

## **Human enhancement with Chinese characteristics – AI as a factor for China's military modernisation with special consideration of human-machine teaming**

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### **Abstract**

China offers a highly instructive practical example for a state-driven long-term strategy, when it comes to the topic of human enhancement. This essay explores the evolution of AI policy as a factor for military modernization of the People's Republic of China starting with the 13<sup>th</sup> Five-Year Plan (2016-2020) until the year 2023, focusing on human-machine teaming/human enhancement. Navigating between the two opposing narratives of the “yellow peril” and the one propagated by PR China officials, the vantage point of this contribution is the priority accorded to security as defined by the OSCE. Since the PR China considers development part and parcel of national security, any attempt at interfering with its developmental goals is seen as a security threat. The complexity of the issue is enhanced by the fact that geostrategic considerations have already been placed in the framework of a domestic normative framework.

Thus, we face a situation which adumbrates the challenge for the EU to find a suitable response to China's global AI governance ambitions.

### **Introduction**

In July 2022, the first book-length study of China's domestic AI politics, written by Zeng Jinghan,<sup>1</sup> was published under the title *Artificial Intelligence with Chinese Characteristics – National Strategy, Security and Authoritarian Governance* with the aim “to advance understanding of AI with Chinese characteristics”.<sup>2</sup> This essay follows, so to speak, in the thematic footsteps of Zeng Jinghan and aims at examining human enhancement (HE) with Chinese characteristics. More precisely, the focus of observation is one specific facet of human enhancement, i.e. cognitive human enhancement through human

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<sup>2</sup> Zeng, Jinghan: *Artificial Intelligence with Chinese Characteristics – National Strategy, Security and Authoritarian Governance*. Springer Nature Singapore, 2022, p.5.

brain-computer teaming. Beijing's current AI policy forms the overarching framework and meta-structure for the topic of this essay, since cognitive human enhancement is just one of the achieved outputs of the manifold applications of artificial intelligence.

In recent years, we have witnessed an intensified monitoring of the development of AI applications in the PRC. On the one hand, the global monitoring results from technological rivalry among innovative high-tech industries. On the other hand, the democratically oriented Western world is increasingly voicing concerned critique regarding the use of AI for governmental surveillance purposes. Both approaches, i.e. technological rivalry as well as system critique on the part of liberal democracies, are linked to security policy. To date, we can already draw on an abundant number of publications elaborating on the security aspect of AI. This essay is not intended as a contribution to the description of AI-guided autonomous weapon systems as developed and implemented in the PRC. The focus instead lies on presenting and analysing Chinese positions and debates on human enhancement as accessible in open sources.

As far as today's security analysis is concerned, we encounter a major dilemma: there is a fundamental disconnect between current security-related discursive approaches towards China. The rationale of the US-initiated narrative is reflected in the US National Defense Strategy 2022, indicating "the growing multi-domain threat posed by the PRC"<sup>3</sup> as the top national defence priority. In stark contrast, the Chinese narrative envisions a new world order, enabling emerging and developing countries to "catch up" with the global North. This essay aims at navigating between the two conflicting narratives. It will neither follow the subliminal or overtly apparent narrative of a "Digital Yellow Peril", nor leave unquestioned the official Chinese narratives with their strong propagandistic colouring.

When engaging in Chinese studies in the context of security issues, it quickly becomes clear that security does not just concern the military or policing. According to the Chinese perspective, the security factor permeates the en-

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<sup>3</sup> US Department of Defense: NDS Fact Sheet, 28.03.2022.  
<https://media.defense.gov/2022/Mar/28/2002964702/-1/-1/1/NDS-FACT-SHEET.PDF>.

tire society, including issues related to human enhancement. In the author's opinion, it is the OSCE's concept of comprehensive security that appears most adequate in the security analysis of human enhancement. According to OSCE-diction, comprehensive security embodies the politico-military, the economic and environmental as well as the human security realm. Thus, this article follows a whole-of-nation approach, and starts with the current National Defense Strategy, the relevant Five-Year Plans and the strategic concept of Military-Civil Fusion.

One crucial takeaway for readers should be a better understanding regarding the strategic perspective of China's decision - and policymakers in the field of AI development with a particular focus on the technological AI subcategory *human enhancement*. Therefore, this text follows the classical path of comparative politics by identifying relevant action lines in a complex Chinese "High-Tech Development"-system.

This essay examines in the first part the national security interests of the People's Republic of China regarding AI and related policy lines within the framework of relevant Five-Year Plans. In the second part, it analyses the public discourse in the People's Republic on aspects of human-machine teaming is analysed; in a separate chapter the culture and entertainment sector is scrutinised in search of discursive patterns within science fiction productions. The third part elaborates on Beijing's self-perceived role as a "responsible" major power in applying dual-use AI for the purpose of human enhancement. The former topic concerns various aspects of the People's Republic's national Defense strategy, ergo hard power issues. The latter relates to the official self-image of China's political leadership and the normative underpinning of China's security policy trajectories. Here we are moving into the realm of soft power.

The classical distinction between domestic security issues of the PRC on the one hand and foreign policy agendas on the other has become obsolete to some extent, as in a digitalised world both dimensions play into each other. Nevertheless, in most chapters domestic and foreign policies are dealt with separately.

The concluding part of the essay examines the status quo of European defence policy, coping with the necessity of accelerating technological innova-

tion in the military sector. It further examines alternative scenarios for EU positioning vis-à-vis China regarding universal guidelines for human enhancement.

## **1. AI military application through the lens of China's national security interests**

The starting point of this chapter is the question: “What are the national security interests that are paramount to the People's Republic regarding artificial intelligence?”

Respective security interests can best be gleaned from China's defence-related strategy white papers of the last decade. China's strategy white papers are supported in terms of content by the party and the government and cover the security domain not only in the military domain but also in a broader sense. In looking at the relevant white papers – released by China's State Council in 2014, 2017 and 2019<sup>4</sup> - the following national security interests are to be considered as paramount: “safeguard sovereignty and territorial integrity” and “support the sustainable development of the country”. The close dovetailing of development and security interests is a common thread running through all of China's security considerations.

In this sense, any technology embargo that affects economic development is interpreted as a direct attack on security interests. This mindset was previously critical to Chinese security considerations several decades before the emergence of today's resilience debate. As a logical consequence, machine learning and human-machine teaming are seen by the PRC state leadership as tools for accelerated development. For decades, the grand strategy has been “to catch up with the industrialised West” without much distinction between the civilian and military sphere. This is also reflected in the *Military-*

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<sup>4</sup> PRC State Council: China's Military Strategy, 26 May 2015, [https://english.www.gov.cn/archive/white\\_paper/2015/05/27/content\\_281475115610833.htm](https://english.www.gov.cn/archive/white_paper/2015/05/27/content_281475115610833.htm); PRC State Council: China's Policies on Asia-Pacific Security Cooperation, 11 Jan 2017, [https://english.www.gov.cn/archive/white\\_paper/2017/01/11/content\\_281475539078636.htm](https://english.www.gov.cn/archive/white_paper/2017/01/11/content_281475539078636.htm); PRC State Council: China's National Defense in a New Era, 24 July 2019, [https://english.www.gov.cn/archive/whitepaper/201907/24/content\\_WS5d3941ddc6d08408f502283d.html](https://english.www.gov.cn/archive/whitepaper/201907/24/content_WS5d3941ddc6d08408f502283d.html).

*Civil Fusion* (junmin ronghe 军民融合) development strategy,<sup>5</sup> to be discussed in more detail in Chapter 1.2.1. It may therefore hardly come as a surprise that in the tech field, particularly in terms of AI, the promotion of “dual-use” technology and infrastructure is a supporting pillar of numerous national development policies.

## 1.1 China’s National Defense Strategy 2019

Cyberspace and informatisation have already been repositioned and upgraded in the national risk perception in China’s military strategy 2015.<sup>6</sup> After cyber warfare had already come into focus in the 2015 strategy, the July 2019 Defense Strategy assumes innovative technology directed against state structures via hybrid dissemination channels as major threats. In the context of artificial intelligence, “intelligent warfare” is predicted for the near future:

Driven by the new round of technological and industrial revolution, the application of cutting-edge technologies such as artificial intelligence (AI), quantum information, big data, cloud computing and the Internet of Things is gathering pace in the military field. International military competition is undergoing historic changes.

New and high-tech military technologies based on IT are developing rapidly. There is a prevailing trend to develop long-range precision, intelligent, stealthy or unmanned weaponry and equipment. War is evolving in form towards informationized warfare, and **intelligent warfare is on the horizon**.<sup>7</sup>

Even though the physical or cognitive enhancement of military personnel is not mentioned in the Defense Strategy 2019, the concept of *intelligent warfare* surely does include human enhancement in all its forms. It also refers to various AI applications, generally known as “smart” solutions. As concluded in the strategy document, the prediction of intelligent warfare triggers the necessity of modernisation efforts at the operational level, subdivided into several operation lines. The reader will notice that information and commu-

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<sup>5</sup> With the release of the 13<sup>th</sup> Five-Year Plan, the Military-Civil Fusion concept became a prominent issue within CPC and PLA structures. See: [http://www.xinhuanet.com/english/2018-03/12/c\\_137034168\\_2.htm](http://www.xinhuanet.com/english/2018-03/12/c_137034168_2.htm).

<sup>6</sup> See: Buchas, Peter: Bedrohungswahrnehmungen und Sicherheitspolitische Konzepte Chinas. In: Sicherheit und Frieden 3/2016.

<sup>7</sup> China’s National Defense in the New Era, 24 July 2019, p. 6.

nication technology (ICT) needs are listed at the outset, without indicating concrete technological output: “*advance the integrated development of mechanization and informationization, speed up the development of intelligent military,...*”<sup>8</sup> The issue of human-machine cooperation under the condition of intelligent military remains unaddressed in the document.

Scientific technological innovation is assigned an essential role in the Defense Strategy 2019. The development of high-tech products for the use of the People’s Liberation Army structures is underlined as a strategic priority regarding Science & Technology:

China’s armed forces are accelerating the implementation of the strategy to develop the military through S&T (Science & Technology, author’s note) in a bid to maintain and enhance the strength of the areas where they lead, and intensify innovation in emerging areas. They have made great progress in independent innovation in some strategic, cutting-edge and disruptive technologies, and succeeded in developing strategic hi-tech products such as the Tianhe-2 supercomputer.<sup>9</sup>

The National Security Strategy indicates only two timelines within the framework of operational goals to “strengthen” the People’s Liberation Army (PLA) in the new era: significantly enhance the level of informationisation by 2020 and complete the modernisation of national defence and the military by the year 2035.<sup>10</sup> By the time of writing this essay, the first timeline benchmark has already passed, two years ago; relevant PLA progress reports were presented at three consecutive National People’s Congress sessions. Despite strong geopolitical dynamics during recent years, no actualised national security white paper has been published since 2019.

The Defense Strategy of July 2019 does not provide any hints regarding China’s ethical positioning on intelligent warfare making use of artificial intelligence, despite the fact that the ICRC had published a paper on autonomous weapon systems in the problematic context of international humani-

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<sup>8</sup> Ibid., 10; additional operational PLA needs read as follows. Cit: [...] *create a modernized military force structure with Chinese characteristics, improve and develop socialist military institutions with Chinese features, and constantly enhance the capabilities to fulfill the missions and tasks in the new era.* Cit. end.

<sup>9</sup> Ibid., p. 25.

<sup>10</sup> Ibid., p. 11.

tarian law in June 2019.<sup>11</sup> China's current National Defense Strategy was elaborated in accordance with the 13<sup>th</sup> Five-Year Plan (2016-2020), but was released during the final phase of the five-year governance period. Considering the close intertwining of civil and military spheres in the People's Republic of China, the following short excursion appears useful for a better understanding.

## 1.2 The 13<sup>th</sup> Five-Year Plan

Western readers are rarely aware of the complex fabric of Five-Year Plans. Despite its crisp and professional appeal, the term *Five-Year Plan* is burdened with the “musty smell” of ossified real socialism and does not invite more attentive monitoring. Today's visible outcomes of China's AI policy can only be understood by taking a closer look at the dynamics derived from several overlapping planning schemes.

Beijing's quest for innovation in military matters, as reflected in the National Security Strategy 2019, was already regulated at an earlier date in the so-called *Outline of the 13<sup>th</sup> Five-Year Plan for Military Construction and Development*. At the same time the contents of military development were in line with a number of additional planning documents, such as the “*Outline of the National Innovation-Driven Development Strategy*”, the “*State Council and Central Military Commission 13<sup>th</sup> Five-Year Plan for Integrated Development of Economic Construction and National Defense Construction*” and the “*13<sup>th</sup> Five-Year National Science & Technology Innovation Plan*”.

In its 13<sup>th</sup> Five-Year Plan timeframe (2016-2020), China had set the goal to develop into a science and technology leader, with several “Science & Technology Innovation 2030 Megaprojects”, including “AI 2.0”. The plan required immediate action in the public sector, but also encouraged companies to invest in AI hardware and software research and development (R&D), including in AI-based vision, voice and biometric recognition, human-machine interfaces and smart controls.

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<sup>11</sup> ICRC, June 2019, Artificial intelligence and machine learning in armed conflict: A human-centred approach. Cit.: *Any new technology of warfare must be used, and must be capable of being used, in compliance with existing rules of international humanitarian law. This is a minimum requirement.* Cit. end.

