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CENTRE FOR GOVERNANCE OF EMERGING TECHNOLOGIES

KICK-STARTING COSMOPOLITAN GOVERNANCE THROUGH SCIENCE: THE CASE OF A GIANT LASER SYSTEM

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SUMMARY AND RECOMMENDATIONS

The following policy paper proposes a novel perspective on how large technical systems can enable global governance.

We base our argument on several current scientific international collaborations (CERN, ITER) and postulate how their success could be extended to dual-use technologies in space, arguing that the normative frame not the technology itself is fundamental to how it is perceived.

We propose that large technical systems, or "scientific machines", have constitutive power to shape the system of global governance which can be turned to humanity's advantage if normative frameworks are developed for them.

The argument is exemplified on the case of Giant Laser Systems (GLS) such as the Breakthrough Initiatives' Starshot program which not only may change radically the way stars are studied (and thus enable new scientific discoveries), but can also contribute to solving practical problems such as growing orbital debris and empower global actors to conceive security regimes concerning sensitive technologies in space.

In conclusion, recommendations are articulated for a state such as the Czech Republic for which a pragmatic normative framework defined herein provides a useful perspective to look at governance of new technologies that ensures normatively desirable outcomes of sweeping technological change, and stimulate international scientific collaboration with positive spill-over effects to other domains of international cooperation.

POLICY PAPER

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INTRODUCTION

Does technology shape politics? Could technology enable the constitution of inclusive political structures or cosmopolitan international regimes? Do objective artifacts, pieces of metal or in particular massive high energy systems (i.e. "lasers"), new energy sources (nuclear fusion), radically innovative propulsion systems (laser, fusion, plasma-based methods) and their actual design and applications have transformatory political power? These questions LINK have been asked for decades. Many argue that indeed, these technologies have significant political effects. The following policy paper develops this line of thinking by suggesting that they may even become integrated in a political strategy seeking to develop more inclusive cosmopolitan governance. To that end, it introduces several key large technical systems that already have changed the way we cooperate internationally and some that have the potential to become the driver of human progress that benefits many and not the few.

LARGE TECHNICAL SYSTEMS (LTS) AND THE DILEMMA OF THEIR OBJECTIVE

What role can large technical systems have in shaping global governance? *We argue that large technical systems have constitutive power to shape global governance system because of their mere existence. This can be turned in humanity advantage if we develop a normative framework for them before they influence our lives in an undesirable way.* This point is first elaborated in relation to two existing LTS before a broader ethical framework for governance of technology from the perspective of a small state is introduced and, finally, a case of a prospective giant laser system is introduced. Such system that would serve as a tool for science and orbital debris removal that however is protected from weaponisation; but, at the same time, would be an enabler for better cosmopolitan governance. To think through the relationship between governance and technology is ever more pertinent, we propose, in the age in which states do not govern technology development LINK and when philanthropes are increasingly visible in shaping the future of space age. We can either think in terms of how to reform the current global governance system or we can think in terms of how to particularly govern implemented technology large enough that may have power to change the global governance system by its mere existence. In either case, machines do, and will continue to shape our lives and such reflection is therefore most warranted.

This argument should not be confused with technological determinism LINK arguing that every technology brings positive (or negative) changes to the society. Eschewing such determinism, we propose instead that technology capable of changing society must come with a policy that steers it and whose ends, framed with humanity as the ultimate referent, are enabled by the implementation of such technology. Technology has the capacity to change the way the world is governed but such power of machines to influence global governance

has been recently understudied. LINK The normative reflection of the world to be desired must come first if technology is to be enrolled to enact *positive* change.

Imagine a situation that a few people with sufficient means at their disposal build a giant laser system capable to propel probes to the nearest star (Proxima Centauri) in two decades traveling 1/5 of the speed of light. Such a scenario is fully feasible LINK, and Breakthrough Initiatives LINK, a group of people founded by Stephen Hawking that are determined to explore universe by various means from listening, watching to travelling, is fully committed to build such system. However, in contrast to CERN LINK or ITER LINK, the laser can be easily perceived as a dual-use technology capable to damage satellites. Alternatively, take the retired experts from space agencies in Tau Zero Foundation who had worked in advanced technology laboratories focused on breakthrough technologies and now are delivering radically new propulsion concepts. For example, their Q-Drive is based on principles in which a magnetic plasma piston uses solar wind and interstellar medium to accelerate giving the system the opportunity to accelerate without carrying the propulsion medium. It is a radical innovation that has the potential to transform our solar system exploration and enable scientific manned missions to nearby stars. Yet such ideas are subjected to no democratically legitimate authority to oversee the applications funded by private individuals. Instead, states tend to support existing industry LINK rather than focus on breakthrough technologies to keep stable economy and employment rather than bear the risks generated by socioeconomic transformations carried by technological revolutions.

