



TWIN4DEM: Strengthening democratic resilience through Digital Twins

D6.1

Initial Methodological Toolbox (Outline)

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1.1	25.07.2025	EUR	Outline shared with GESIS, UBB, FBK for review
1.2	18.08.2025	EUR	Updated version of the outline shared with communication partner DBC for review
1.3	27.08.2025	EUR	Final version

1. Executive Summary

Over the last decade, executive power grabs – also called executive aggrandisement – have driven a retreat of democracy raising concerns about Europe’s democratic resilience among scholars, policymakers and the public alike. Despite the profusion of data on many dimensions of democratic life, democracy researchers have not been able to identify the multidimensional causal pathways that trigger executive aggrandisement and weaken rule of law-based institutions. Methods traditionally used in democracy research simply cannot provide a comprehensive understanding of the complex and multidimensional causes of executive aggrandisement. TWIN4DEM ambitions to scale up the use of Computational Social Sciences (CSS) in democracy research by bringing together scholars of Social Sciences and Humanities (SSH), CSS, computer scientists and democratic promotion stakeholders to jointly address one of the most crucial questions in democracy scholarship: what causes democracies to decline? Combining various advanced CSS methods (natural language processing; data aggregation and synthesising, and dynamic simulation models) allows to uncover the drivers and implications of executive aggrandisement in a more precise manner. By prototyping the first ever digital twins (DT) of four European democratic systems (Czechia, France, Hungary and the Netherlands), TWIN4DEM develops cross-cutting tools to process and aggregate textual and non-textual data more efficiently and accurately through the simulation of policy scenarios in a participatory and inclusive environment.

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ABBREVIATIONS

Abbreviation	Description
CSS	Computational Social Sciences
SSH	Social Sciences and Humanities
DT	Digital Twin
CSO	Civil Society Organisation
NLP	Natural Language Processing
PEO	Project Ethics Officer
EBP	Ethics Briefing Pack
EUR	Erasmus University Rotterdam
EEAB	External Ethics Advisory Board

OA	Open Access
GDPR	General Data Protection Regulation
OSF	Open Science Framework
MPs	Members of Parliament
EU	European Union
GESIS	ESIS-Leibniz Institut für Sozialwissenschaften e.V.
FBK	Fondazione Bruno Kessler
ETICAS	Eticas Research and Consulting SL
DBC	Diadikasia Business Consulting Symvouloi Epicheiriseon AE
UBB	Universitatea Babeş Bolyai

1. Introduction

1.1 Purpose of the document

This document presents the **outline for the TWIN4DEM Methodological Toolbox**, which will be hosted on the project website [Home - twin4dem.eu](https://home-twin4dem.eu) under the section “*Tools and Resources*.” The toolbox will function as a **dynamic and evolving platform** where the project’s datasets, models, software applications, and related materials will be collected and made openly accessible to a broad audience, including scholars, policymakers, practitioners, and civil society stakeholders.

The outline provided here defines the **structure, functionalities, and content categories** of the toolbox. Its purpose is to establish a clear framework for the organisation and dissemination of project outputs, ensuring that all resources are transparent, reproducible, and reusable in line with Open Science and FAIR (Findable, Accessible, Interoperable, Reusable) principles.

The **format of the current deliverable** has been agreed in consultation with our liaison at the European Commission. While the initial plan—set out in the Consortium Agreement—was to provide preliminary datasets and documentation at this stage, this has proven not to be feasible, as we require additional time to develop these outputs. In agreement with the Commission, the consortium has therefore prioritised the design of the **framework and structure of the methodological toolbox** as the first deliverable. This adjustment ensures that a dedicated and visible space for the toolbox is established on the TWIN4DEM website, laying the foundation for a complete methodological toolbox as the project advances.

1.2 Planned timeline for creating a TWIN4DEM methodological toolbox

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Table 1 presents planned updates on initial outline and the deployment of data, software, documentation and models in the TWIN4DEM website. It is important to note that the timeline for releasing data and software may change depending on developments in the project and it will be regularly discussed and agreed with the partners.