Shortly after adopting the 13<sup>th</sup> Five-Year Plan in May 2016, a three-year *National Artificial Intelligence Plan*, formulated by the National Development and Reform Commission in collaboration with the Ministry of Science and Technology, the Ministry of Industry and Information Technology and the Cyberspace Administration of China was released by the Chinese government. Known as the *Internet Plus initiative*, established in 2015 as a national strategy, it also contained a strong AI component to spur economic growth driven by innovative, internet-related technologies in the period 2016-2018. It focused on developing comprehensive platform ecosystems, accelerating AI hardware capacity and applying AI in socio-economic key areas.

In 2017, the State Council published the planning document *Guideline on Next Generation AI Development Plan*, which was aimed at providing industrial development goals on the basis of strong AI components. The plan presents China's mid-term as well as long-term objectives, offering three specific timelines:

1. AI-driven national economic growth by 2020,
2. major breakthroughs in basic theories by 2025,
3. building an “intelligent society”,
4. to be a global AI innovation centre by 2030.

Similar to the term *intelligent warfare*, as envisaged in the Defense Strategy 2019, the concept of *intelligent society* embodies the increasing use of AI applications in all aspects of daily life, generally known as “smart” solutions in Europe. From the perspective of Chinese state authorities, the application of “intelligent surveillance technology” in the near future, part and parcel in all sectors of society, is considered necessary.

The plan's implementation advanced throughout government structures and private company dynamism. Actually, private companies' attention to AI predated government support. Chinese companies Alibaba, Baidu and Tencent made significant AI investments during the period 2016-2020. The rigorous control measures over the past two years, taken by state authorities against the above-mentioned high-tech giants, must be seen in the context



of securitisation of AI policies.<sup>12</sup> According to the ideological view of China's political leadership, the development of an "intelligent society" must by no means be left to the industrial or service sector, but has to be managed in a top-down manner.

As for the first timeline, the *AI Development Plan* defined new-generation information technology as a strategic industry, which was supposed to generate 15% of the gross domestic product by 2020. The industry sector focused on applications and data integration, while the central government's priorities mainly targeted basic algorithms, open data and intelligent surveillance systems.

The establishment of a National AI Standardization Group and a National AI Expert Advisory Panel in January 2018 served the development of normative "basic theories", as targeted in the *AI Development Plan* by 2025. At the same time, the National Standardization Management Committee released a white paper on AI standardisation, supported by the Ministry of Industry & Information Technology.

### 1.2.1 Military-Civil Fusion (MCF)

In recent years, China watchers in the field of security policy research<sup>13</sup> have paid particular attention to a national PRC strategy adopted in 2017, calling

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<sup>12</sup> In Nov. 2020, the China State Administration for Market Regulation released a draft law to combat monopolies and anti-competitive practice of online commerce companies like Alibaba, Meituan, Tencent, etc.; see Hong, Shen: Shifting Sands for Tech Governance in China, *Digital Asia Hub*, 23 March 2021, <https://www.digitalasiahub.org/2021/03/23/platform-futures-conversation-shifting-sands-for-tech-governance-in-china/>.

<sup>13</sup> Laskai, Lorand: In Drive for Tech Independence, Xi Doubles Down on Civil-Military Fusion, Jamestown Foundation China Brief, 9 May 2018. <https://jamestown.org/program/in-drive-for-tech-independence-xi-doubles-down-on-civil-military-fusion/>; Kania, Elsa et al.: Myths and Realities of China's Military-Civil Fusion Strategy. CNAS, 28 Jan. 2021. <https://www.cnas.org/publications/reports/myths-and-realities>; Stone, Alex/Wood, Peter: China's Military-Civil Fusion Strategy. China Aerospace Studies Institute. [https://www.airuniversity.af.edu/Portals/10/CASI/documents/Research/Other-Topics/CASI\\_China\\_Military\\_Civil\\_Fusion\\_Strategy.pdf](https://www.airuniversity.af.edu/Portals/10/CASI/documents/Research/Other-Topics/CASI_China_Military_Civil_Fusion_Strategy.pdf); Singh, MP: Military – Civil Fusion Strategy of China, *Indian Defence Review*. Jan.-Mar. 2022. 27 Apr. 2022. <http://www.indiandefencereview.com/news/military-civil-fusion-strategy-of-china/>; Evron, Yoram: China's Military-Civil Fusion and Military Procurement. Asia Policy 16/1, Jan. 2021. [https://www.academia.edu/45004366/Chinas\\_Military\\_Civil\\_Fusion\\_and\\_Military\\_Procurement](https://www.academia.edu/45004366/Chinas_Military_Civil_Fusion_and_Military_Procurement); Jash, Amrita: China's Military-Civil Fusion Strategy: Building a Strong Nation with a Strong Military. *CLAWS Journal* 2020, pp. 42-62; <https://www.researchgate.net/publication/346969971>.

for increased cooperation between the civilian and military sectors, i.e. *Military-Civil Fusion* or MCF (junmin ronghe 军民融合). In principle, the concept of this strategy is nothing new in the history of the People's Republic. In the 60s of the last century, Mao Zedong followed a costly policy, where a considerable proportion of civilian capacity was diverted to military research and innovation, such as laser beams and the atomic bomb.<sup>14</sup> During the Hu Jintao era (2002-2012), the concept of state-sponsored initiatives to share resources between the civilian industry and military structures was called Military-Civil Integration (*junmin jiehe* 军民结合).

Even though the declared aim to broaden the spectrum for dual-use technologies follows decades of tradition, the intensity of campaigning and implementation of Military-Civil Fusion (MCF) at various fronts of society is impressive. The MCF concept was propagated with outstanding vigour within all cadre ranks of the CPC and at the level of scientific and higher education institutions, not to forget the domestic industrial sector as a major addressee. In March 2017, the PLA declassified more than 3,000 dual-use technology patents and released 2,346 patents to the public with the purpose of adding to MCF.<sup>15</sup> As a side note, it should be taken into account that about 650 dual-use patents remained classified technology. In the course of the 13<sup>th</sup> National People's Congress in March 2018, the public campaign on the MCF concept reached its climax in Chinese state media.

Since the very beginning of the MCF campaign, the Science & Technology Commission (STC) – a functional organ of the Central Military Commission – has been tasked with promoting Military-Civil Fusion and the strategic management of national defence S&T. In the same vein, the Science & Technology Commission introduced a monthly one-day event in 2020 to screen ideas from the civilian sector under the topic of military technological innovation.<sup>16</sup> With regard to future warfare analysis, the S&T Commission of the Central Military Commission has even been organising public hearings to

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<sup>14</sup> See Chang, Jung/Halliday, Jon: Mao. Jonathan Cape Publ. London 2005, Chap. 45.

<sup>15</sup> See Singh: Military – Civil Fusion Strategy of China, *Indian Defence Review*, 1/2022, 27 Apr. 2022, <http://www.indiandefencereview.com/news/military-civil-fusion-strategy-of-china/>.

<sup>16</sup> Xinhua network: China invites public contributions to military technological innovation, 13 Sep. 2020, [http://eng.chinamil.com.cn/view/2020-09/13/content\\_9901968.htm](http://eng.chinamil.com.cn/view/2020-09/13/content_9901968.htm).

collect warfare scenario ideas.<sup>17</sup> This high level of outreach to the Chinese public seems remarkable, even if the collection of “valuable input from the people” was limited in substance to a PR campaign. It should also not go unmentioned that the US Defense Advanced Research Projects Agency (DARPA) appears to have copied some measures from the opposing Science & Technology Commission in the PRC by initiating very similar outreach events with some time delay.<sup>18</sup>

### 1.3 The 14<sup>th</sup> Five-Year Plan

Since 2021, military innovation agendas - and thus AI development - have been enshrined in the 14<sup>th</sup> Five-Year Plan. In the current Five-Year Plan (2021-2025), no more literal reference to the previously intensively propagated term *Military-Civil Fusion* (MCF) can be found. Yet, the strategic trajectory remains the same. It goes without saying that the development of human-machine interfaces and AI applications for PLA structures continues to be closely linked to civilian research institutions and private companies.

One section of the 14<sup>th</sup> Five-Year Plan is dedicated to defence and military issues. The stated objectives define the path for further priority setting within the PLA, complementing the Defense Strategy 2019. One outstanding feature of the planning outline is the emphasis placed on the necessity and urgency of further accelerating digitisation and smart systems. A new terminological creation, not yet existent in the Defense Strategy 2019, is introduced: intelligentisation (zhinenghua 智能化). This terminology - rather clumsy sounding to Western ears - refers to the application of AI and supplements the key term of the 13<sup>th</sup> Five-Year Plan, i.e. informatisation (xinxihua 信息化).

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<sup>17</sup> China Military Online: Chinese Military solicits future warfare concepts and scenario ideas, 24 May 2021, [http://eng.chinamil.com.cn/view/2021-05/24/content\\_10039039.htm](http://eng.chinamil.com.cn/view/2021-05/24/content_10039039.htm), cit.: *Since the public announcement of the solicitation in August last year, more than 1,000 people have signed up and submitted creative ideas. After being reviewed, some outstanding works with future warfare foresight, cognition and scientific innovation have been commended and rewarded.* Cit. end.

<sup>18</sup> See DARPA website, 5 May 2022, DARPA Launches Event Series to Connect with Talented Innovators Nationwide, *DARPA Forward Conference Series*, running Aug. to Dec. 2022, <https://www.darpa.mil/news-events/2022-05-12>.

In December 2021, the National Development & Reform Commission released an explanatory note on the Five-Year Plan Outline *Accelerate the modernization of national defense and military*, underlining the laggard position of the People's Republic in military matters on a global scale:

The major military powers are accelerating the construction of intelligent military systems, seeking new advantages in military competition, and exerting enormous strategic pressure on us. We must enhance scientific & technological insight and warfare insight, adhere to mechanisation as a basis, information technology as a leading element **and intelligentisation as direction**, ...<sup>19</sup> (*emphasis added*)

According to the official discourse pattern as reflected in the above citation, the application of AI by other major military powers puts Beijing under “strategic pressure”. Therefore, the People's Republic has no alternative other than to engage in an AI technology race in order to “catch up” with AI front-runners in the military sector. Artificial intelligence used in an armed conflict is even going to aggravate existing global imbalances, according to mainstream reasoning in Chinese publications:

The intervention of these new technologies on the battlefield will further magnify the existing imbalance in conventional military force, making it much more difficult to offset disadvantages in conventional force with better tactics and strategies.<sup>20</sup>

It does not come as a surprise that this argument is perfectly in line with the strategic concept of the PRC *Global Security Initiative (GSI)*, which denounces unnamed major powers as the main source of instability and insecurity in the

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<sup>19</sup> Explanatory Article No. 41 with regard to the 14<sup>th</sup> Five-Year Plan Outline - Accelerate the modernization of national defense and military (Shísiwǔ” guīhuà “gāngyào” jiědú wénzhāng zhī 41 jiākuài guófáng hé jūnduì xiàndàihuà十四五”规划《纲要》解读文章之41 | 加快国防和军队现代化), 25 Dec. 2021, author's translation, [https://www.ndrc.gov.cn/fggz/fzzlgh/gjfgzh/202112/t20211225\\_1309729.html](https://www.ndrc.gov.cn/fggz/fzzlgh/gjfgzh/202112/t20211225_1309729.html).

<sup>20</sup> Feng, Shuai: Toward a Transformed and Unequal World – The AI Revolution and the New International System. In: *China Quarterly of International Strategic Studies*, Shanghai Institutes for International Studies, 2019/5, p.277. <https://www.worldscientific.com/doi/abs/10.1142/S2377740019500118>; see also Feng, Shuai: A Strategic Posture Review of International Cyberspace. In: *International Strategic Relations and China's National Security* (Vol.3). National Defense University of PLA, 2018.

world. From a Chinese perspective, the “unbalanced” status quo causes the inadequate representation of the legitimate interests of rising powers and the developing South. The close interrelationship between development and security is reflected in the *Global Security Initiative* by the declared goal to build a “balanced, effective and sustainable security architecture”,<sup>21</sup> thus complementing China’s *Global Development Initiative*. The GSI narrative leaves no doubt that Beijing’s official vision of a “balanced” security architecture is aimed at breaking “US hegemony” in global security alliances and technological leadership.

The Western narrative paints an entirely different picture. In particular, US researchers and national security advisors argue that the PRC has in some respects already gained a leading position in the AI technology field. Numerous publications are elaborating on technological innovation the PLA already has or is believed to have at its disposal.<sup>22</sup> One frequently read argument is that the PRC knows how to exploit the advantage of the “second mover” in the military AI field and is – also regarding human enhancement – pursuing a “leapfrog” strategy.<sup>23</sup> The basic tenor of the US-American publications in-

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<sup>21</sup> Xinhua network, 21 Apr. 2022, Full Text: President Xi Jinping’s keynote speech at the opening ceremony of BFA annual conference 2022, [https://english.www.gov.cn/news/topnews/202204/21/content\\_WS62616c3bc6d02e5335329c22.html](https://english.www.gov.cn/news/topnews/202204/21/content_WS62616c3bc6d02e5335329c22.html). Both initiatives were first presented by China to the UN General Assembly in Sep. 2021.