When Scientific Machines Change Society for the Better

CERN has been an unprecedented success in bringing nations together to build a technical system that delivered radical change in our perception of the physical world. However, it was not devised – more than six decades ago when the CERN treaty was penned – only because of the scientific potential it was expected to yield. CERN was devised as a new form of international scientific collaboration LINK than could not be easily dismantled by European political turbulences, and to build ties between nations so that no full-scale war could occur among them again. Its success can be underlined by the fact that USA scrapped its own collider to become part of CERN because it did not make sense to mirror the investments, compete on the human resources market which is extremely thin and ultimately be even incapable to deliver the same scientific results. The shared investments finally enabled a larger collider that enabled more and better science. It does not make sense to build a larger collider outside the CERN if the governance model remains inclusive, and no competing facility elsewhere in the world would likely surpass the results it has delivered. A proposal of even bigger collider LINK is already on the table in China. However, the Chinese example shows that the world is less keen to cooperate if the government is not open. The scientific inclusiveness is not given but comes with liberal values and general political openness. If a certain threshold is reached, then scientific cooperation can flourish. If the scientific cooperation flourishes it can have positive effect on international governance. CERN has invented novel models of cooperation, brought together best physicist minds in the world, shown that nations

can cooperate on a multibillion-dollar risky project and paved the road for more international scientific collaboration. Not only has it revolutionized physical research but has become an example of success with its collaborative treaty that inspired almost all next international scientific collaborations requiring large technical system. A treaty inclusive for member states and other actors willing to participate, inclusive for scientists delivering scientific results and finally effective to deliver science that has made human lives better and longer by delivering science we use every day.[1]

When finished, ITER has the potential to be the main energy source for the global society and will be the most complicated scientific machine ever built. The result of this experiment will likely enable building fusion reactors of any size from power plants and submarines to space crafts. It is also the kind of risky project that no one nation was willing to undergo alone, thus 35 nations seek to reach the objective together.

Between Centralized and Decentralized Machines

In some domains, decentralised machines may provide solutions e.g. in terms of limiting carbon dioxide production. In other domains, decentralized solutions are a *priori* impossible, illegitimate or unethical. A good example is planetary defense from asteroids. There is simply no way for people around the world to buy a piece of planetary defense equipment comparable to the extension to A/C that would be capable to deflect an asteroid. Thus, a governmental decision, public funds and democratic legitimacy are the only ways to produce planetary defense infrastructure that would keep the Earth safe from asteroids. National solutions can hardly be legitimate as they will necessarily exclude parts of humankind. Moreover, a nationally governed system even of a space superpower would never be able to be contained inside that superpower's territory as the risk corridor of the asteroid impact usually cuts through more than a half of the globe.
Or imagine a hypothetical scenario that the risk corridor cuts through a nation, e.g. Nigeria, that has uranium on its territory and at the same time a superpower with planetary defense capability refuses to act. There would emerge a significant risk that such nation would seek nuclear weapons to deflect the asteroid since nuclear deflection is presumed to be the most effective.

In the 1960s and 1970s, the traditional technological determinism argued that new technologies would bring good to the society by virtue of their mere introduction. The negative turn in technological determinism that followed argued precisely the opposite: technology would bring about an apocalypse. The anarcho-capitalists LINK in the 1980s and 1990s argued that mere decentralization would bring good because it would rid the people of the corrupted Behemoth. However, as the planetary defense example shows, the decentralization cannot be considered as a solution to all threats and governance challenges. In fact, decentralization through technological means is a perfect example of utopian technology determinism that misses the normative objective of human flourishing. Indeed, megaprojects may lead to centralisation of power but at the same

[1] World wide web, touchscreen and trackball, photon cancer treatment, imaging in medicine, microprocessor production, space missions and so on.

time, they *pool* power rather than create one central source, and make good on the definition of power as a capacity to act together LINK in pursuit – when framed well –, of solving common problems at hand while providing an unprecedented scientific tool.

