

## Restoring chronology in investigative journalism

*Oleh Stepovyi*<sup>1</sup>

Received: 2025-10-30

Accepted: 2025-12-30

DOI: <https://doi.org/10.5281/zenodo.18331368>

**Abstract.** The article is devoted to the analysis of the processes of reconstruction of chronologies in modern investigative journalism, which operates in the conditions of a digital environment, information overload and fragmented sources. The focus is on the transformation of journalistic approaches to establishing the temporal sequence of events from the moment of the first tip to the publication of a verified investigation. The purpose of the study is to find out how modern digital tools, algorithms and analytical methods affect the construction of a reliable chronology of events in journalism. In the course of the scientific study, general scientific methods of cognition were used: analysis, synthesis, comparison, interpretation, systematization, generalization, content analysis of professional and scientific sources. The results of the study show that the investigation process has a clear temporal logic, which includes the stages of idea formation, feasibility assessment, information collection, its verification, systematization and final generalization. It is emphasized that the construction of a chronology is not only a technical task, but a key analytical element that ensures the evidentiary integrity of the material. The use of information processing technologies: databases, online registries, visualization tools, artificial intelligence tools can significantly increase the efficiency of a journalist's work. Such studies become scientifically sound and based on real facts. In the future, journalistic investigations will be closely linked to multifactorial analysis, teamwork and the use of new ways of presenting information. The results of the study allow us to formulate a holistic vision of the approaches, tools and means that form the basis of solid journalistic material.

**Keywords:** journalism, digital tools, research chronology, artificial intelligence, investigation.

---

<sup>1</sup> ORCID: <https://orcid.org/0009-0005-2252-1311>

Journalist, Bachelor's Degree in Automated Control of Technological Processes,  
Project and Program Management Specialist,  
Chernihiv State Institute of Economics and Management, Ukraine

## Introduction

In the modern information environment, investigative journalism faces a significant complication of the processes of reconstructing events in time. The excess of digital data, the fragmentation of sources, the rapid spread of unverified information and deliberate manipulation of facts create a situation in which the establishment of a reliable chronology acquires the features of a separate analytical problem. Under these conditions, traditional journalistic approaches to recording events become less effective for building cause-and-effect relationships, and therefore, for more structured reports, it is necessary to use more modern technologies for collecting and processing data. The problem becomes more relevant with the rapid development of technologies, since as they develop, they change the requirements for journalistic investigations. Such information must be transparent, free from errors, and free from subjective judgments.

## Literature Review

The issue of reconstructing the chronology of events in investigative journalism is sufficiently researched in foreign scientific literature. Among the leading researchers, it is worth highlighting D. Mahesha [7], M. Khalil [6], who emphasize data processing methods. Also valuable are the analytical generalizations of G. Kessler [5], who, within the framework of fact-checking support of political debates, demonstrated examples of the use of digital tools to verify the time limits of statements and events. L. Postma [10] draws attention to the integration of AI into editorial practice.

Modern prospects for multimodal analysis in the reconstruction of chronologies are studied by M.T. Fischer et al. [3], who consider ethically sensitive approaches to processing text, audio and visual data within a single system. Also valuable is the summary by P. Coelho [2], who analyzes the evolution of collaborative journalism as a form of organizing the investigative process, which allows for the effective reproduction of temporal connections in transnational projects, such as the Pandora Papers [9]. The instrumental capabilities of artificial intelligence as a component of modern journalistic analysis are discussed in detail in the study by A.J. Nyarko and R.M. Adonu [8], which simultaneously point out the risks of algorithmic bias and the need for ethical control.

The study also used expert literature, including publications in modern online publications, in particular gijn.org [4], The Washington Post [5], icij.org [9], unric.org [1], karnavatiuniversity.edu.in [11], which highlight current tools for digital verification, data visualization, source protection, and collaborative work in journalism.

Despite the sufficient amount of literature on this topic, there is a lack of systematized material on the topic of the study, and therefore, using various methods of scientific knowledge, the information was analyzed, grouped, systematized and presented in the light of the research topic.