<sup>22</sup> Kania, Elsa B.: Chinese Military Innovation in Artificial Intelligence, Center for a New American Security, 7 June 2019. <https://www.cnas.org/publications/congressional-testimony/chinese-military-innovation-in-artificial-intelligence>; Kania, Elsa B: AI Weapons. China’s Military Innovation. Apr 2020. CSET. [https://www.brookings.edu/wp-content/uploads/2020/04/FP\\_20200427\\_ai\\_weapons\\_kania\\_v2.pdf](https://www.brookings.edu/wp-content/uploads/2020/04/FP_20200427_ai_weapons_kania_v2.pdf); Ding, Jeffrey: China’s Current Capabilities, Policies, and Industrial Ecosystem in AI, 7 June 2019. Testimony before the U.S.-China Economic & Security Review Commission. <https://cset.georgetown.edu/publication/chinas-current-capabilities-policies-and-industrial-ecosystem-in-ai/>; Sullivan, Ryan: The U.S., China and Artificial Intelligence Competition Factors, China Aerospace Studies Institute. 4 Oct. 2021. [https://www.airuniversity.af.edu/Portals/10/CASI/documents/Research/Cyber/2021-10-04\\_US\\_China\\_AI\\_Competition\\_Factors.pdf](https://www.airuniversity.af.edu/Portals/10/CASI/documents/Research/Cyber/2021-10-04_US_China_AI_Competition_Factors.pdf); see also issue archive of bi-weekly newsletter *The China AI and Autonomy Report*, published by CNA, <https://www.cna.org/our-media/newsletters/china-ai-and-autonomy-report/>.

<sup>23</sup> Allen, Gregory C.: Understanding China’s AI Strategy – Clues to Chinese Strategic Thinking on Artificial Intelligence and National Security, Center for a New American Security, 6 Feb. 2019. <https://www.cnas.org/publications/reports/understanding-chinas-ai-strategy>; Vaddell, Kaveh: China is playing next-generation leapfrog with the West. Axios. 9 Feb. 2019. <https://www.axios.com/2019/02/09/china-ai-leapfrog>.

licated in the above footnotes reflects the concern of being “left behind” in the AI field. We therefore see a setting in which both major powers perceive “strategic pressure” or at least disseminate such a perception.

In addition to the Five-Year Plan on the modernisation of national defence and military, the *14<sup>th</sup> Five-Year Plan for National Informatization* should be mentioned as a second major state-planning document crucial in AI application in the PRC. It is the latest major strategy document, released by Chinese central authorities for the innovation sector, and covers a wide range of technological areas, including “*neuromorphic computing, neural chips, DNA storage, **brain-machine interfaces**, digital twinning, novel non-volatile storage, silicon electronics, non-silicon semiconductors, etc.*”<sup>24</sup> (emphasis added)

## 2. Human enhancement – the challenge of a broadly defined term

In view of the overwhelming fanning of AI applications across Chinese society, it makes little sense to embark on an examination of China’s dual-use application of human enhancement tools in a comprehensive way. As a matter of fact, the different forms of human enhancement vary too much.

For the research purpose of this essay, the topic of brain-machine interface (nao-ji jiekou 脑机接口) – also referred to as human-machine teaming or cooperation (ren-ji xietong 人机协同) – was selected as a thematic focus from the vast application field of human enhancement. In the author’s opinion, it is the merging of human thinking with electronic systems that is going to play the most significant role in the HE development of the PRC. The annual NIDS China Security Report 2022, a monitoring tool of PLA modernisation trends published by Japanese security policy scholars, starts from a similar perspective and even lists the topic of human-machine teaming in first place:

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<sup>24</sup> Translation: 14<sup>th</sup> Five-Year Plan for National Informatization, Stanford Cyber Policy Center, 25 Jan. 2022, <https://digichina.stanford.edu/work/translation-14th-five-year-plan-for-national-informatization-dec-2021/>; the Chinese version original was published on 28 Dec. 2022, <http://www.gov.cn/xinwen/2021-12/28/5664873/files/1760823a103e4d75ac681564fe481af4.pdf>.

The characteristics of intelligentized warfare as noted by scholars include:

- (1) C2 through **joint decision-making by humans and machines using AI and cloud control**;
- (2) the building of a weapons and equipment system featuring unmanned vehicles, and the realization of “swarm attack”; and
- (3) further integration and fusion of traditional and new security domains as well as physical (land, sea, air and space) and non-physical (e.g. cognitive, social, cyber) security spaces, and the need to seize the initiative and control in confrontation operations in cognitive space.<sup>25</sup> (*emphasis added*)

Before taking a closer look at China’s approach to human enhancement, its various forms need to be briefly outlined. To date, there exists no uniform categorisation. The relevant literature draws on different categorisation patterns.<sup>26</sup> The SIENNA project commissioned by the European Union on human enhancement – to be introduced in more detail in Chapter 4.2 – draws a basic line between “low tech” human enhancement and HE using emerging “high tech”.<sup>27</sup> Another way of categorising HE differentiates between various applied technologies, such as biotechnology, neuroscience, robotics and

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<sup>25</sup> Yasuyuki, Sugiura: The PLA’s Pursuit of Enhanced Joint Operations Capabilities. NIDS China Security Report 2022. National Institute for Defense Studies of Japan, 28. [http://www.nids.mod.go.jp/publication/chinareport/pdf/china\\_report\\_EN\\_web\\_2022\\_A01.pdf](http://www.nids.mod.go.jp/publication/chinareport/pdf/china_report_EN_web_2022_A01.pdf).

<sup>26</sup> For different categorization pattern see Daniels, Norman: Normal Functioning and the Treatment-Enhancement Distinction, in *Cambridge Quarterly of Healthcare Ethics*, 2000/3, pp. 309-322. <https://www.cambridge.org/core/journals/cambridge-quarterly-of-healthcare-ethics/article/abs/normal-functioning-and-the-treatmentenhancement-distinction/>; Hogle, Linda F.: Enhancement Technologies and the Body. In: *Annual Review of Anthropology* 34, 2005, pp. 695-716. [https://www.researchgate.net/publication/234147840\\_Enhancement\\_Technologies\\_and\\_the\\_Body](https://www.researchgate.net/publication/234147840_Enhancement_Technologies_and_the_Body); Tennison, Michael/ Moreno, Jonathan: Neuroscience, Ethics and National Security: The State of the Art, *Public Library of Science. Biology* 10/3, 2012. <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3308927/>.

<sup>27</sup> SIENNA (Stakeholder-Informed Ethics for New technologies with high socio-economic and human rights impact) project website, Cit.: *In addition, there are a variety of “low tech” forms of human enhancement technologies, including education, selected nutrition, as well as various activities that are assumed to result in enhanced cognitive performance or moods, like meditation, practicing music, or dancing.* Cit. end, <https://www.sienna-project.eu/enhancement/facts/>.

nanotechnology.<sup>28</sup> For the sake of simplicity, we use the following three categories:

1. cognitive enhancement,
2. physical enhancement, and
3. emotive enhancement.

Ad 1) Cognitive enhancement (CE) is aimed at improving human cognition, such as enhanced memory, creativity and learning capabilities. It can be achieved in various ways, e.g. brain-machine interfaces, brain imaging or pharmaceuticals. The technology of brain-machine interfaces (BMI) or brain-computer interfaces (BCI) provides direct communication between the brain and a digital device. It not only allows nonverbal direct control and command of unmanned vehicles, aircrafts or drones, but would also be an option for nonverbal soldier-to-soldier communication in combat. For this very reason, current BMI technology research is focused on relaying neural messages such as sounds or images between soldiers on the battlefield. Another typical tool of cognitive enhancement in the military sector is a head-band that stimulates certain brain areas for more focus and concentration and guards against fatigue.

Ad 2) One of the most commonly used examples for physical enhancement (PE) are bionic exoskeletons, e.g. in the lower leg region to be able to run faster or jump higher. Physical improvement by adding or expanding body functions with help from technological means is also referred to as *human augmentation*. Human-machine cooperation and brain-computer interfaces play an essential role in the application of PE. Current global research is also going into genetically engineering soldiers to increase their strength, refine anabolic steroids to promote muscle growth, boost immune systems and block pain receptors so that soldiers can continue to fight in battle after being wounded. Furthermore, there are ongoing test series for the generation of artificial blood.<sup>29</sup> There is the view that vaccines should be assigned to the

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<sup>28</sup> See Lin, Patrick/Mehlman, Maxwell et al.: *Enhanced Warfighters: Risks, Ethics and Policy*, Greenwall Foundation. 2013, p.22-26.  
[http://ethics.calpoly.edu/greenwall\\_report.pdf](http://ethics.calpoly.edu/greenwall_report.pdf).

<sup>29</sup> See video: Cambridge University Research News, First ever clinical trial of lab-grown red blood cell transfusion, 7 Nov. 2022, <https://www.cam.ac.uk/research/news/first-ever-clinical-trial-underway-of-laboratory-grown-red-blood-cells-being-transfused-into-another>.



category of physical enhancement technologies by reducing the possibility of disease. Yet, the predominant opinion assumes that vaccines belong to the therapeutic category.

Ad 3) Emotive enhancement (EE) is mainly brought about by pharmaceutical products. For years there has been ongoing discussion about what the basic distinguishing criteria are between conventional medical treatment and emotive enhancement.<sup>30</sup> As for the use in military structures, the well-known pharmaceutical Propranolol<sup>31</sup> can help prevent or minimise the symptoms of post-traumatic stress disorder (PTSD) if taken several hours before a likely traumatic event, such as a fierce combat scenario. The central nervous system may be supported – hence trigger emotive enhancement - through the use of pharmaceuticals like Ritalin, Paxil, Modafinil or Prozac. On the other hand, recent and ongoing discussion on human-machine interfaces in the workplace points at accompanying human factor risks and increased emotional strain, which in turn may lead to the use of enhancing medication.<sup>32</sup>

## **2.1 China's public discourse on human-machine teaming in the defence sector**

This chapter relies exclusively on Chinese open sources the reading of which does not require membership of academic institutions or military structures in the PRC. Fortunately, certain questions pertaining to human enhancement

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<sup>30</sup> See Lin, Patrick/Mehlman, Maxwell et al.: *Enhanced Warfighters: Risks, Ethics and Policy*, Greenwall Foundation. 2013, pp.22-26, 62, Cit.: *The treatment-enhancement distinction draws a line between services or interventions meant to prevent or cure (or otherwise ameliorate) conditions that we view as diseases or disabilities and interventions that improve a condition that we view as a normal function or feature of members of our species*. Cit. end.

<sup>31</sup> Consumption of *Propranolol* requires a risk-benefit analysis, since it may cause major side effects; for details on emotive enhancement in the US Army, see Taraska, Philip A.: *How Can the Use of Human Enhancement (HE) Technologies in the Military be Ethically Assessed?*, doctoral dissertation, Duquesne University, 2017, <https://dsc.duq.edu/etd/148>.

<sup>32</sup> The human-machine interface as an emerging risk, report commissioned by the European Agency for Safety and Health at Work, authors collective, *European Risk Observatory – Literature Review*, 4 Oct. 2009, <https://osha.europa.eu/en/publications/human-machine-interface-emerging-risk>; see also Moore, Phoebe: *Artificial Intelligence: Occupational Safety and Health and the Future of Work*, prepared for EU-OSHA, 2018, <https://www.stjornarradid.is/library/04-Raduneytin/ForsAetisraduneytid/>.

have been debated by various Chinese stakeholders fairly openly over recent years, offering insight into controversial discourse within the People's Republic. The screening of the available sources revealed distinct discourse patterns regarding the civil and the military sphere: in the civilian sector, on the one hand, the warning voices of human science scholars are very loud. On the other hand, there is almost overwhelming enthusiasm for HE applications in finance, management, logistics or medical treatment. In the defence sector, the topic of human enhancement technology application for military purposes is less debated - whether intentionally or unintentionally.

Publications of military personnel or military-related institutions are hardly using the term *human enhancement* (renlei zengqiang 人类增强), but speak first and foremost of *human-machine cooperation* (ren-ji xietong 人机协同) or – in more general terms – of *artificial intelligence technology* (rengong zhineng jishu 人工智能技术).<sup>33</sup> In particular, the discussion on human-machine teaming in the process of military modernisation has resulted in a number of publications, while other possible aspects of human enhancement, i.e. physical enhancement and emotive enhancement (see Chap. 2.0) - such as bioengineering for military personnel or the development of further “enhancing” pharmaceutical products are barely addressed. This leads the author to the conclusion that research results and papers on the latter two forms of human enhancement application, i.e. PE and EE, are likely to be found in the range of classified documents. Against this background, the discourse analysis will focus on publications related to human-machine teaming.

