

УДК 342.9:342.7:004.9:341.17(4):612.6
DOI: <https://doi.org/10.33098/3083-726X.2026.1.33.188-205>

DIGITAL TRANSFORMATION AND INSTITUTIONAL CAPACITY FOR
INTERAGENCY COOPERATION IN POSTHUMOUS REPRODUCTION

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The profound demographic crisis in Ukraine, exacerbated by the prolonged state of martial law, necessitates the development of innovative legal instruments for preserving the nation's gene pool. Current national legislation (Laws No. 3496-IX of November 22, 2023 and No. 3573-IX of February 7, 2024) has established the foundational legal framework; however, a functional mechanism for its practical implementation is currently lacking. The primary challenge lies in the fragmentation of data regarding the storage of reproductive cells and the verification of posthumous consent, which complicates the realisation of reproductive rights for the defenders of Ukraine. The objective of this study is to substantiate a conceptual model for a State Register of Consents for Posthumous Reproduction based on the principles of institutional interoperability. The research aims to define the functional roles of public authorities in ensuring a seamless digital process for exercising reproductive rights. The research utilises a multidimensional methodological framework: the comparative-legal method for aligning national policy with the Interoperable Europe Act; the system-structural method for designing the interagency cooperation architecture; and the modeling method for simulating data exchange processes between the Ministry of Health, the Ministry of Digital Transformation, and the Ministry of Justice. The study proposes an "interoperable ecosystem" model that replaces fragmented departmental databases with a unified digital node. It defines the specific competencies of the Ministry of Digital Transformation (infrastructure and QES verification), the Ministry of Health (bioethical oversight and ART monitoring), and the Ministry of Justice (legal validation of parentage). This model enables an automated, out-of-court procedure for determining the child's origin under Article 123 of the Family Code of Ukraine. Institutional capacity in the digital age is determined by the quality of interagency synergy rather than isolated agency authority. The establishment of the proposed Register, aligned with the European Interoperability Framework (EIF), ensures legal certainty, reduces the burden on the judiciary, and serves as a strategic investment in Ukraine's post-war demographic recovery.

Key words: digital transformation, institutional capacity, interagency cooperation, semantic interoperability, posthumous reproduction, gene pool preservation, Interoperable Europe Act, e-government, reproductive rights.

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Ostrovska B. Digital transformation and institutional capacity for interagency cooperation in posthumous reproduction. *Art of Justice*. Редакційно-видавничий відділ Університету Короля Данила, 2026. Вип. 1 (33). С. 188-205. DOI: <https://doi.org/10.33098/3083-726X.2026.1.33.188-205>

Introduction

Demographic resilience is an existential factor for a nation's survival under extreme conditions, such as war, and a prerequisite for its recovery in the post-war period. In this context, it emerges as one of the priorities for the sustainable development of the state. Taking into account the global tasks presented in the "Transforming our world: the 2030 Agenda for Sustainable Development" approved by UN General Assembly Resolution A/RES/70/1 dated September 25, 2015¹ – specifically Goal 3 "Ensure healthy lives and promote well-being for all at all ages" and

¹ United Nations General Assembly. (2015, September 25). Transforming our world: The 2030 Agenda for Sustainable Development (Resolution A/RES/70/1). <https://digitallibrary.un.org/record/3923923>

Goal 16 "Promote peaceful and inclusive societies for sustainable development, provide access to justice for all and build effective, accountable and inclusive institutions at all levels" – the development of legal and institutional mechanisms for regulating posthumous human reproduction is a modern tool for ensuring the demographic resilience of Ukraine. This approach is one of the strategies for preserving the gene pool of the Ukrainian people and an investment in our country's human capital for future generations (Ostrovska, 2025).

The demographic crisis has deepened since the beginning of the full-scale war in Ukraine. This is confirmed by official birth rate statistics for 2023: 187,387 children, which is one-third less compared to the pre-war year of 2021 and represents the lowest figure during the years of independence (Opendatabot, 2024).

Under martial law, preserving the reproductive potential of the Defenders of Ukraine acquires special significance. This is driven not only by the need to provide state guarantees in the field of human reproductive rights but also by the state's moral obligation to citizens who risk their lives and health daily to protect the state sovereignty and territorial integrity of Ukraine.