*The purpose of the article* is to comprehensively analyze the features of the reconstruction of chronologies in investigative journalism in the digital environment and to clarify the role of modern tools and analytical approaches in the transition from fragmentary clues to verified publications. To achieve the goal, the following tasks will be performed: to analyze the main stages of preparation and implementation of investigative journalistic materials with an emphasis on the temporal logic of the study; to identify key trends in the future development of investigative journalism and outline the risks associated with the use of the latest technologies in journalistic investigations.

## Research Results

Modern investigative journalism operates in a digital environment that has fundamentally changed the ways of searching for information and reconstructing the sequence of events. As D. Mahesha's analysis [7] shows, a key shift has been the expansion of access to online databases, open government registers and digital archives, which allows journalists to work with information distributed in time and space. Thanks to the use of big data tools, journalists can compare dates, transactions, documents and public statements, revealing temporal patterns and hidden connections that are the basis for building reliable chronologies in complex investigations [7].

Investigative journalism is a long, systematic process of purposeful collection, verification and comparison of information in order to identify facts that are hidden, difficult to access or deliberately suppressed, but have significant social weight. Unlike daily news reporting, investigative journalism involves gathering evidence, working with a variety of sources, and constructing a well-reasoned, verified story that can withstand public and legal scrutiny [4].

The timeline of an investigation encompasses a series of interconnected stages that reflect the logic of the transition from an initial tip to the publication of verified material. Although in practice these stages may overlap or overlap, their sequence allows for the process of gathering information to be streamlined and to ensure its evidence-based nature [4].

*The genesis of an investigative idea* is the initial stage at which the research impulse is formed. The idea may arise from a source tip, document analysis, previous publications, or data work. At this stage, the journalist formulates a hypothesis or central question and prepares a story proposal that outlines the focus of the investigation, potential documents and human sources, and individuals or institutions that may be held accountable. Determining the minimum and maximum history allows us to record the social value of the material regardless of the completeness of the confirmation of the initial assumptions [4].

*The assessment of the feasibility of the investigation* consists in making a decision on the availability of resources, time, contacts and the necessary expertise to continue the work. An important component of this stage is the risk assessment. As a rule, the following parameters are analyzed within this stage:

- resource provision;
- time constraints;
- access to sources;
- level of expert support;
- risk factors [4].

*Systematic information collection* is the central stage of the investigation and is based on working with documents, interviews and observations. Journalists are often forced to independently create working databases, combining fragmentary information from public registers, archives, official documents, requests for access to information and fieldwork. The key is the organization, indexing and comparison of data, which allows us to identify connections between events, individuals and financial flows [6].

*Verification and comparison of evidence* involve multi-level verification of the collected information. Documentary evidence has high evidentiary value, but requires careful authentication. Along with them, interviews, personal experience, laboratory studies, technical and forensic expertise are used. Data and documents do not replace traditional journalistic work, and their reliability must be confirmed through independent sources and expert assessments [6].

*Analytical generalization of information* is the final stage of collection, at which the journalist systematizes materials and forms a holistic evidentiary picture of events. The

accumulation of information must reach a state of analytical saturation, at which conclusions are based on a set of independent sources and evidence. It is at this stage that the distinction between investigative material and superficial news publications is ensured and the basis for responsible public disclosure of the results is laid [12].