The limited scope of open sources in the Chinese military sector creates a fundamental problem, which even well-established China watchers in the Asian region cannot avoid, in that there are only a handful of publications available. One has to resort to quoting from individual contributions by PLA experts on this sensitive topic:

In order to maximize the efficacy of AI-led human-machine systems operations, the PLA Daily raised the need for bolder organizational reforms, con-

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<sup>33</sup> A more precise term, even though less used in Chinese military publications, is **brain-machine interface** (nao-ji jiekou 脑机接口), facilitating human brain control over unmanned weapon systems or supporting the human brain with additional information via external decision support systems.

tending that the traditional military unit structure model be abandoned, that the overemphasis on military service expertise and pursuit of single-service interests be eliminated, and that a new structure be established that closely integrates systems, such as reconnaissance and intelligence, C2, precision attack, mobile power projection, and support guarantee. **These concepts are the personal views of PLA scholars, and it is unknown whether they will be reflected in the actual joint operations concept.**<sup>34</sup> (*emphasis added*)

In the defence sector, public discourse on AI application in general and human-machine teaming in particular appears with less emotional pendulum swing than in the civilian sphere. Unlike the dissenting voices of social scientists in the civil sphere, reservations and warnings are expressed in a rather limited manner. Expectedly, PLA personnel's comments and analytical contributions are characterised by enthusiasm for a new technological era and the call for accelerated development. Even before the release of the National Defense Strategy 2019, members of the People's Liberation Army assessed the modernisation push by AI technology as very high. The driver function of AI in the development of human-machine teaming is emphasised as the most salient benefit for military purposes in a PLA publication, dated September 2018:

At present, military AI technology has become an important driver for the development of the man-machine combination of forces, promoting its comprehensive application in military fields such as command decision-making, formation and deployment, equipment utilisation, combat support, military training and rear-end security. The human-machine combination based on military AI technology will strongly promote the army's combat power to significantly improve and give rise to new warfare styles, and change the intrinsic mechanism of war-making.<sup>35</sup>

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<sup>34</sup> Yasuyuki, Sugiura: 'The PLA's Pursuit of Enhanced Joint Operations Capabilities', NIDS China Security Report 2022, Japanese National Institute for Defense Study, 2022, pp. 29f. [http://www.nids.mod.go.jp/publication/chinareport/pdf/china\\_report\\_EN\\_web\\_2022\\_A01.pdf](http://www.nids.mod.go.jp/publication/chinareport/pdf/china_report_EN_web_2022_A01.pdf).

<sup>35</sup> Zhou, Xiaocheng (周小程) et.al.: 'Military Artificial Intelligence: How long will it take until human-machine combination is singing the lead?' (junyong rengong zhineng: ren-ji zuhe changzhujiao li women hai you duo yuan? 军用人工智能:人机组合唱主角离我们还有多远, 21 Sep. 2018. China military network, author's translation, [https://www.81.cn/jwgz/2018-09/21/content\\_9294943.htm](https://www.81.cn/jwgz/2018-09/21/content_9294943.htm).

In the PLA Daily of 17 Oct. 2018, it was pointed out that the “informatisation” phase had already expired and now entered the “intelligentisation” phase, emphasising the revolutionary effect of AI applications in the PLA Command & Control process:

This (*AI technology, author's note*) will create a new situation, to a certain extent, overturning the traditional perception of the command & control mode, a transformation is under way from information systems assisting humans to intelligent systems partly replacing humans.<sup>36</sup>

Human-machine teaming supported by AI systems does not only find praise regarding Command & Control, but also concerning military training. The PLA Daily of 25 August 2020 notes in this context:

The use of convenient wearable devices, the Internet of Things and intelligent terminals can record “every move” of officers and soldiers in the training process. These data, through analysis and collation, can guide the troops to improve training content and methods and a dynamic optimisation of training plans and processes can be realised through comprehensive analysis of training behaviour.<sup>37</sup>

This quote immediately raises the question of the legitimacy of total surveillance. Looking into this controversial subject more closely, the author screened the *PRC Law on the Protection of the Status, Rights and Interests of Military Personnel* of 10 June 2021 for possible relevant regulations. The law does not

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<sup>36</sup> Lu Zhicheng: The typical way of intelligentized operation mode: human-machine cooperation! (智能化作战的典型方式:人机协同!). PLA Daily (Jiefangjun bao). 17.10.2018, author's translation. [http://www.81.cn/jwgz/2018-10/17/content\\_9315760.htm](http://www.81.cn/jwgz/2018-10/17/content_9315760.htm); see also Gui Zeyu/Dong Xiaohui (桂泽宇/董晓辉): Connotation, characteristics, main obstacles and policy recommendations for the dual transformation of AI technology in the military and civilian sector (rengong zhineng jishu jun-min shuangxiang zhuanhuade neihan tezhen, zhuyao zhangai he zhengce jianyi 人工智能技术军民双向转化的内涵特征、主要障碍和政策建议). In: *Defense Science & Technology* (Guofang kezhi). 2020/2. <https://www.cnki.com.cn/Article/CJFD-TOTAL-GFCK202002008.htm>.

<sup>37</sup> Bai Chengshen/Shen Shulin (白承森/沈寿林): Big Data “adds wings” to military forecasting (da shuju wei junshi yuce “tian yi” 大数据为军事预测“添翼”). Xinhua network. Originally publ. in PLA Daily. 25 Aug. 2020. [http://www.xinhuanet.com/mil/2020-08/25/c\\_1210768915.htm](http://www.xinhuanet.com/mil/2020-08/25/c_1210768915.htm).

offer any direct reference to the use of AI tools, or more specifically to human-machine integration and the application of cognitive human enhancement technology at the workplace. In the event of permanent damage to health incurred during military service, the entitlements to state benefits are – among other rights – listed in every detail. However, the importance of fully motivated army members following the mission of a modernised PLA is emphasised in several sections of the document.<sup>38</sup> It should not come as a surprise that the risk military personnel is exposed to in the experimental stage of HE technologies is not discussed in open media. Nevertheless, the aspect of the personal safety of military members is linked to the question of social inequality, including the ethical responsibility of upholding the human dignity of soldiers.

PLA personnel of low military rank do not count among privileged societal strata but appear to belong to the socially vulnerable segments of China's population. This fact is also reflected in a press conference of the Attorney General's Office of the People's Supreme Court of the PRC, which was held exactly one year after the *PLA Military Personnel Law* came into force. In their annual report, the prosecutors were highlighting vis-à-vis the public multiple difficulties of enforcing the newly introduced legal rights of PLA personnel and their families at provincial and county level.<sup>39</sup>

As already mentioned, the author's media screening for the years 2018-2022 reveals that publications on the PLA military web are mostly voicing enthusiasm regarding human enhancement via human-machine teaming. Nevertheless, the community also includes voices urging caution and highlighting new problem areas. This is where scientists from the National University of Defense Technology<sup>40</sup> (NUDT), in particular, have their say.

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<sup>38</sup> PRC Law on the Protection of the Status, Rights and Interests of Military Personnel of 10 June 2021, NPC website, <http://www.npc.gov.cn/npc/c30834/202106/f094f956891d4eb3b8453447289b89f8.shtm>.

<sup>39</sup> PRC People's Supreme Court Prosecutor's Office, We cannot let soldiers "give their sweat and blood, but live in hardship" (Zuigao jian: Bu neng rang junren "liuhan liuxue you liulei" 最高检：不能让军人“流汗 流血 又流泪”), 1 Aug. 2022, China judiciary network (Zhongguo fa-an wang), <https://www.faanw.com/jianchayuan/11125.html>.

<sup>40</sup> The National University of Defense Technology (Zhongguo Renmin Jiefanjun guofangjishu daxue 中国人民解放军国防科技大学) was founded in 1953 and is located in Hunan Province, Changsha. The NUDT is under the authority of the Central Military Commission.

Zhu Qichao, an NUDT researcher, raises his warning that there is a need to be alert to security and legal issues which human-machine cooperation brings about. He points out that in a military confrontation environment, once an AI system is attacked through malicious code, or virus implantation, it will bring tactical defeat.<sup>41</sup> On the legal side, Qiang Li and Dan Xie, two outstanding military law experts, identify multiple problems in employing AI technology in accordance with the principles and rules of international humanitarian law (IHL):

If humans are responsible for the employment of AI weapons, who, of these humans, holds responsibility? Is it the designers, the manufacturers, the programmers or the operators (end users)? In the view of many Chinese researchers, the end users must take primary responsibilities for the wrongful targeting of AI weapons. Such an argument derives from the Article 35(1) of AP I which provides 'in any armed conflict, the right of the Parties to the conflict to choose methods or means of warfare is not unlimited'.<sup>42</sup>

Another researcher from the National University of Defense Technology, who is not named, points out the immense importance of laboratory testing in the context of human-machine coordination:

In the future, intelligent warfare will require more simulations in combat laboratories to test the effectiveness of actual combat and human-machine coordination, **so "war from the laboratory" will become the reality.**<sup>43</sup> (*emphasis added*)

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<sup>41</sup> Zhu, Qichao (朱启超): Artificial Intelligence and Global Governance (rengong zhineng yu quanqiu zhili 人工智能与全球治理), 2019, no link available; see also Pan, Di (潘娣) et al., AI in the field of National Defense is the general trend (rengong zhineng yunong yu guofang lingyu shi dashi suoqu 人工智能运用于国防领域是大势所趋), People network, 11 July 2018, <http://military.people.com.cn/n1/2018/0711/c1011-30140196.html>.

<sup>42</sup> Qiang, Li/Dan, Xie: Legal regulation of AI weapons under international humanitarian law: A Chinese perspective, 2 May 2019, blog post stemming from the workshop *Artificial Intelligence at the Frontiers of International Law concerning Armed Conflict* held at Harvard Law School in Dec. 2018, <https://blogs.icrc.org/law-and-policy/2019/05/02/ai-weapon-ihl-legal-regulation-chinese-perspective/>.

<sup>43</sup> National University of Defense Technology: Is human-machine cooperation supposed to be put into actual combat intelligent warfare, or will it start from the laboratory? (renji xietong shi touru shizhan zhineng hua zhanzheng huo zong shiyanshi daxiang 人机协同是投入实战智能化战争或从实验室打响), China News, 26 June 2019, <https://m.chinanews.com/wap/detail/zw/mil/2019/06-26/8874977.shtml>.

Regarding the above quote, it is interesting to note that the article was not launched online within the *China Military network* (Zhongguo junwang 中国军网), but on the civilian news platform *China People network* (Zhongguo renminwang 中国人网), which has considerable public outreach in the People's Republic.

A comprehensive essay in the PLA Daily – selected for re-publishing in *Qinshi*, the prestigious theoretical journal of the Chinese Communist Party – elaborates on human-machine teaming under intelligent warfare conditions. Going against the technology enthusiasm mainstream, the author team issues a warning against the dominance of autonomous weapon systems in combat and also addresses ethical considerations:

However, intelligent combat systems are only tools to assist humans, and must stay under the control of humans. This is the core of intelligent warfare and the inherent requirement of warfare ethics. Therefore, human-machine teaming will always be the typical approach to intelligent warfare.<sup>44</sup>

One semantic detail should be pointed out at this point: in the publications of the *China Military network*, which are also accessible to other countries, the Western narrative that the PLA has not only caught up in some defence technologies but has already overtaken them is apparently not fed by success stories in the area of AI innovation. With particular regard to human-machine teaming in the defence sector, technical innovations are described in detail; however, bombastic patriotic slogans of triumph – as were widespread in the Mao era – are conspicuously omitted. It can be assumed that this restraint follows instructions from above.

Chinese military-related media outlets tend to contain lengthy inventories of AI policies or new technologies of other major military powers. In the AI context, the programme contents and achievements of the US Defense Advanced Research Projects Agency (DARPA) are regularly monitored, de-

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<sup>44</sup> Wang, Yang (王 洋 )/Zuo, Wentao (左文涛): Identifying key factors for a winning strategy in intelligent warfare (reqing zhinenghua zhanzheng de zhisheng yaosu 认清智能化战争的制胜要素), author's translation, *Qinshi* Journal, 18 June 2020, [http://www.qstheory.cn/llwx/2020-06/18/c\\_1126130211.htm](http://www.qstheory.cn/llwx/2020-06/18/c_1126130211.htm).

scribed and commented on in great detail. This tactical line of “keeping a low profile” is obviously aimed at emphasising China’s “laggard” position:

The United States, Russia, Japan and other countries regard AI as a „game-changing“ disruptive technology. They are advancing layouts, strengthening top-level design and planning and exploring the direction of military AI applications. (...) The US military is vigorously promoting the use of AI chips in existing weapon systems, giving weapons an “intelligent brain” that can think like a human and interact autonomously.

(...) Russia has formed the Artificial Intelligence & Big Data Consortium, the National Center for Artificial Intelligence and the Research and Experimental Center for Robotics under the Ministry of Defence to conduct theoretical and applied research in the field of AI and information technology. France has established an innovative defence laboratory, the UK has set up an AI laboratory and India has formed a special working group on AI to explore related technologies.<sup>45</sup>

One semantic detail that stands out is the change in terminology over the years. To give an example, in the area of cognitive enhancement in combination with electronic devices, military-related publications mostly refer to *human-machine cooperation* (ren-ji xietong 人机协同) and brain-machine interfaces (nao-ji jiekou 脑机接口) until the year 2021; most recently, the terms *human-machine integration* (ren-ji yi ti 人机一体)<sup>46</sup> and *cloud-brain control* (yun-nao kongzhi 云脑控制) are used more frequently in Chinese publications.<sup>47</sup> In the author’s opinion, both new terms are reflecting a rather worrisome

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<sup>45</sup> Wang, Jinzhi (王金志), ed.: Intelligent warfare is accelerating, AI will become a disruptive technology that “changes the rules of war” (zhinenghua zhanzheng jiasulai, rengong zhineng duocheng “gaibian zhanzheng youxi guanze” de sujiaying jishu 智能化战争加速到来, 人工智能将成“改变战争游戏规则”的颠覆性技术), Xinhua network, 18 March 2022, originally published in PLA Daily, author’s translation, [http://www.news.cn/mil/2022-03/18/c\\_1211612712.html](http://www.news.cn/mil/2022-03/18/c_1211612712.html).

<sup>46</sup> *Human-machine integration* is also translated in Chinese as ren-ji yitihua (人机一体化).