Problem Statement

With the adoption of the Law of Ukraine "On Amendments to Certain Legislative Acts of Ukraine Regarding Ensuring the Right of Military Personnel and Other Persons to Biological Fatherhood (Motherhood)" dated November 22, 2023, No. 3496-IX¹ (incorporating changes introduced by the Law of Ukraine "On Amendments to Certain Legislative Acts of Ukraine Regarding the Preservation of the Gene Pool of the Ukrainian People" dated February 7, 2024, No. 3573-IX²), a regulatory foundation was established for the realization of the right to biological fatherhood (motherhood). Specifically, the Civil Code of Ukraine³ dated January 16, 2003, No. 435-IV was supplemented with paragraph 7 of Article 281, which established the individual's right to dispose of their reproductive cells in the event of death or being declared dead. Furthermore, the Law of Ukraine "Fundamentals of Ukrainian Legislation on Healthcare"⁴ dated November 19, 1992, No. 2801-XII was supplemented with Article 60-1 regarding state guarantees for the free collection and storage of reproductive cells at the state's expense for military service members and other persons covered by this Law engaged in tasks related to national security and defence, whose professional activity is associated with an increased risk to life and health (for a period of three years from the moment of such person's death or declaration of death).

While our previous research explored the practical opportunities and legal framework for military service members to utilise assisted reproductive technologies (hereinafter – ART) in the context of posthumous reproduction during the war in Ukraine (Ostrovska, 2025), this study shifts the focus towards interagency interaction and digital transformation required for the effective exercise of these reproductive rights.

Identification of previously unresolved parts of the general problem

However, for the comprehensive implementation of these norms, it is necessary to establish a specialised institutional mechanism for the realisation of posthumous reproduction for the

¹ Verkhovna Rada of Ukraine. (2023, November 22). Pro vnesennia zmin do deiakykh zakonodavchykh aktiv Ukrainy shchodo zabezpechennia prava viiskovosluzhbovtiv ta inshykh osib na biolohichne batkivstvo (maternstvo) [On amendments to some legislative acts of Ukraine regarding ensuring the right of military personnel and other persons to biological fatherhood (motherhood)] (Law No. 3496-IX). <https://zakon.rada.gov.ua/laws/show/3496-20>

² Verkhovna Rada of Ukraine. (2024, February 7). Pro vnesennia zmin do deiakykh zakonodavchykh aktiv Ukrainy shchodo zberezhenia henofondu Ukrainskoho narodu [On amendments to some legislative acts of Ukraine regarding the preservation of the gene pool of the Ukrainian people] (Law No. 3573-IX). <https://zakon.rada.gov.ua/laws/show/3573-20>

³ Verkhovna Rada of Ukraine. (2003, January 16). Tsyvilnyi kodeks Ukrainy [Civil Code of Ukraine] (Law No. 435-IV). <https://zakon.rada.gov.ua/laws/show/435-15>

⁴ Verkhovna Rada of Ukraine. (1992, November 19). Osnovy zakonodavstva Ukrainy pro okhoronu zdorov'ia [Fundamentals of Ukrainian legislation on healthcare] (Law No. 2801-XII). <https://zakon.rada.gov.ua/laws/show/2801-12>

Defenders of Ukraine. A key element in this process should be the *State Registry of Consents for Posthumous Human Reproduction* (hereinafter – the State Registry of Consents), the functioning of which will be based on the principles of *interagency interaction* (specifically, automated data exchange, for example, through the "Trembita" system) under the general coordination of the Ministry of Health of Ukraine and in accordance with the Law of Ukraine "On Public Electronic Registries" No. 1908-IX dated November 18, 2021¹.

Analysis of recent research and publications

For the development of Ukraine's national legislation, it is important to borrow foreign experience in the field of digitalisation and interagency interaction. This provides opportunities for regulating not only the medical-legal side of the issue but also defining the administrative-technological structure of the proposed model.

Based on the concept of "*technology enactment*" by Jane Fountain (University of Massachusetts, USA) (Fountain, 2001), we consider the State Registry of Consents not just as a database, but as a new digital institution that realises the capacities for interagency interaction.

Issues of ethics and consent after death are thoroughly disclosed in the works of Shelly Simana (Harvard Law School) (Simana, 2018). She substantiates the concept of *prospective autonomy*, according to which a person's right to self-determination regarding their own genetic material requires *explicit consent* and remains valid after their death. This prevents legal uncertainty and the occurrence of potential conflicts – for example, between the state, healthcare facilities, and family members – which often arise as a result of the subjective interpretation of "*presumed consent*".

