ^{xi} <https://www.lowyinstitute.org/the-interpretor/sustainable-development-goal-space>
- ^{xii} <https://spacerenaissance.space/the-18th-sustainable-development-goal/>
- ^{xiii} <https://www.oecd.org/en/topics/space-sustainability.html#:~:text=Space%20activities%20can%20generate%20negative.can%20contribute%20to%20resource%20depletion>
- ^{xiv} <https://www.nature.com/articles/s44184-024-00097-4>
- ^{xv} <https://www.bacp.co.uk/bacp-journals/therapy-today/2023/september/the-big-issue/>
- ^{xvi} <https://www.webmd.com/a-to-z-guides/virtual-reality-and-health>
- ^{xvii} <https://pubmed.ncbi.nlm.nih.gov/articles/PMC4361984/>
- ^{xviii} <https://oceanographicmagazine.com/news/deep-making-humans-aquatic/>
- ^{xix} <https://www.deep.com/>
- ^{xx} <https://www.simonandschuster.com/books/The-Ritual-Effect/Michael-Norton/9781982153021>
- ^{xxi} <https://medium.com/@anmol.v1/digital-rituals-the-small-screen-habits-that-quietly-shape-our-lives-c8d152f33e0f>
- ^{xxii} <https://www.trendwatching.com/trends-and-insights/adrift-and-anxious-people-are-turning-to-rituals-for-structure-and-meaning>
- ^{xxiii} <https://www.frontlinebesoci.com/p/rituals-the-ties-that-bind>
- ^{xxiv} <https://connect.msqpartners.com/ritualized>
- ^{xxv} Cozzio, C., and A. Furlan. "Ritual-Based Redesign of Routines: An Experimental Approach in the Restaurant Industry." *International Journal of Contemporary Hospitality Management* 35, no. 6 (2023): 2113–35. <https://doi.org/10.1108/IJCHM-01-2022-0056>
- ^{xxvi} <https://conversationco.com.au/blog/behaviour-change-rituals-and-waste-management>
- ^{xxvii} Sun, C., Ye, C., Li, C. and Liu, Y. (2024), "Virtual ideality vs. virtual authenticity: exploring the role of social signals in interactive marketing", *Journal of Research in Interactive Marketing*, Vol. 18 No. 3, pp. 430-445. <https://doi.org/10.1108/JRIM-01-2023-0011>
- ^{xxviii} Luebke SM, Engelmann I. Perceiving politicians as true to themselves: Development and validation of the perceived political authenticity scale. *PLoS One*. 2023 May 24;18(5):e0285344. doi: 10.1371/journal.pone.0285344. PMID: 37224107; PMCID: PMC10208464.
- ^{xxix} <https://pubmed.ncbi.nlm.nih.gov/37224107/>
- ^{xxx} Sedikides, C., Schlegel, R.J. Distilling the concept of authenticity. *Nat Rev Psychol* 3, 509–523 (2024). <https://doi.org/10.1038/s44159-024-00323-y>
- ^{xxxi} <https://www.thecooldown.com/green-business/climate-proof-towns-luxury-rich-poor-segregated-homes/>
- ^{xxxii} Morris, E., J.J. Cousins, and A. Feldpausch-Parker. "Transformation and Recognition: Planning Just Climate Havens in New York State." *Environmental Science and Policy* 146 (2023): 57–65. <https://doi.org/10.1016/j.envsci.2023.05.004>
- ^{xxxiii} Kubeš, J., and Z. Kovács. "Provincial Gentrification in the Global North – A Literature Review." *Cities* 157 (2025). <https://doi.org/10.1016/j.cities.2024.105586>
- ^{xxxiv} <https://www.scientificamerican.com/article/there-is-no-such-thing-as-a-climate-haven/>
- ^{xxxv} <https://www.economist.com/leaders/2025/02/27/inheriting-is-becoming-nearly-as-important-as-working>
- ^{xxxvi} https://www.lemonde.fr/en/economy/article/2025/05/07/how-france-has-become-a-nation-of-heirs-again_6741000_19.html
- ^{xxxvii} <https://www.cfainstitute.org/insights/articles/great-wealth-transfer-myths-reality>
- ^{xxxviii} https://www.oecd.org/en/publications/inheritance-taxation-in-oecd-countries_e2879a7d-en.html
- ^{xxxix} <https://publications.jrc.ec.europa.eu/repository/handle/JRC134659>