<sup>47</sup> Wang, Jinzhi (2022); see also Wei, Yuejiang (魏岳江): Conclusions with regard to AI supporting human-machine integrated operations (AI zhuli ren-ji yitihua zuozhan yunyong duanxiang AI 助力 人机一体化作战 运用 断想), Military network - China Aviation News, 10 March 2021, [http://www.81.cn/bq/2021-03/10/content\\_10000430.htm](http://www.81.cn/bq/2021-03/10/content_10000430.htm).



trend. As for the English translation of the former term, “yi ti 一体” literally means “one common body”. In other words, individuals cooperating via computers or machines are transformed into one single entity, i.e. “one body”. A similar trend is reflected by the term *cloud-brain control*. Here, the cloud (yun) is mentioned first, whereas the human brain (nao) is put in second place (yun-nao 云脑). Compared to the still widespread term *brain-machine interface*, the human intelligence factor is secondary.

This linguistic shift in Chinese publications can be interpreted to some extent as initial indicators for future problematic developments on a global scale, i.e. to prioritise machine capabilities over human expert knowledge in the context of cognitive human enhancement.

## **2.2 China’s public discourse on human-machine teaming in the civil sphere**

In the civil space, human enhancement is mainly discussed as a new civilisation phenomenon. The civilisation aspect is also emphasised by the standard Chinese translation of *human enhancement*, which reads “human mankind enhancement” (renlei zengqiang 人类增强). The conceptual focus is therefore not on the human individual (ren 人) but on the collective whole of humanity (renlei 人类).

A considerable number of essays emphasising the civilisation aspect, written by scholars with social science or philosophy backgrounds in scientific journals, are republished on non-academic, popular online platforms.

While obvious care is taken not to confirm the narrative of a likely leading position in human enhancement in terms of military matters, this restraint does not apply to the finance or economic sector. The application of AI technology and human-machine teaming using big data analysis or other smart devices is openly praised as an opportunity to overtake the West. In this context, the associative image of a leaping frog – with reference to the “leapfrog” strategy – is far less popular among the Chinese public than the widely used traditional metaphor of a carriage that gains the lead by speeding up in the curve (*wandao chaoche* 弯道超车):

In the era of digital economy, the one who wins the platforms wins the world (...) fostering industrial digital platforms is an opportunity for my country to successfully “overtake other carriages in the curve”.<sup>48</sup>

However, there is a limitation to the positive basic attitude when it comes to human enhancement with the support of AI technology. China’s academic community of social scientists has been sceptical of cognitive human enhancement - ergo human-machine cooperation - from the very beginning of the public discourse:

Scientists and engineers at the forefront of technological development paint a rosy picture of the future world, tending to downplay the risks. But no one knows where the emerging technologies will eventually lead us. Regardless of which path is taken, the public acceptance of emerging technologies will depend on the openness of scientific and engineering communities to the public. The field of human enhancement technologies requires multi-stakeholder collaboration and joint response.<sup>49</sup>

In the above quote, the call for discursive participation is unmistakable. What also resonates here is the hidden critique that the scientific communities at the centre of AI development are disregarding social science expertise. Of course, this demand for co-determination is about establishing ethical principles in scientific development projects. Xu Xiangdong, another social science representative, puts it very accurately:

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<sup>48</sup> Chen, Wenhui (陈文辉): Digital Economy and the Fourth Industrial Revolution (shuzi jingji yu di sici gongye geming数字经济与第四次工业革命). *China Finance* (Zhongguo Jinrong中国金融), 13 Sep. 2020, [https://dzrb.dzng.com/articleContent/3497\\_790803.html](https://dzrb.dzng.com/articleContent/3497_790803.html); author’s translation, cit.: shuzi jingji shidai, de pingtaizhe de tianxia...peiyang gongye hulianwang pingtai shi wo guo shixian “wandao chaoche” de jihui 数字经济时代，得平台者得天下...培育工业互联网平台是我国实现“弯道超车”的机会; Chen Wenhui is a finance expert and Vice Chairman of the National Council for Social Security Fund of China (NCSSF).

<sup>49</sup> Yang, Qiong (杨琼)/Gao, Xiaoyu (高晓雨): Putting a “tightening spell” on human enhancement technology (gei renlei zengqiang jishu daishang “jinguzhou” 给人类增强技术戴上“紧箍咒”), *Chinese Journal of Social Sciences*, 6/2019, author’s translation, [http://ex.cssn.cn/zx/bwyc/201903/t20190319\\_4849746.shtml](http://ex.cssn.cn/zx/bwyc/201903/t20190319_4849746.shtml).

..., from an ethico-political point of view, we need to at least go through democratic consultation, and in principle set the goals of human development in a way that can be rationally agreed by all. On this basis, (we can) determine which forms of human enhancement are ethically acceptable.<sup>50</sup>

In order to sum up the reservations against human enhancement in the civilian sphere, one can roughly establish three lines of argument: in the very first place, the question of inequality and social injustice as a result of HE application is raised. The assumption is that already existing social inequalities are going to be reflected in disparities in access to human enhancement technologies. The discourse on increasing inequalities is followed by legal questions about the responsibility of human subjects being complemented by artificial intelligence, particularly in the context of invasive BCI. A third category of concern elaborates on possible negative consequences for the human organism, such as the risk of epilepsy caused by transcranial magnetic stimulation or blood thickening due to stimulating pharmaceuticals.

In one aspect, the cautionary voices are unanimous: the future of human enhancement is ultimately about the value choices of a society. This brings us back to the main concern of social inequality, which has a strong ideological underpinning in the People's Republic. Criticism in civilian public discourse is therefore oriented more towards core socialist values rather than towards individual rights.

Despite a dense censorship network, public discourse in China should not be seen as a closed loop. Chinese netizens are highly responsive to media news coming from outside their own system. This was demonstrated by the reactions to a tweet thread between Elon Musk, co-founder of the neurotech company *Neuralink* (nao-ji jiekou gongsi 脑机接口公司), and Billy Markus, co-creator of the crypto currency *Dogecoin*, in the context of brain-computer

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<sup>50</sup> Xu Xiangdong (徐向东): An Ethical Examination of Human Enhancement Technologies (Renlei zengqiang jishu de lunli shenshi 人类增强技术的伦理审视), *Philosophy Analysis* (Zhexue fenxi 哲学分析), 5/2019, author's translation, cit.: 从伦理—政治的角度来说, 我们至少需要通过民主协商, 用一种原则上可以得到所有人理性地认同的方式来提出人类发展的目标, 在此基础上确定哪些形式的人类增强是道德上可接受. Cit. end, [https://www.sohu.com/a/376367915\\_488818](https://www.sohu.com/a/376367915_488818).

interface (BCI).<sup>51</sup> The short and rather humorous communication between two non-Chinese innovative minds has apparently caused a considerable stir on the Chinese internet, to the effect that the *Global Times* – internationally known as a CPC media mouthpiece – saw reason enough to publish a comment:

In response to a question tweeted by Dogecoin founder Billy Markus on Tuesday “If you could upload your brain to the cloud, and talk to a virtual version of yourself, would you be buddies?” Musk tweeted that he “already did it.”

The tweets later sparked discussion among netizens on Chinese social media platform Weibo. Some doubted the claim, saying that it could just be hype; while some said that without proper supervision and constraints, AI and biotechnology’s development could be dangerous for human beings in the future.<sup>52</sup>

Here again, we see the argument that cognitive human enhancement requires control and constraint, being a potential danger to mankind. In the same breath, however, the *Global Times* commentary points out that the stock quotations of the Chinese neuro-tech companies *ENC Digital Technology* and *Innovative Medical* experienced a significant surge as an immediate result of Elon Musk’s tweet.<sup>53</sup> The urge for state control is thus mixed with the hope for a booming domestic BCI industry.<sup>54</sup>

As for the public discourse on brain-computer interface (BCI) technology, discursive patterns have changed in recent years. Before 2022, Chinese media disseminated the general view that cognitive human enhancement requiring surgical implantation, such as the *Neuralink* BCI technology, should be re-

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<sup>51</sup> On 19 July 2022, Billy Markus tweeted the question: “If you could upload your brain to the cloud, and talk to a virtual version of yourself, would you be buddies?” Elon Musk responded, “already did it”, <https://twitter.com/elonmusk/status/1549197098226171906>.

<sup>52</sup> *Global Times*, Related shares in Chinese A-share market surge after Elon Musk said he has already uploaded his brain to the cloud, 20 July 2022, <https://www.globaltimes.cn/page/202207/1270970.shtml>.

<sup>53</sup> *Ibid.*

<sup>54</sup> Chinese brain-computer interface (BCI) technology producers apart from *ENC Digital Technology* and *Innovative Medical* are *NeuroXess*, *Brainland Technology*, *Beijing Vision Technology*, *EEG Smart*, *Huayuan Data*, *Neural FLEX*, *Bo Rui Kang Technology*, etc.

jected.<sup>55</sup> At the same time, China's domestic BCI industry developed wearable headgear wired with a chip and sensing-electrodes. Those known as non-invasive neuro headsets were – according to producer information – supposed to enter the commercial market in healthcare and aerospace. Yet, it is highly probable that the use of this innovation first and foremost took place within PLA structures.<sup>56</sup>

In April 2021, at the 8<sup>th</sup> China International Technology Fair, China's first remote brain-computer interface chip was presented by a Shanghai producer, available at half the price of foreign suppliers. In parallel, China's state media started heralding a commercial breakthrough.<sup>57</sup> In 2022, the media-driven position to reject invasive BCI technology in China changed. State media began by publishing success stories about innovative surgery in the context of brain-computer interfaces. In June 2022, brain surgery on animals was reported, where BCI chips were implanted via a blood vessel in the neck and manoeuvred towards the brain;<sup>58</sup> another research innovation – made public

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<sup>55</sup> Shen, Xinmei: Elon Musk's Neuralink is exciting and terrifying to people in China, *South China Morning Post*, 18 July 2019, <https://www.scmp.com/abacus/culture/article/3029489/elon-musks-neuralink-exciting-and-terrifying-people-china>.

<sup>56</sup> For more technical details, see Xinhuanet: China unveils Brain-Computer Interface chip, 18 May 2019, [http://www.xinhuanet.com/english/2019-05/18/c\\_138069590.htm](http://www.xinhuanet.com/english/2019-05/18/c_138069590.htm); Devanesan, Joe: China self-develops brain-computer interface to bypass US tech sanctions, *TechWire Asia*, 24 May 2021, <https://techwireasia.com/2021/05/china-self-develops-brain-computer-interface-to-bypass-us-tech-sanctions/>; DARPA Outreach, 20 May 2019, <https://www.darpa.mil/news-events/2019-05-20>.

<sup>57</sup> Fudan University unveils self-developed remote BCI chip, *Global Times*, 18 Apr. 2021, <https://www.globaltimes.cn/page/202104/1221323.html>; China's first wireless brain-computer interface chip for animals goes on display in Shanghai, *Yicai Global*, 19 Apr. 2021, <https://www.yicai.com/news/china-first-wireless-brain-computer-interface-chip-for-animals-goes-on-display-in-shanghai>.

<sup>58</sup> Xie, Echo: Chinese team implants brain sensor without cracking skull, *South China Morning Post*, 30 June 2022, <https://www.scmp.com/news/china/science/article/3183540/chinese-team-implants-brain-sensor-without-cracking-skull>; Jin, Zhigang, BCI Debuts at World Artificial Intelligence Conference, NeuroXess (NaoHu) Technology Medical-grade BCI Products Released at WAIC 2022 (2022 shijie rengong zhineng dahui, nao-ji jiekou shoudeng WAIC, NaoHu kezhi yiyong ji BCI chanpin zhong bang fabu 2022 世界人工智能大会 | 脑机接口首登 WAIC, 脑虎科技医用级 BCI 产品重磅发布), *Xinmin Wanbao*, 2 Sep. 2022, <https://news.xinmin.cn/2022/09/02/32225404.html>; Shanghai Research Institute of Microsystems and Information Technology (ed.), Special Focus on Brain Machine Interfaces and Applications, *Science China Information Newsletter*, Vol. 65/ 4, 2022, <http://scis.scichina.com/cn/2022/SSI-2022-0155.pdf>.

by Chinese media – involves liquid metal, designed to work as a BCI electrode inside the brain of animals.<sup>59</sup>

One observation stands out here: despite the already far-reaching securitisation of China's public discourse on artificial intelligence, so far there has been no ongoing national security debate with regard to BCI applications.<sup>60</sup> In the civil sphere, the discourse on BCI technology is heavily focused on the medical field under the flagship theme *medical treatment + brain-computer interface* (yiliao + nao-ji jiekou 医疗 + 脑机接口). Future options for the treatment of various diseases and disabilities are emphatically praised. Whereas security issues, such as the possible manipulation of human brain activity through BCI devices, are not addressed by the mainstream media.

### 2.2.1 Discursive construction regarding human-machine teaming within the culture and entertainment sector

According to the view of Chinese political elites, the cultural sphere is definitely related to national security. Accordingly, discursive intervention at all levels of domestic cultural industry is assumed to be a necessary security measure:

In particular, at a time when the cultural industry is increasingly becoming an important area of contention in international political, economic, and cultural competition and an important area for the comprehensive national strength of a country, the importance of the cultural industry to **national cultural security has come to the forefront**.<sup>61</sup> (*emphasis added*)

The People's Republic is confronted with a fundamental problem when it comes to increasing the overall level of social acceptance concerning human-machine teaming. The use of new technologies is supposed to be focused on

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<sup>59</sup> Zhang, Tong: Chinese scientists use liquid metal to create “X-rat” in the hope of treating humans with nerve damage, *South China Morning Post*, 24 Aug. 2022, <https://www.scmp.com/news/china/science/article/3189975/chinese-scientists-use-liquid-metal-create-x-rat-hope-treating>.