That incidentally means that megaprojects simultaneously may serve as *enablers for more inclusive global governance if the conversation regarding their future is inscribed with normative considerations*. Machines – in this case large technical systems – do not save the world. Yet the politics of their use alters the way humans live.

THE RESPONSIBLE POLICY OF A SMALL STATE WITH A COSMOPOLITAN OUTLOOK

In the public discourse consummated by the sense of various insecurities where few look forward to inhabiting the *increasingly uncertain* future world, it may perchance be of use to draw inspiration for such vision of inclusive and cosmopolitan politics in the unlikely place: the discipline of security studies.

The key paradigmatic shift to orient development of this framework, introduced by Ken Booth, a research professor at Aberystwyth University, is to conceive of security not as the absence of an identified threat but as an *environment* in which people can thrive and *flourish*. LINK In Anthony Burke's theory of cosmopolitan security, LINK then, this environment includes, by strategic necessity, the biosphere in forming a post-Westphalian global architecture of democratic deliberation based on the cosmopolitan thought of Immanuel Kant. Even if it is mindful of Ulrich Beck's argument LINK that the core of our shared problems lies in our *national outlook* which is a *prison error of identity* and that without *cosmopolitan outlook* we will never solve global problems, such cosmopolitan theory needs not forego and even eradicate nation states. Their existence, Garrett Wallace Brown suggests, is a reality that cannot be bypassed. But then, he continues, Kant's vision has indeed included global federal design but could serve as an inspiration also to devising a cosmopolitan system for independent yet responsible states LINK that would contribute to the perpetual peace.

Building on these ideas, the ethical framework to emerge would need be sensitive to profound political implications of technology on politics and see inclusiveness and participation as necessary features of a global technology governance that seeks not to amplify or create new power asymmetries but rather ensure that goods produced by transformatory technological shifts improve living of as many as possible and indeed make them thrive and flourish; and, as a matter of fact, produce constitutive effects on multilayered global cosmopolitan governance than can spill to other domains producing positive feedbacks.

Against the ethical framework's backdrop, the policy of a small state in the realm of technology governance should be pragmatically reflective regarding

the practical implications of imagined technologies. Pragmatism is commonly identified with doing what is necessary to score most, with little heeding of moral guidance. The traditional philosophical pragmatism as developed more than a century ago by John Dewey was something else entirely, however: it focused on delivering *good intentions in solving practical problems in our lives*. Dewey LINK warned from relying only on reason without reflective thinking. Working from this blueprint, Jonna Nyman recently introduced an inspirational modern rearticulation of pragmatism LINK in the field security studies. According to Nyman, pragmatism can be used in policy making especially in situations when one needs to develop a normative frame for a technology that can be sensitive from the international security perspective.

Its focus should be particularly the technologies that are sensitive from international security perspective enough so that inclusiveness is not only proper but *strategically necessary*, and which, at the same time, carry the promise of delivering significant breakthroughs in terms of organisation of social life.

As such, it should rest on a coherent vision for global engagement rather than enclosure. In case of a small state such as the Czech Republic, such vision can be productively related to the intellectual fabric bequeathed to its international identity by the late Václav Havel that has been sometimes reduced to the promotion of the human rights ideograph but in fact, anchored in the pivotal philosophical concepts of care and responsibility for all humankind and environment that relate one to the horizon of being and protect from the "temptation of nothingness".

Toward a Laser Megaproject

Last but not least, the ethical framework for global governance of new technologies from the perspective of a smaller state should concern not just their efficient regulation, but also visions of megaprojects necessitating international collaboration. Their security depends not on the size of their armies, but alliances and functional patterns of global governance that provide them with shaping influence by means of steering the governance mechanisms. They may, and indeed often are, accepting of a great power leadership – inspirational superpower that is worth to be followed LINK (Apollo Effect) – but should find value in institutionalised international *scientific* collaboration since it provides them with a visible participatory role in global affairs (premised on finding a *niche* where their expertise excels because by default their resources are limited) while also producing trust and confidence in deemed intentions concerning the use of the technologies to be developed. Such confidence can facilitate achievement of grand scientific objectives – that, without collaborative projects, may be impossible to achieve – while also mitigating the risk of their possible abuse for parochial security politics.