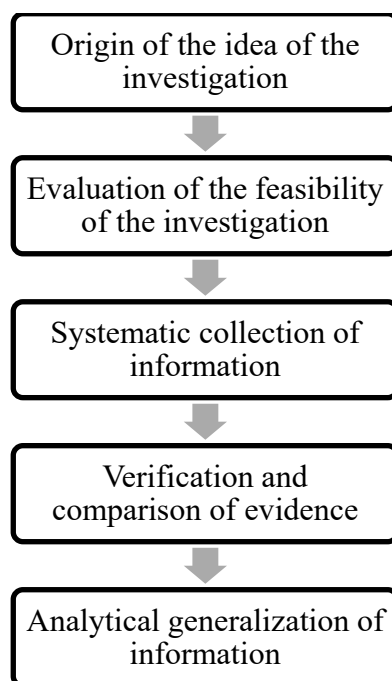


Fig. 1. Stages of information collection in investigative journalism

Notes. Systematized by the author based on sources [4; 6; 12]

Modern trends in investigative journalism are determined not by the emergence of a separate new stage of work, but by changes in everyday practices of searching, verifying and organizing information. Digital technologies have become a familiar working environment for journalists, within which sources are formed, temporal connections between events are established and chronologies of complex stories are built. In this context, it is important to distinguish between specific tools used in work and broader approaches that determine the way of thinking and organizing an investigation [7].

The most basic and at the same time indispensable tools remain online databases and open state registers. Thanks to these sources, journalists can track changes over time, compare data from different periods and record the sequence of decisions or events, which is the basis for recreating a chronology [7].

Data analysis and visualization tools have become widely used. For example, professional platforms for analyzing large data sets or web tools for creating interactive visualizations are widely popular, which allow you to quickly present data in the form of graphs, maps and animations adapted for digital media. Such presentations allow, firstly, to save the journalist's time, and secondly, to advantageously present the results of research for public disclosure. Such information is easily perceived, it is remembered and allows you to clearly emphasize what is important. The construction of graphs, timelines and maps helps to identify gaps in the data, recurring events or anomalies that are difficult to notice when working with texts or tables. Thus, visualization performs both an analytical and explanatory function [7].

An important place among modern tools is occupied by means of secure communication. Encrypted messengers and secure electronic platforms have become the standard for interacting with sources, especially in politically sensitive or transnational investigations.

Along with this, platforms for teamwork allow you to store materials, coordinate information and maintain a single logic of events within collective projects [7].

Social networks are a separate source of information, which are used to detect initial signals of events and collect eyewitness accounts. At the same time, information from these platforms is often fragmentary, devoid of context and chronologically unstable. Therefore, working with social networks is almost always combined with further verification of dates, the origin of content and comparison with other sources [7].

In this regard, digital verification and fact-checking tools have become particularly important. OSINT tools, open databases and specialized fact-checking platforms are used to verify the reliability of statements and accurately establish the time limits of events. Fact-checking is increasingly going beyond the boundaries of internal editorial practice and emerging as a separate journalistic genre, which is well illustrated by the experience of The Washington Post [5] during the 2024 US presidential debates [10].

In recent years, artificial intelligence tools have been added to this toolkit. They are used for preliminary analysis of large volumes of texts, news streams and posts on social networks, which allows for faster structuring of information and outlining possible timelines. At the same time, scientific research emphasizes the need for careful use of such tools due to the opacity of algorithms and the risks of bias, which requires constant journalistic control [10].

Below is a generalized table of tools that journalists use today to search for information and recreate chronologies in investigations (Table 1).

Table 1 – Modern tools for searching for information and reconstructing chronologies in investigative journalism

Type	Examples	Functions
Online Sources and Open Data	State registers, digital archives, online databases	Search and comparison of documents; documenting events over time
Analysis, Visualization, and AI	Tableau, Flourish, text analysis algorithms	Identifying temporal patterns; building and verifying chronologies
Communication and Teamwork	Signal, secure email, Slack, Trello, Google Drive	Source protection; workflow coordination; content alignment
Social Media and Crowdsourcing	Twitter, Facebook, Instagram, forums	Gathering initial signals of events and eyewitness testimonies
Verification and Fact-Checking	OSINT tools, The Washington Post Fact Checker	Checking the accuracy of facts, dates, and context
Collaborative and Multimedia Tools	ICIJ platforms, interactive timelines, maps, podcasts	Aligning global chronologies and explaining event sequences

Notes. Systematized by the author based on sources [5; 7]