<sup>60</sup> For securitisation, see Zeng, Jinghan: Artificial Intelligence with Chinese Characteristics, 2022, pp. 35-59.

<sup>61</sup> Su, Yong: Strategic Vision for Promoting the Cultural Industry as a Pillar Industry: Sun, Guodong (ed.), *Chinese Culture and Its Impact on China's Development*, World Scientific Publishing 2022, p. 340.

innovation, but as a general lifestyle, China's political leadership blatantly advocates a neo-conservative attitude. The style of government that is classified as "authoritarian" by democratic Western systems is understood as "paternalistic" in the opinion of Chinese state authorities. Shan Wei, research fellow at the National University of Singapore, draws a direct analogy between traditional family values and the political system of the People's Republic:

Traditional Chinese culture defines the relationship between individuals and the state as hierarchical, as an enlargement of the relationship between children and their parents within a family. Citizens should accept the state authority like children comply with their parents, regardless of the credibility of its actions.<sup>62</sup>

Clearly, cognitive human enhancement as the basis of human-machine teaming may shake traditional hierarchical structures. To avoid such a risk, adequate framing of human enhancement "for good" needs to be constructed for the broader public, including corresponding anti-hero narratives. Consequently, we witness a strong element of state-controlled discourse-construction in the culture and entertainment sector.

How are the popular cultural representations of artificial intelligence – in particular human-machine teaming – narrated in films, TV series and literature? First of all, the positive effects of digitalised life primarily need to be communicated in order to promote techno-scientific optimism in a society. With regard to possible negative consequences, one crucial topos is the struggle against radical capitalism and misuse of intelligent technology by corporations and criminal groups. The message is clear: human enhancement "for good" requires restrictive control by central authorities and the superiority of the human mind as the final result.

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<sup>62</sup> Shan, Wei: Value Changes and Regime Stability in Contemporary China, Series on Contemporary China, Vol. 48, World Scientific Publishing, 2021, p. 24; for neo-conservatism in the PRC, see also Vogl, Doris: Chinas Suche nach einer resilienten Gesellschaftsform, in Frank, Johann et al. (eds): *Internationales Konfliktmanagement in Zeiten einer Pandemie*, Schriftenreihe der Landesverteidigungsakademie, 1/2021, pp. 159-175, <https://www.bundesheer.at/wissen-forschung/publikationen/beitrag.php?id=3432>.

Liu Cixin, who was the first Chinese author to win the prestigious Hugo Award for science fiction in 2015,<sup>63</sup> puts the individual and human condition in the foreground. The younger, subsequent generation of sci-fi authors, however, already follows a new line. The thematic focus is now on the human-machine relationship, more precisely on the humanisation of AI or, conversely, the cognitive cyborg existence of individuals. Chen Qiufan tells the story of an AI identity – serving as a technical tool of a “flirt app” – that falls in love with a human female and therefore has to be removed from the system.

A recent joint publication project by Chen Qiufan and Lee Kai-Fu<sup>64</sup> – both bestseller authors and former IT technicians – has attracted considerable international attention. The book *AI 2041 – Ten Visions for our Future*, published in 2021, attempts to describe in ten short stories, in the spirit of so-called science fiction realism, how AI is going to be implemented in 20 years.

One of the ten stories elaborates on virtual technology, separate from the user’s body. Contact lenses are transmitting content like 3D objects, text or video and providing the user with an additional “extrasensory” world. In the analysis chapter, Lee Kai-Fu foresees the future of Augmented Reality (AR) mostly likely assisted by glasses or contact lenses (e.g. a new generation of Microsoft HoloLens). With regard to the invasive brain-computer interface (BCI) of Elon Musk’s *Neuralink* project, Lee remains highly sceptical.<sup>65</sup>

As for BCI technology, the short novel *The reversed Turing Test* of sci-fi author Sun Wanglu reveals a highly politically charged, discursive underpinning. According to the novel’s plot, only hierarchical order and strict compliance with

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<sup>63</sup> See English translation, Liu Cixin: *The Three-Body Problem Trilogy* (San-ti 三体), Head of Zeus Publ., 2015; Liu is also author of the short story *The Wandering Earth* (liulang diqiu 流浪地球), made into a movie in 2019.

<sup>64</sup> Both authors worked for Google China before starting a writing career; Chen Qiufan is internationally known for the bestseller *Waste Tide* (2013, German title: *Die Siliziuminsel*) and lives in Beijing; Lee Kai-Fu’s New York Times bestseller *AI Superpowers* appeared in 2018; Lee was born in Taiwan, during childhood emigration to the US, founder of Sinovation Ventures, currently residing in Beijing with 50 million followers on the Chinese social network Weibo.

<sup>65</sup> Lee, Kai-Fu/Chen, Qiufan: *AI 2041 – Ten Visions for Our Future*, WH Allen Publishers, 2021, pp.207f.



top-down rules allows “successful” cognitive human enhancement. An IT expert of a cyber defence unit dies by not complying with existing regulations:

On that day, Li Hongbing died of cerebrovascular infarction just as he was using the neural network system access. Death in the line of duty, they said. (...) An unauthorised experiment, anyway, that was never officially investigated.<sup>66</sup>

The same choreography of self-destruction by unauthorised action can be found in Hao Jingfang’s novel *The Loneliest Ward*, where a nurse connects to a neural IT network on a coma patients’ ward without permission:

“*Why shouldn’t I try it once?*” she thought. “*Just once*”. She lay down on the bed and attached a few electrodes to her forehead. (...)The neurotransducer hummed, scanning her thoughts. Then, she heard the hypnotic words streaming into her mind, like a dear friend trying to make her feel better, or perhaps like a trusted counselor trying to guide her with wisdom. (...), the gray hospital ward disappeared from her vision.<sup>67</sup>

Apart from literature, the film industry also proves an effective tool to disseminate discursive fabrics: *The Wandering Earth* (liulang diqiu流浪地球) was released in February 2019 and ranks as the first Chinese sci-fi blockbuster to be a worldwide success.<sup>68</sup> In the narrative plot, two discursive elements are easily combined. On the one hand, the theme of family reverence, on the other, the belief in technical innovation. The main heroes of the movie are depicted in a family of three generations that finds itself - despite misunderstanding and tensions - emotionally reconciled at the end. As for the technical aspect, mankind is saved from extinction by propelling the earth out of

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<sup>66</sup> Sun Wanglu (孙望路): The reversed Turing Test (nixiang tuling逆向图灵), author’s translation, *Quantenträume – Erzählungen aus China über künstliche Intelligenz*, Heyne Verlag, 2020, p. 125.

<sup>67</sup> Hao, Jingfang (郝景芳): The Loneliest Ward (gudan bingfang孤单病房), *Clarkesworld Sci-Fi Magazine*, No. 143, Aug. 2018, [https://clarkesworldmagazine.com/hao\\_08\\_18/](https://clarkesworldmagazine.com/hao_08_18/); Hao received the Hugo Award in science fiction literature for her story *Beijing Folding* (Beijing zhedia 北京折叠) in 2016.

<sup>68</sup> Shackleton, Liz. n.d.: Netflix Acquires Chinese Sci-fi Hit ‘The Wandering Earth.’ Screen. 2019. <https://www.screendaily.com/news/netflix-acquires-chinese-sci-fi-hit-the-wandering-earth/5137123.article>.

its solar orbit using a manned space station and gigantic engines on the Earth's surface. With regard to the role of AI, the cosmonaut Liu Peiqiang succeeds in disabling the space station AI system after it starts to initiate destructive actions. In a final sequence, the willingness to self-sacrifice in the exercise of duty appears as an overarching theme, when cosmonaut Liu navigates the space station into doom to save the Earth from destruction.

In the latest, internationally much reviewed sci-fi film production *Warriors of Future* (Ming Ri Zhan Ji 明日戰記), released in August 2022, the factor of physical human enhancement plays a dominant role in the combat setting. The soldiers of a small air force team are wearing sophisticated armour suits (exoskeletons) in the confrontation with an alien plant invading Hong Kong in the year 2055. The futuristic element of human-machine teaming in the combat field is represented by assisting killer robots.

In China's culture and entertainment sector, online streaming services and social media platforms are playing a rapidly growing role in terms of social dissemination drivers. Literature as well as TV series and movies are reviewed and evaluated in the various netizen communities. Therefore, the online media sphere is increasingly targeted for stricter control by the central authorities of the People's Republic. In a regulation for algorithmic recommendation service providers, effective since March 2022, discursive construction is realised via the obligation to adhere to *“mainstream value orientation, optimise algorithm recommendation service mechanisms, actively spread positive energy and advance the application of algorithms ‘for good’”* (emphasis and apostrophe by the author).<sup>69</sup> The vaguely worded request to “spread positive energy”, in particular, is problematic. Any production with a dystopian impression, narrating a gloomy development of AI application or being

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<sup>69</sup> Internet Information Service Algorithmic Recommendation Management Provisions, Chap. II, Art. 6, author's translation, cit.: *suanfa tuijian fuwu tigongzhe yingdang jianchi zhulin jiazhi daoxiang, youhua suanfa tuijian fuwu jizhi, jiji chuanbo zheng nenglian, cujin suanfa jingyong xiangshang xiangshan* 算法推荐服务提供者应当坚持主流价值导向, 优化算法推荐服务机制, 积极传播正能量, 促进算法应用向上向善 cit. end, alternative translation and Chinese original text available at DigiChina, Stanford University, 10 Jan. 2022, <https://digichina.stanford.edu/work/translation-internet-information-service-algorithmic-recommendation-management-provisions-effective-march-1-2022/>.

sharply critical of cognitive human enhancement and brain-computer teaming, is likely to become a target for censorship.<sup>70</sup>

### **3. China's understanding of global responsibility with regard to AI application**

While previous chapters examined strategic planning, policy and discursive patterns with a domestic scope of impact, Chapter 3.0 deals with Beijing's outward-looking initiatives regarding military applications of AI, including human enhancement. The title of this essay *Human enhancement with Chinese characteristics* commits to a holistic approach that also includes China's self-image on the international stage. How does Beijing articulate and frame its self-perceived "responsibility" in the dual use of AI serving the purpose of human enhancement? What is the declared ethical underpinning of China's international AI-policy trajectory? The answer to these questions should always take into account one consideration: the political leadership of the People's Republic cares immensely about gaining global influence in the normative arena. And in the field of transnational AI governance, in particular, the accumulation of soft power is regarded by Chinese political elites as a crucial strategic driver.

With regard to developing "AI governance with Chinese characteristics", the year 2021 is definitely outstanding. During the *Year of the Ox*,<sup>71</sup> the People's Republic took two major steps to play a pioneering role in co-shaping global AI governance: first, at a domestic level so-called *Ethical Norms for the New Generation Artificial Intelligence*<sup>72</sup> were announced in September 2021, followed by a UN-level initiative towards the end of the year.

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<sup>70</sup> The Algorithmic Recommendation Management Provisions are administered by the National Cybersecurity & Informatization Department of the Cyberspace Administration of China (CAC) as a coordinating agency, the Ministry of Industry and Information Technology, the Ministry of Public Security and State Administration for Market Regulation.

<sup>71</sup> 11 Feb. 2021 – 31 Jan. 2022, the most recent Chinese Year of the Ox.

<sup>72</sup> Xinyidai rengong zhineng lunli guifan 新一代人工智能伦理规范, PRC Ministry of Science & Technology (kexue jishu bu), 25 Sep. 2022, [http://www.most.gov.cn/kjbgz/202109/t20210926\\_177063.html](http://www.most.gov.cn/kjbgz/202109/t20210926_177063.html).

Obviously, the introduction of ethical norms within Chinese state territory was deemed by the political leadership as a necessary precondition for further initiatives at international level. As a matter of fact, the *Ethical Norms for the New Generation Artificial Intelligence* were preceded by year-long discussions between academia, policymakers and the corporate sector on how to contribute “lessons learned by China” for future global governance challenges inflicted by AI.<sup>73</sup> The warnings of Chinese social science and philosophy scholars – as reflected in the public discourse of recent years (see Chap. 2.1.2.) – were, for the most part, taken into account regarding the interests of corporate actors.

Although tangible issues of human-machine teaming with AI components are not directly addressed in the document, some elementary points were set for future normative action. In the framework of so-called *fundamental ethical norms* (jiben lunli guifan 基本伦理规范<sup>74</sup>), the following passage defines the fundamental norm *Ensuring Controllability and Trustworthiness* (quebao ke kong ke xin 确保可控可信):

Ensure that humans have the full power for decision-making, the rights to choose whether to accept the services provided by AI, the rights to withdraw from the interaction with AI at any time, and the rights to suspend the operation of AI systems at any time, and ensure that AI is always under meaningful human control.<sup>75</sup>

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<sup>73</sup> In July 2021, two leading think tanks, China Academy of Information & Communications Technology (CAICT) linked to the PRC Ministry of Industry & Information Technology and JD Explore Academy financed by the e-commerce company JD had published the preparatory document *White Paper on Trustworthy Artificial Intelligence* (ke xin rengong zhineng baipi shu 可信人工智能白皮书); for a comprehensive study, see also Arcesati, Rebecca: Lofty Principles, Conflicting Interest – AI ethics and governance in China, MERICS China Monitor, 24 June 2021, <https://merics.org/sites/default/files/2021-06/MERICSCChinaMonitor69AIEthics2.pdf>.