The scientific justification for our proposed model is the concept of *semantic interoperability* (Peristeras et al., 2009), developed by Vassilios Peristeras (International Hellenic University; former member of the European Commission), who is one of the authors of the *European Interoperability Framework (EIF)*. The scholar proves that the lack of a "*common language*" of data leads to their "*legal worthlessness*" during exchange. In the context of our study, this means that without semantic unity, data between different agencies will remain only technically compatible, while the adoption of unified standards for records in the State Registry of Consents (for example, based on the national system of interaction of state electronic information resources "Trembita") is a mandatory condition for its legal validity.

Purpose of the Article

The objective of this study is to substantiate a conceptual model for a State Register of Consents for Posthumous Reproduction based on the principles of institutional interoperability. The research aims to define the functional roles of public authorities in ensuring a seamless digital process for exercising reproductive rights.

Main Body of the Research

The proposed model provides clear legal certainty regarding the competence of each agency in the field of posthumous reproduction. This allows for overcoming the institutional limitations of the "old" monocentric model, characterised by the concentration of management functions for the State Registry of Consents within a single agency. Instead, the implementation of the principle of interagency interaction minimises a number of risks that typically arise at the intersection of

¹ Verkhovna Rada of Ukraine. (2021, November 18). Pro publichni elektronni reiestry [On public electronic registers] (Law No. 1908-IX). <https://zakon.rada.gov.ua/laws/show/1908-20>

the powers of various government bodies. This approach ensures the complexity and coherence of the entire management cycle of the State Registry of Consents, from the moment of an individual's declaration of will to the actual realisation of their reproductive rights.

For example, the Ministry of Health of Ukraine is not authorised to handle matters of civil status registration or inheritance, which fall under the exclusive competence of the Ministry of Justice of Ukraine. The elimination of interagency bureaucratic barriers through automatic synchronisation with the State Registry of Civil Status Acts will enable the prompt state registration of a child's birth and the determination of their origin. At the same time, the involvement of the Ministry of Digital Transformation of Ukraine, responsible for technical support – specifically data security and verification of the person's consent – mitigates potential risks regarding the transparency of administrative operations and subsequent medical manipulations with reproductive biomaterial and human embryos in both state healthcare facilities and the private sector (reproductive clinics, cryobanks, etc.).

Thus, the establishment of an interagency interaction system for managing the State Registry of Consents, involving the aforementioned three ministries, is a prerequisite for ensuring legal certainty in the state regulation of posthumous reproduction.

At the core of the proposed model lies the concept of institutional interoperability, which consists of the ability of public authorities to engage in coordinated interagency interaction to achieve a common strategic goal – protecting human reproductive rights and strengthening the demographic resilience of the state.

Such a model is based on the principles of the *European Interoperability Framework (EIF)*¹, which involves the comprehensive integration of the following levels: legal, organisational, semantic, and technical. These, in turn, are reflected in the alignment of norms, institutional interaction, the existence of a single terminological field, and automated data exchange. This approach not only confirms the project's compliance with *Good Governance*² standards and Ukraine's strategic European integration course but also directly meets the requirements for joining the EU Single Digital Market. The legal foundation of this market is Regulation (EU) 2024/903³ of the European Parliament and of the Council of 13 March 2024 on measures for a high level of public sector interoperability across the Union (*Interoperable Europe Act*), which defines institutional interoperability as a fundamental prerequisite for providing "cross-border digital public services" and the "seamless functioning of the EU internal market" (see recitals 1, 2 of Regulation (EU) 2024/903).

This concept allows for a re-evaluation of the importance of comprehensive regulation of posthumous human reproduction in Ukraine, viewing it not as a purely medical issue, but primarily as an indicator of the capacity of state institutions to harmoniously and effectively ensure fundamental human rights in the digital age.

Accordingly, a functional distribution of powers is proposed within the framework of our model:

- *The Ministry of Digital Transformation of Ukraine* provides the technological base for interagency interaction and digital verification of the individual's declaration of will. The use of a Qualified Electronic Signature (hereinafter – QES) serves as a fundamental element ensuring the authenticity, the *inter vivos* (lifetime) nature, and voluntariness of the person's consent, thereby mitigating risks of falsification.