A giant laser system is one possible case of a *niche* breakthrough technology from the Czech Republic's standpoint that can be framed by the ethical framework introduced above. By virtue of its capacity to deorbit space debris, propel nanoprobes to Proxima Centauri and even to deflect an asteroid that may one day threaten the Earth's survival, it may be a vehicle of human flourishment.

At the same time, unlike in the cases of CERN and ITER, developing such capacity by a limited number of states may indeed be feasible, but it could not remain without a response by the rest due to security dilemma. Inclusive participation thus becomes strategic necessity and the sensitiveness of the technology a desirable challenge capable to enable its cosmopolitan governance. This, however, is conditioned on a strong framing narrative that orients the intentions behind the development of the system for civilian and scientific purposes where peace and human flourishing are the core principles enshrined in the founding treaty. Such framing narrative is not just a source of legitimacy for one particular technical system development; but, crucially, provides guidance over its design and process. It would manifest, for example, in open access to all project features, inclusion with no exception. Incidentally, technology framed in this manner would be consistent with current international space law stipulated in the Outer Space Treaty which insists that space activities are of benefit to all countries; fulfilling its principal objective. The CERN blueprint (with essential participation coded into decision making) can serve as a source of inspiration here, as does the in-kind financing principle known from ITER, ISS or ESA that would ensure millions rather than billions are need for the infrastructure's operation. These projects also confirm that LTS can stimulate high-tech business (ITER), spin-offs useful in daily lives (CERN) and international cooperation transcending current fault lines (ISS).

CONCLUSION

We argue that the most achievable model of cosmopolitan governance is multilayered cosmopolitan governance that heeds the principle of subsidiarity by means of inclusive, participatory decision-making where no one is excluded. Large-scale international scientific collaboration may be one, with CERN serving as a useful model: influencing decision-making on a national level regarding its budget because the treaty itself is designed precisely to avoid free-riding and to attract collaboration keeping all locked by the presumption of benefit sharing; and delivering manifold technological spin-offs that the member states can use in any meaningful applications that we would hardly find another historical precedent. Developing comparable international scientific collaboration in the laser domain capable of delivering above-mentioned applications advanced by a small state may not only generate the technology but also trust and transparency that may transcend the project as such. A proposal to all to become part of the project without exception can produce a critical mass, especially if the superpowers are included, to provide basic confidence and stimulate further (necessary) pragmatic discussions how the enterprise with the first tangible benefit in terms of clearing the skies can be achieved transparently. The giant laser system appears to be feasible technically. It deserves a quest for feasible model to govern it.

Policy Recommendations

→ Scientific machines may be viewed as enabling international collaboration when governed well and situated in the ethical policy framework that pragmatically focuses on solving practical problems while enabling new scientific discoveries.

→ For a small state like the Czech Republic, such framework provides a useful perspective to look at governance of new technologies, either by means of institutionalization and rule-making that is intended not to constrain and suffocate, but to ensure normatively desirable outcomes of sweeping technological change (human flourishing with benefits yielded to many rather than the few); or by stimulating international scientific collaboration with constitutive effects for advancing global cooperation imbued with potential for positive change toward cosmopolitan peace.

→ This is a pragmatic rather than grand utopian vision because it dwells not on a singular ideational design but rather developing a dense web of collaborative practices to resolve practical matters increasing trust and building a shared sense of purpose.

→ The giant laser is one of potential breakthrough technologies for which there is a niche capability in the Czech Republic. From the governance standpoint, to turn it into a large technical complex (i.e. a "running" scientific machine), the next practical step is to form international consortium for scientific cooperation and design its model drawing on successful historical blueprints and situated firmly with the ethical framework, and to seek open and participatory membership in the project with a view of possible future institutionalization.

Abbreviations

CERN – European Organization for Nuclear Research
ITER – International Thermonuclear Experimental Reactor
ISS – International Space Station
OST – Outer Space Treaty

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