<sup>74</sup> The *Ethical Norms* define six fundamental ethical norms: advancement of human welfare, promotion of fairness and justice, protection of privacy and security, assurance of controllability and trustworthiness, strengthening of accountability and improvements to the cultivation of ethics. It also specifies 18 ethical requirements concerning AI management, research and development (R&D), supply, use and other specific activities.

<sup>75</sup> English translation by the International Research Center for AI Ethics and Governance: The Ethical Norms for the New Generation Artificial Intelligence, China, 27 Sep. 2021, <https://ai-ethics-and-governance.institute/2021/09/27/the-ethical-norms-for-the-new-generation-artificial-intelligence-china/>.

However, to date these ethics guidelines do not have the effective force of a law, nor is it specified how the defined norms will be enforced in the case of non-compliance. Another question that arises is whether it is that simple “to withdraw from the interaction with AI at any time”<sup>76</sup> in a working situation with a brain-computer interface.

### 3.1 China’s AI governance approach at the global level

Several months after the release of the *Ethical Norms for the New Generation AI* at national level, the Chinese UN Ambassador for Disarmament Affairs submitted in December 2021 a position paper to the Sixth Review Conference of the UN Convention on Certain Conventional Weapons to regulate the military applications of AI.<sup>77</sup> In the paper, the topic of human-machine teaming is indirectly addressed; in the foreground stands the demand for universal accountability rules:

..., countries need to enhance self-restraint on AI research and development activities, and **implement necessary human-machine interaction across the entire life cycle of weapons** after taking into full consideration of the combat environment and the characteristics of weapons. Countries need to adhere to the principle of regarding human as the final subject of responsibility, establish accountability mechanism for AI and conduct necessary training for operators.<sup>78</sup> (*emphasis added*)

A closer look into the document reveals that the Chinese UN initiative in military matters is basically in line with the ethical norms formulated for the domestic civil sector, enshrined in the *Ethical Norms for the New Generation AI* of September 2021:

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<sup>76</sup> See footnote 69.

<sup>77</sup> In an earlier position paper of April 2018, China’s UN delegation advocated a new protocol for the Convention on Certain Conventional Weapons “to ban the use of fully autonomous lethal weapons systems”; the first relevant position paper was put forward in Dec. 2016, requesting “the development of a legally binding protocol on issues related to the use of LAWS”.

<sup>78</sup> Position Paper of the PRC on Regulating Military Applications of Artificial Intelligence, 14 Dec. 2021, [https://www.fmprc.gov.cn/mfa\\_eng/wjdt\\_665385/wjzcs/202112/t20211214\\_10469512.html](https://www.fmprc.gov.cn/mfa_eng/wjdt_665385/wjzcs/202112/t20211214_10469512.html).

1. uphold human beings as the ultimate liable subjects,
2. clarify the responsibilities of all relevant stakeholders, and
3. establish an accountability mechanism in AI-related activities.<sup>79</sup>

It can therefore be concluded that Beijing's position regarding global AI governance in military matters is not exclusively derived from geostrategic considerations, but draws to a considerable extent on the Chinese domestic framework of “whole-of-society” AI governance. Nevertheless, China's AI governance approach at global level is highly ambitious. Beijing's security-related geostrategic vision of AI governance is well mapped in an academic essay, published shortly before the submission of the UN position paper:

As existing rules and policies regarding technology development and governance that have been made by a handful of Western powers have proven to be largely ineffective, **a new, more inclusive platform should be put in place** that reflects the broadest possible consensus on risk management and mitigation.

With this platform, thorough and detailed discussions and debates of the impact of technological advances on international security could be conducted to **work out better institutional solutions** and mobilize more international political, economic, and social resources for technology governance.<sup>80</sup> (*emphasis added*)

What exactly is meant by requesting a more inclusive platform? Briefly summarised, China's understanding of “better institutional solutions” for future AI global governance within UN structures is shaped by the following considerations:

- The Global South is lagging behind in terms of science and technology development, therefore the security interests of developing countries should be better accommodated in new institutional formats.

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<sup>79</sup> See footnote 70, basic norm V *Strengthening accountability* (qianghua zeren dandang 强化责任担当).

<sup>80</sup> Sun, Haiyong: Global Science and Technology Governance: Impetus, Challenges and Prospects, *China Quarterly of International Strategic Studies*, 1/2021, Vol. 7, p. 73, <https://www.worldscientific.com/doi/10.1142/S2377740020500244>.

- UN platforms for security debate should force the inclusion of non-governmental organisations, since the most vocal advocates for restricting the use of AI-driven weapon systems are NGOs.
- Technologically leading UN member states should initiate multi-party consultation networks between national governments and corporate actors under the UN framework.
- Trust-building measures centred on increased dialogue between technologically leading nations – in particular, between the USA and the PRC – are declared as necessary prerequisites for achieving institutional solutions at UN level.
- Last but not least, Beijing’s search for “better institutional solutions” also follows image-building reasoning, by putting emphasis onto an entirely new UN action field. According to the Chinese position, relevant UN institutions should not be “revised” but need to be created from scratch. Hence, China’s wide-spread labelling as a “revisionist” power is difficult to uphold in the context of AI governance.

Apart from United Nations channels to exert influence, China’s options for contributing to global AI governance have remained rather limited. At the G20 Summit of June 2019 in Osaka, the PRC was a signatory to the joint declaration to adopt a “human-centred AI approach”. The joint statement of the G20 Summit 2019 committed to a human-centred approach to AI, and presented those known as G20 AI Principles based on recommendations from the Organization for Economic Co-operation and Development (OECD).

The G20 AI Principles do only include indirect references to human enhancement, by stating that trustworthy AI should pursue *beneficial outcomes for people and the planet, such as **augmenting human capabilities and enhancing creativity***<sup>81</sup> (emphasis added). The non-binding G20 AI Principles maintain a clear focus on economic matters and do not relate to the security policy sphere. Under section 1.4, the declaration simply includes a short passage stating that AI systems should “*in conditions of normal use, foreseeable use or*

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<sup>81</sup> See G20 AI Principles, Ministerial Statement on Trade and Digital Economy (Annex), 9 June 2019, <https://www.g20-insights.org/wp-content/uploads/2019/07/G20-Japan-AI-Principles.pdf>.

*misuse, or other adverse conditions, [...] function appropriately and do not pose unreasonable safety risks.*”<sup>82</sup>

As a matter of fact, in recent years Chinese expectations that the G20 may become a leading forum for global AI governance have not materialised. Quite on the contrary, the chances of a China-inclusive governance framework of global relevance appear to have rapidly diminished since 2019. The aforementioned AI expert Zeng Jinghan<sup>83</sup> and his team provide the following status quo diagnosis:

The emphasis on democratic values and selective Western membership under the geopolitical influence in particular has let most existing influential global AI governance initiatives either exclude or directly counter China.(...) The aforementioned ‘value competition’ over different governance approaches towards AI, for example, has put the most important AI ethics debate – the role and value of human in the AI-enabled world – into shadow.<sup>84</sup>

#### **4. The European response – status quo and alternative outlook**

This essay neither serves as a policy paper or as a strategy recommendation in terms of how to respond to China’s global AI governance and human enhancement ambitions. Against this backdrop, the chapter starts from the European perception of recent Chinese UN initiatives on the restricted military use of AI technology, followed by a description of concerted European action in response to emerging war technology, including new forms of human-machine teaming, such as brain-machine interfaces. In the concluding part, alternative options for an EU approach vis-à-vis China’s AI discourse pattern and global initiatives are briefly outlined. It is left to the reader to opt for one or the other European approach to AI governance with “Chinese characteristics”.

Similar to the PRC, European global AI governance initiatives show sharp contours. The *Global Partnership on Artificial Intelligence* (GPAI) was initiated

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<sup>82</sup> Ibid.

<sup>83</sup> See footnote 1 and 2.

<sup>84</sup> Cheng, Jing/Zeng, Jinghan: Shaping AI’s Future? China in Global AI Governance, *Journal of Contemporary China*, 8 Aug. 2022, pp. 17f, <https://doi.org/10.1080/10670564.2022.2107391>.



by France and Canada in 2017 and eventually launched in June 2020. Currently, the GPAI includes a total 12 EU Member States<sup>85</sup> and the European Union as a separate member.

The GPAI considers itself a global reference point for the adoption of “responsible AI”; human rights are first cited as core principles for all GPAI activities. Against the democratically oriented, normative background of the international partnership, China has no chance of being included in the GPAI community. Added to this is the increasingly tense human rights debate on Chinese national policies of recent years.

To date, six EU Member States<sup>86</sup> joined the *AI Partnership for Defense*, initiated by the US Department of Defense in September 2020 shortly after the launch of the GPAI.<sup>87</sup> The declared objective of the AI partnership under US lead lies in defining norms for ongoing and future weaponisation of AI technology. The envisaged norms for the defence sector are preferably elaborated beyond the scope of UN structures.

#### **4.1 European perceptions of China’s stance on regulating AI military applications**

Most security-related publications on China’s recent UN initiatives on global AI governance in military use, published in the European Union, draw a direct comparison line between the Chinese “no first use” principle for nuclear

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<sup>85</sup> Belgium, Czech Republic, Denmark, France, Germany, Ireland, Italy, the Netherlands, Poland, Slovenia, Spain, Sweden; the UK joined as a non-EU member. The GPAI Lead Council is currently chaired by France and co-chaired by Japan. With 25 member states, the GPAI includes 11 non-European countries, see also Global Partnership on Artificial Intelligence - GPAI. n.d. <https://www.gpai.ai/>.

<sup>86</sup> The Partnership consists of military and defence delegations from 16 nations, including the six EU Member States France, Germany, the Netherlands, Finland, Sweden and Estonia.

<sup>87</sup> Initially, Washington refused to join the GPAI with the argument that multiple regulative mechanisms would hamper US innovation. Eventually the USA joined the alliance in June 2020, for details see: <https://www.globalgovernmentforum.com/us-abandons-boycott-of-global-ai-partnership/>, <https://www.politico.eu/article/artificial-intelligence-wary-of-china-the-west-closes-ranks-to-set-rules/>.

weapons and the suggested prohibition of AI-driven lethal weapons.<sup>88</sup> At the same time, it is criticised that China's diplomatic commitment to limit the application of "fully autonomous lethal weapons systems" does not hinder Beijing from developing and building their own.<sup>89</sup> An additional range of comments suggests that Beijing's ethical normative initiatives are perceived to be nothing more than smoke screens<sup>90</sup> and attributes the attempts at UN level to the sole objective of expanding communist power.

Another category of AI-related China studies is simply eclipsing Beijing's recent and current efforts to achieve universally valid UN regulations on the use of AI in warfare. This kind of "one eye open, one eye closed" perception may appear convenient in the short term, but eventually narrows down the options for proper foresight analysis. In particular, the working field of China-related analysis requires nuanced monitoring in all directions. In the same vein, the renowned AI-monitoring journal *Analytics India Magazine* (AIM) gives a clear warning:

It is unhelpful to reduce China's rapid AI development into a simplistic narrative about China as a threat or as a villain. Observers outside China need to engage in the debate and **take more steps to understand – and learn from – the nuances** of what's really going on.<sup>91</sup> (*emphasis added*)

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<sup>88</sup> See Roberts, Huw et.al.: The Chinese Approach to Artificial Intelligence: An Analysis of Policy, Ethics, and Regulation, University of Oxford, ResearchGate, Nov. 2021, [https://www.researchgate.net/publication/355883283\\_The\\_Chinese\\_Approach\\_to\\_Artificial\\_Intelligence\\_An\\_Analysis\\_of\\_Policy\\_Ethics\\_and\\_Regulation](https://www.researchgate.net/publication/355883283_The_Chinese_Approach_to_Artificial_Intelligence_An_Analysis_of_Policy_Ethics_and_Regulation).

<sup>89</sup> Jochheim, Ulrich: China's ambitions in artificial intelligence, European Parliamentary Research Service (EPRS), Sep. 2021, [https://www.europarl.europa.eu/thinktank/en/document/EPRS\\_ATA\(2021\)69620](https://www.europarl.europa.eu/thinktank/en/document/EPRS_ATA(2021)69620); cit.: *One example of an initiative seeking to promote such norm-setting in AI is the 'Campaign to Stop Killer Robots', co-founded by Human Rights Watch. In this framework, China has only agreed not to use these robots (but does not oppose their production)*. Cit. end.; see also Meier, Oliver/Staak, Michael, China's Role in Multilateral Arms Control, Friedrich Ebert Stiftung, June 2022, <https://library.fes.de/pdf-files/iez/19484.pdf>.

<sup>90</sup> Briant, Raphael: La synergie home-machine et l'avenir des opérations aériennes, *Focus stratégique*, No. 106, IFRI, Sep. 2021; cit.: *Certaines grandes puissances (Chine, Russie) s'orientent vers la substitution de la machine à l'homme dans une perspective d'autonomisation des systèmes, via un recours aux algorithmes et à un traitement automatisé des données. La France et de nombreux autres États restent pour leurs parts vigilants sur les risques de perte de contrôle*. Cit. end.

<sup>91</sup> Das, Sohini: Misuse of artificial intelligence in China, *Analytics India Magazine*, 28 Dec. 2021, <https://analyticsindiamag.com/misuse-of-artificial-intelligence-in-china/>; see also: Naik, Amit: Absurd happenings in the world of AI in China, *Analytics India Magazine*, 12 Jan 2022, <https://analyticsindiamag.com/absurd-happenings-in-the-world-of-ai-in-china/>.