¹ European Commission. (2024). European Interoperability Framework – Framework strategy. https://ec.europa.eu/isa2/eif_en

² Council of Europe. (2024). 12 Principles of good governance. <https://www.coe.int/en/web/good-governance/12-principles>

³ Regulation (EU) 2024/903 of the European Parliament and of the Council of 13 March 2024 on measures for a high level of public sector interoperability across the Union (*Interoperable Europe Act*). (2024). Official Journal of the European Union. <http://data.europa.eu/eli/reg/2024/903/oj>

- *The Ministry of Health of Ukraine* performs medical–biological and bioethical control, which includes, in particular, maintaining a registry of cryobanks, licensing healthcare facilities, and supervising compliance with industry standards and medical protocols in the application of ART.

- *The Ministry of Justice of Ukraine* guarantees the state verification of the origin of a child born via posthumous human reproduction technologies through the automated receipt of confirmation from the State Registry of Consents at the moment of birth registration. In this way, through the integration of this new registry with the State Registry of Civil Status Acts, the determination of parentage according to Article 123 "Determination of origin of a child born as a result of the use of assisted reproductive technologies" of the Family Code of Ukraine dated January 10, 2002, No. 2947-III¹ can be carried out through an automated administrative procedure in an out-of-court manner. This approach allows for the automatic certification of a child's origin from a deceased person, thereby reducing the need for long and gruelling court processes to confirm fatherhood (motherhood), removing an undue burden from the judicial system of Ukraine and contributing to the psychological rehabilitation of the family after the loss of a loved one.

Results

The proposed model allows for a transition from fragmented departmental databases to the State Registry of Consents, which will function as a "*central hub*" in the national system of interagency institutional interaction. Furthermore, it effectively eliminates bureaucratic barriers, minimises the load on the judicial system, and guarantees the fulfilment by the state of its moral and legal obligations to its defenders.

Such a concept redistributes administrative functions among different agencies to ensure maximum legal certainty and efficiency in their interaction. The integration of these registries meets the requirements of semantic interoperability of the *European Interoperability Framework (EIF)*, making the Ukrainian model compatible with the EU Single Digital Market.

It is worth noting that the procedure for registering consent for posthumous reproduction in the State Registry of Consents should involve not only a digital formalised approach in a declarative form but also contain all signs of a person's comprehensive informedness for conscious and voluntary decision-making. At the same time, the importance of adhering to the principle of individual autonomy in their right to revoke or change the content of their consent at any moment during their lifetime should be emphasised.

This approach ensures dynamism in the realisation and protection of human reproductive rights, embodying the concept of "*living law*" that evolves alongside the constant development of biomedicine, thereby maintaining the ongoing relevance of human rights protections. Such a perspective is consonant with the international legal "*living instrument doctrine*" as a method of evolutive legal interpretation, formulated in the jurisprudence of the European Court of Human Rights regarding the importance of interpreting legal norms "*in light of present-day conditions*" (see § 31, *Tyrer v. the United Kingdom* (1978))², rather than being confined exclusively to their original historical intent.

¹ Verkhovna Rada of Ukraine. (2002, January 10). Simeinyi kodeks Ukrainy [Family Code of Ukraine] (Law No. 2947-III). <https://zakon.rada.gov.ua/laws/show/2947-14>

² *Tyrer v. the United Kingdom*, No. 5856/72 (ECHR April 25, 1978). <https://hudoc.echr.coe.int/eng?i=001-57587>

Conclusions

The transformation from a fragmented departmental approach to the proposed model of interagency interaction is a *conditio sine qua non* for increasing the institutional capacity of public authorities.

Considering the rapid global trend toward the digitalisation of services, the institutional capacity of the state, especially during a period of martial law, is determined not by the scope of authority of each body, but by the quality of their interaction, which results in a synergy effect.

The proposed model is not only a technical solution but also a modern, leading digital tool that ensures the effective creation of the State Registry of Consents for Posthumous Human Reproduction on these principles, taking into account the *Interoperable Europe Act*. This will not only ensure the realisation and protection of the reproductive rights of citizens but also become a legal foundation for further reforms aimed at strengthening demographic resilience and sustainable post-war recovery, as well as a step for Ukraine toward a unified digital space with the EU.

Prospects for further research

Furthermore, the implementation of the proposed model highlights a number of accompanying challenges, particularly regarding cybersecurity in cross-border data interaction, as well as problems of authenticating the declaration of will in case of loss of access to the QES or the compromise of a private key¹. Given the multidisciplinary complexity of these issues, their thorough analysis goes beyond the scope of this study and will be presented in our future scientific works.

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