Along with the use of new tools in journalistic practices, new approaches to organizing investigations have also been established that correspond to the growing complexity of the information environment and the globalization of social processes. One of the key such approaches is the development of collaborative journalism. These approaches are particularly effective in cases of reconstruction of complex, multi-level and long-term events that cover several states, legal systems and economic contexts. They make it possible to work with large data sets, local sources and specific national realities that would be inaccessible to an individual journalist or one editorial office. Indicative in this sense are the projects of the International Consortium of Investigative Journalists, in particular the Pandora Papers [9], which demonstrate the potential of transnational cooperation in exposing hidden financial

schemes and offshore practices. Within the framework of collaborative journalism, several key organizational and methodological advantages can be identified:

- the distribution of research functions, which allows for the parallel analysis of different segments of information;
- the combination of local and global perspectives, thanks to the participation of journalists familiar with the national context;
- the coordination of chronologies and facts within a single analytical framework;
- the reduction of individual risks associated with political, legal or physical pressure on individual participants in the investigation;
- increased public resonance, since the results are simultaneously published in different media and countries [2].

Recently, the requirements for presenting the results of journalistic investigations have been changing significantly, which is due to the development of digital media and the transformation of information consumption models. Interactive timelines, cartographic visualizations, multimedia formats and podcasts are increasingly used not only as tools for engaging the audience, but also as means of clear and structured explanation of the sequence of events and cause-and-effect relationships. In the digital environment, the form of presentation of the material becomes an integral part of the analytical process and directly affects how the audience interprets the chronology of a journalistic investigation [2].

The future of investigative journalism is increasingly closely linked to the development of artificial intelligence tools that change the way information is searched, analyzed and organized over time. It is AI that is becoming a key technology that allows working with data sets that cannot be processed manually and supports journalists in reconstructing complex and long chronologies of events in the areas of corruption, financial crimes and state opacity [11].

A separate role in the future development will be played by tools for digital verification and forensic analysis. In response to the spread of disinformation and deepfake content, journalists are increasingly using technologies for metadata analysis, reverse image search and automated manipulation detection. At the same time, researchers emphasize that the development of such tools is accompanied by a technological race with fake producers, which requires constant updating of skills and verification methods [1].

Let us consider a generalized characteristic of the key directions of the future development of investigative journalism and the associated risks (Table 2).

Table 2 – Key directions of the future development of investigative journalism and the associated risks

Development Direction	Potential for Investigative Journalism	Key Risks
Artificial Intelligence and Automation	Analysis of large data sets; identifying connections and temporal patterns; accelerating chronology building	Algorithmic bias; model opacity; overreliance on automated conclusions
Multimodal Analysis	Integration of text, audio, video, and images; multidimensional reconstruction of events	Complexity of verifying diverse data; privacy threats
Digital Verification	Detection of manipulations and deepfake content; strengthening the evidence base	Technological race with fake producers; need for high-level expertise
New Formats and Infrastructures (VR/AR, Blockchain)	Immersive explanation of chronologies; protection of archives and materials	Manipulative impact of visualization; legal uncertainty

The directions of journalism development indicated in Table 2 open up significant analytical and instrumental opportunities for deepening and accuracy of investigations, while at the same time actualizing a complex of ethical and legal risks. Most of the risks of journalism are associated with the use of artificial intelligence. Additional challenges remain economic pressure on editorial offices and increased digital surveillance, which limits resources for long-term investigations and complicates the protection of sources. Under such conditions, the effective use of new technologies is possible only if ethical standards are observed, the transparency of algorithms is maintained, and the central role of the journalist in decision-making is preserved [1].

### Conclusions

Investigative journalism is based on a clear step-by-step logic that includes the formation of an idea, assessment of its feasibility, collection of information, verification of evidence and analytical generalization of materials. Such a sequence ensures the evidentiality, internal consistency and stability of the investigation to public and legal scrutiny.