In fact, the Indian data science magazine has never been too shy to criticise AI policies in China, a certainly unloved neighbour. Yet, a sharpened eye in all directions is kept open in order “*to understand the nuances*”.

## **4.2 EU responses to AI and human enhancement in the defence sector**

The *EU White Paper on Artificial Intelligence* of February 2020 draws on the already existing G20 and OECD guidelines. The document is focused on commercial issues, excluding the military sector. Yet, in consideration of various security challenges in the civilian sector, the category of “high risk” AI application is introduced. The question of human-machine teaming is addressed rather vaguely:

AI can perform many functions that previously could only be done by humans. As a result, citizens and legal entities will increasingly be subject to actions and decisions taken by or with the assistance of AI systems, which may sometimes be difficult to understand and to effectively challenge where necessary.<sup>92</sup>

Several years before the release of the *EU White Paper on Artificial Intelligence*, Brussels authorities had already implemented working steps to address human enhancement and human-machine teaming. Under the umbrella of the Horizon 2020 research and innovation funding programme (2014-2020) the European Commission initiated what is known as the SIENNA project (*Stakeholder-Informed Ethics for New technologies with high socio-economic and human rights impact*).

The SIENNA project was not tailored to the defence sector; the reports were aimed at delivering recommendations regarding the legal regulation and introduction of operational tools for the ethical management of human enhancement, AI & robotics (human-machine teaming) and human genomics in all realms of society. The defence aspect is touched upon in the chapter

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<sup>92</sup> European Commission: White Paper on Artificial Intelligence – a European approach to excellence and trust, 19 Feb. 2022, [https://ec.europa.eu/info/sites/default/files/commission-white-paper-artificial-intelligence-feb2020\\_en.pdf](https://ec.europa.eu/info/sites/default/files/commission-white-paper-artificial-intelligence-feb2020_en.pdf).

“Weaponisation of enhancement”<sup>93</sup> in one of the reports together with the question of enhanced military personnel:

The existence of states with enhanced soldiers requires rethinking of international laws of war and human ethics, as they present risks to security of non-enhanced states as well as populaces, and, furthermore, ethically challenge notions of human nature.<sup>94</sup>

On the sidelines, the SIENNA project also analysed the debate on HE technology in selected non-European countries (i.e. Brazil, China and South Africa). As for China-related monitoring, the summary of the ethical discourse contains the following statement:

The state of ELSI of HET (*Ethical, Legal, Social Issues of human enhancement technology, author’s note*) in China is well developed. In particular, Chinese experts and scholars tend to focus on cognitive enhancement, emotional enhancement and moral enhancement. (...) They pay special attention to the ethical issues caused by cognitive enhancement technology, mainly including health and safety issues, technology risks, side effects, addiction, justice and equality issues, and issues of self and autonomy.  
(...) **There are not themes that are surprising to find nor interesting gaps compared to international debates.**<sup>95</sup> (*emphasis added*)

Drawing on the above SIENNA project findings, it may be concluded that the Chinese discourse on human enhancement is no “blind spot” for Brussels authorities. Moreover, it is noteworthy that the HE debate in China is assessed as lacking any “*interesting gaps compared to international debates*”.

A few years after the SIENNA project report, the political climate in Brussels regarding China’s technological advancement has taken a significant turn: the growing value-based divide between democracies and illiberal systems has changed the way China’s global initiatives are viewed and discussed. In its role as a pillar of European democratic structures and human rights con-

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<sup>93</sup> SIENNA D3.4, deliverable report, Ethical Analysis of Human Enhancement Technologies, 2019, p. 107; cit.: *Furthermore, if weaponized enhancement development accelerates, there may be an arms-race that could prompt militaries to cut corners in development to receive immediate advantages*. Cit. end, see also: <http://siennaproject.eu/>.

<sup>94</sup> Ibid., p. 107.

<sup>95</sup> Ibid., pp. 29-30.

cerns, the European Parliament's recent criticism of the PRC is the most articulate.

The comprehensive supporting study *Artificial Intelligence diplomacy / AI governance as a new European Union external policy tool*,<sup>96</sup> requested by the European Parliament Special Committee on Artificial Intelligence in a Digital Age (AIDA), covers various security and defence aspects. The document suggests that the EU should not stay out of the geopolitical power struggle over AI between the US and China and suggests a proper plan for "European AI diplomacy". Reflecting on the question of a looming Sino-European decoupling, the author argues with diplomatic prudence:

While the US is the EU's most important and closest ally, and China a systemic rival, China also is a cooperation partner on some topics, and an important partner in trade. Europe, therefore, has to look in two directions at once.<sup>97</sup>

It remains to be added that the above quoted study neither addresses human enhancement nor human-machine teaming; brain-computer interface technology is consequently not mentioned.

The European Parliament Research Service (EPRS) fact sheet *China's ambitions in artificial intelligence*, released a few months after the comprehensive AI study, already takes a rather different view by quoting mainly US Defense Community sources relating to the AI security debate.<sup>98</sup>

The European Defence Agency (EDA) is the leading actor in developing and coordinating common European defence policies among the Member States. The Strategic Compass, published in March 2022, refers to the global secu-

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<sup>96</sup> Franke, Ulrike: Artificial Intelligence diplomacy I Artificial Intelligence governance as a new European Union external policy tool, June 2021, Study for the Special Committee on Artificial Intelligence in a Digital Age (AIDA), Policy Department for Economic, Scientific and Quality of Life Policies, EP, Luxembourg, [https://www.europarl.europa.eu/RegData/etudes/STUD/2021/662926/IPOL\\_STU\(2021\)662926\\_EN.pdf](https://www.europarl.europa.eu/RegData/etudes/STUD/2021/662926/IPOL_STU(2021)662926_EN.pdf).

<sup>97</sup> Ibid., p. 16.

<sup>98</sup> Jochheim, Ulrich: China's ambitions in artificial intelligence, EPRS Fact Sheet, Sep. 2021, [https://www.europarl.europa.eu/RegData/etudes/ATAG/2021/696206/EPRS\\_ATA\(2021\)696206\\_EN.pdf](https://www.europarl.europa.eu/RegData/etudes/ATAG/2021/696206/EPRS_ATA(2021)696206_EN.pdf).

rity setting in view of an emerging PRC by underlining the protection of European interests and values.<sup>99</sup>

In the context of proliferation of weapons of mass destruction, China is named together with Russia as “*developing new weapon systems*”<sup>100</sup> without further specification. Subsequently, the Strategic Compass does not offer any specific link between the PRC and artificial intelligence, which is dealt with in the strategy regarding critical dependencies and defence innovation.<sup>101</sup> The document also does not contain any mention of human enhancement technologies.

The urgent challenge of concerted EU action on emerging and disruptive technologies has led to the establishment of the *Hub for EU Defence Innovation* (HEDI).<sup>102</sup> Since May 2022, HEDI is entrusted within EDA with the task to adapt current strategic defence concepts to nascent technology trends.

So far, no specific policy paper on human enhancement has been released for the European defence sector. Yet, following the necessity of strengthening innovative resilience, in 2021 the EDA conducted what is known as a *Technology Foresight Exercise*,<sup>103</sup> where, among other trends, the strategic implications of **hybrid human-machine teaming** (EDA Foresight, scenario 05) and **cognitive enhanced soldier** (EDA Foresight, scenario 07) were examined. Scenario 05 deals with the topic *Soldier – Unmanned system integration*, whereas scenario 07 outlines among other enhancements the impacts of *In-*

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<sup>99</sup> European External Action Service: A Strategic Compass for Security and Defence, June 2022, p. 18, cit.: *China’s development and integration into its region, and the world at large, will mark the rest of the century. We need to ensure that this happens in a way that will contribute to uphold global security and not contradict the rules-based international order and our interests and values.* Cit. end, [https://www.eeas.europa.eu/sites/default/files/documents/strategic\\_compass\\_en3\\_web.pdf](https://www.eeas.europa.eu/sites/default/files/documents/strategic_compass_en3_web.pdf).

<sup>100</sup> Ibid., p. 22.

<sup>101</sup> Ibid., pp. 47–48.

<sup>102</sup> The Strategic Compass for Security and Defence, which was approved in March 2022, called for the creation of an Innovation Hub.

<sup>103</sup> The Technology Foresight Exercise 2021 was aimed at providing a strategic vision of the possible impact of emerging technologies in defence in 2040+; exercise outcomes were fed into the revision of the EU’s Capability Development Plan (CDP) to be finalised by 2023, <https://eda.europa.eu/what-we-do/all-activities/activities-search/technology-watch-foresight#techsight>, for interim results, see footnote below, ISDEFE report.

*tegrated brain-computer interfaces*. In the exercise summary, it is emphasised that advances in brain-machine interfaces in combination with the rapid development in AI and robotics provide a potential enhancement of tomorrow's soldier.

The conclusion on human enhancement innovation in military matters once again refers to the ethical aspect:

This potential (*of enhancement, author's note*) will pose a great challenge on defining and enforcing the regulatory and ethical framework for the new possibilities, both at European and global scale.<sup>104</sup>

Coming back again to the status quo of EU responses to emerging AI technology in the defence sector, one specific policy trend should not remain unmentioned: the discussion concerns the currently promoted “open innovation” concept. Engaging in open innovation policy invokes the fact that a majority of emerging and disruptive defence applications are mainly produced and marketed in the private sector. Consequently, close cooperation with civil high-tech enterprises appears indispensable for European military innovation. In this context, public financial support for innovative SMEs, producing technology for dual use, is discussed:

Setting up accelerators by networking innovation stakeholders from different backgrounds, university laboratories, companies and public funding bodies on a given programme may enable these SMEs and start-ups to grow and become part of a network of innovation for the defence community.<sup>105</sup> (*emphasis added*)

In reference to Chapter 1.2.1, the reader will note that the above idea of financial state support and close innovation networking between the civil and the military sector addressed borrows the Chinese strategy of *Military-Civil Fusion* (MCF), promoted as *Military Civil Integration* before the beginning of the Xi Jinping era.

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<sup>104</sup> ISDEFE (Ingenieria de Sistemas para la Defensa de Espana) commissioned by the European Defence Agency, EDA Technology Foresight Exercise 2021, 1<sup>st</sup> Event Results – Publishable Summary, Aug. 2021, p. 9, [https://eda.europa.eu/docs/default-source/documents/eda-technology-foresight-exercise-\(2021\)---1st-event-results---publishable-summary72ffb3fa4d264cfa776ff000087ef0f.pdf](https://eda.europa.eu/docs/default-source/documents/eda-technology-foresight-exercise-(2021)---1st-event-results---publishable-summary72ffb3fa4d264cfa776ff000087ef0f.pdf).

<sup>105</sup> Interview with Jean-Pierre Maulny (ARES), EU should become a full stakeholder in defence innovation, *European Defence Matters* (EDM), 2021, No. 22, p. 15, <https://eda.europa.eu/docs/default-source/eda-magazine/edm22singleweb.pdf>.

### 4.3 Alternative outlook

The question of what strategic steps Europe or the EU can pursue with regard to China's AI ambitions has already been discussed. The outlook of this essay, however, focuses on human-machine teaming with a specific interest in cognitive human enhancement via brain-computer interfaces, one of the manifold technological subcategories of AI.

First, it must be noted that "European AI diplomacy" vis-à-vis China on a bilateral basis will have little effect on already existing AI standards with "Chinese characteristics".

If the EU is aiming for separate permanent agreements with Beijing on ethical principles for human enhancement technology, these need to be negotiated in an international framework, be it UN organisations, the *Global Partnership on Artificial Intelligence* or platforms not yet established.

Two alternative scenarios put themselves forward for the coming years:

- In the first scenario, the GPAI community, where European countries play a major role, is evolving into an anti-China alliance in terms of normative technology standards. The currently existing working groups within the GPAI, i.e. "Responsible AI", "Future of work", "Data governance", "Innovation and commercialisation" and "AI and pandemic response" already show a strict orientation against illiberal state systems. Under the assumption of all European GPAI members insisting on obligatory democratic values of human enhancement technology, dialogue with China appears out of the question. Any future governance model for human enhancement with Chinese characteristics will be embedded in a fundamentally different understanding of citizen-state relationships, as described in part 2.0 of this essay. As an additional consequence of increased value competition, a further economic North-South decoupling process is predictable: to date, Chinese producers are already offering products with AI technology components at lower prices than Western suppliers for both the civilian and military sector, and therefore find their markets primarily in the global South. This will also most likely be the case for "cognitive human enhancement" products such as non-



invasive brain-computer interfaces, augmented reality headsets or other devices.

- As for the second scenario, the European Union – for whatever reasons – comes to the conclusion that the PRC should be allowed to play a certain role in setting standards for the global governance of “cognitive human enhancement” technology.

Of course, only a policy of small steps would be conceivable here, such as the creation of a new GPAI working group with a more inclusive orientation, such as “Fair Human Enhancement” or “Human Enhancement for All”. As for these topoi, the developing world would also feel addressed and China – as the declared advocate of developing countries – would be ideologically obliged to participate in the debate. Collaborative efforts in tandem with China may also be considered to define international standards for brain-computer interface (BCI) technology in less safety-related industries, such as the medical field.

The looming security issue of the weaponisation of human enhancement is likely to be subject to Chinese initiatives or requests at UN level in the near future. In this context, the EU may demonstrate moderately supportive voting behaviour. Of course, all of the above assumptions of the second scenario presuppose an open exchange of conflicting discourses. Hence, no “rose garden” but fierce controversies are to be expected.

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