The toolkit of modern investigations combines digital resources and new approaches to organizing work. Online registries, data analysis and visualization, means of secure communication and digital verification are complemented by collaborative journalism and multimedia formats, within which the form of presentation becomes part of the analytical process. The prospects for the development of journalism are associated with the introduction of artificial intelligence, multimodal analysis and new media infrastructures that expand analytical capabilities, but at the same time actualize ethical, technological and legal risks that require systematic and responsible management.

### References

1. Artificial Intelligence and the Future of Journalism: Risks and Opportunities. (2025). UNRIC. URL: <https://unric.org/en/artificial-intelligence-and-the-future-of-journalism-risks-and-opportunities/>
2. Coelho, P. (2023). New frontiers of investigative journalism: From the lone wolf to the pack. *Qualidade do Jornalismo*, (44). URL: <https://journals.openedition.org/cs/10879?lang=en>
3. Fischer, M. T., Metz, Y., Joos, L., Miller, M., & Keim, D. A. (2024). MULTI-CASE: A transformer-based ethics-aware multimodal investigative intelligence framework. <https://doi.org/10.48550/arXiv.2401.01955>
4. Introduction to investigative journalism. (2024). Global Investigative Journalism Network. URL: <https://gijn.org/resource/introduction-investigative-journalism/>
5. Kessler, G. (2024, June 28). Fact-checking the first Biden–Trump 2024 presidential debate. *The Washington Post*. URL: <https://www.washingtonpost.com/politics/2024/06/28/fact-check-presidential-debate/>
6. Khalil, M. (2023). Investigative journalism: Handling data and gathering evidence. *Al Jazeera Media Institute*. URL: <https://elearning.aljazeera.net/sites/default/files/media/docs/2023/Investigative%20journalism-%20Handling%20data%20and%20gathering%20evidence.pdf>
7. Mahesha, D. (2017). The impact of digital technology on investigative journalism. *International Journal of Research and Analytical Reviews*, 4(3). URL: <https://www.ijrar.org/papers/IJRAR19D5833.pdf>
8. Nyarko, A. J., & Adonu, R. M. (2024). Investigative journalism in the new age: Examining the use of AI tools in investigative journalism practices in Ghana. *Global*

- Investigative Journalism Conference. URL: [https://www.researchgate.net/publication/384968870\\_INVESTIGATIVE\\_JOURNALISM\\_IN\\_THE\\_NEW\\_AGE\\_EXAMINING\\_THE\\_USE\\_OF\\_AI\\_TOOLS\\_IN\\_INVESTIGATIVE\\_JOURNALISM\\_PRACTICES\\_IN\\_GHANA](https://www.researchgate.net/publication/384968870_INVESTIGATIVE_JOURNALISM_IN_THE_NEW_AGE_EXAMINING_THE_USE_OF_AI_TOOLS_IN_INVESTIGATIVE_JOURNALISM_PRACTICES_IN_GHANA)
9. Offshore havens and hidden riches of world leaders and billionaires exposed in unprecedented leak. (2021). International Consortium of Investigative Journalists. URL: <https://www.icij.org/investigations/pandora-papers/global-investigation-tax-havens-offshore/>
  10. Postma, L. (2024). Data journalism, digital verification and AI: The case for newsroom convergence. VIEW: Journal of European Television History and Culture, 13(25). <https://doi.org/10.25969/mediarep/23184>
  11. The future of investigative journalism in the digital era. (2025). Karnavati University. URL: <https://karnavatiuniversity.edu.in/the-future-of-investigative-journalism-in-the-digital-era/>
  12. Wuergler, L., Cancela, P., Gerber, D., & Dubied, A. (2023). Identifying investigative pieces: A multi-step method for spotting a blurred journalistic genre. Journalism Studies, 24(14), 1754–1774. <https://doi.org/10.1080/1461670X.2023.2209814>
  13. Gorbatyi, O. (2025). The role of semiotics in humor transmission and audience engagement. Modern Engineering and Innovative Technologies, 4(39-04), 97–106. <https://doi.org/10.30890/2567-5273.2025-39-04-017>