Timeline	TWIN4DEM resources	Involved partners
08.2025	Initial outline and web framework of TWIN4DEM methodological toolbox (D6.1)	EUR, DBC
02.2026	Deployment of initial data-set documentation and models	EUR, FBK, DBC, UBB, GESIS
08.2026	Updates of data-set documentation and models in consultation with partners	EUR, FBK, DBC, UBB, GESIS
02.2027	Updates of data-set documentation and models in consultation with partners	EUR, FBK, DBC, UBB, GESIS
06.2027	Deployment of multilingual textual data: multilingual NLP tools based on legal data and political discourses	FBK, DBC, EUR
08.2027	TWIN4DEM integrated dataset and documentation	GESIS, EUR, DBC
10.2027	Deployment of full documentation of the DT model	UBB, DBC, EUR
12.2027	Online tutorials for using the toolbox in consultation with partners	EUR, FBK, DBC, UBB, GESIS
12.2027	Final updated TWIN4DEM methodological toolbox (D6.4)	EUR, DBC, FBK, UBB, ETICAS, GESIS

Table 1 TWIN4DEM Methodological Toolbox Timeline

1.3 Structure of the document

The document is structured as follows:

- **Section 1:** Introduction presents the purpose of the document, the timeline for creating the TWIN4DEM methodological toolbox and the document structure.
- **Section 2:** Initial outline for TWIN4DEM Methodological Toolbox – presents the information that will be included in the TWIN4DEM website, including relevant explanations when necessary. Each subsection represents a specific category for the

website, including the accompanying text and relevant explanations. The subsections are as follows:

- Quick Access Panel,
 - Data Repository,
 - Software & Models
 - Tutorials & Training,
 - Publications & Methodological Documentation,
 - Community & Support,
 - Licensing & Ethical Use,
 - Updates & Versioning.
- **Section 3: References**

2 Initial Outline for TWIN4DEM Methodological Toolbox

Explanation: The text below is designed as introductory information to the users of the methodological toolbox. It will be placed on the project website [Home - twin4dem.eu](https://twin4dem.eu) under the section “*Tools and Resources*”.

Website text: Welcome to the TWIN4DEM Methodological Toolbox – your central access point to the data, models, and software developed within the TWIN4DEM project.

The toolbox serves as a practical gateway to the scientific and technical outputs of the project, offering well-documented, high-quality resources that can be applied in research, policy analysis, and policymaking. By bringing together these materials in one coherent, user-friendly platform, the toolbox aims to foster knowledge exchange about democracy-related data, methodological innovation, and cross-disciplinary collaboration between political scientists, legal scholars and computer scientists.

More precisely, the toolbox is primarily designed for:

- **SSH Researchers** analysing democratic trends across presidential and parliamentary political systems,
- **Policymakers** developing evidence-based strategies to counter anti-democratic processes,
- **Civil society organizations (CSOs)** advocating for democratic resilience,
- **Developers** building new applications using TWIN4DEM data or code.

This toolbox is designed following Open Science and FAIR (Findable, Accessible, Interoperable, Reusable) principles to ensure transparency, reproducibility, and usability for

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researchers, policymakers, and practitioners. This approach also ensures the long-term sustainability and adaptability of the tools provided.

All materials are freely available under open licenses (e.g., CC-BY-NC). Users of the methodological toolbox should acknowledge TWIN4DEM by citing these resources.

2.1 Quick Access Panel

Explanation: This panel will be designed visually – text for tooltips or labels. The outline presented here is based on a preliminary design that may change as the project evolves and we gain new insights about the datasets, software and models. It will include the following elements:

Website text:

- **Data** – Browse and download curated textual and non-textual datasets on executive aggrandisement, including an interlinked database of legal acts, parliamentary votes, and public statements.
- **Software & Models** – Access open-source text analysis tools and agent-based simulation models developed in Python, R, and Netlogo.
- **Tutorials** – Step-by-step guides, webinars, and interactive notebooks for adapting CSS methods to democracy research.
- **Publications** – Methodological reports and scientific papers published in high-impact, open-access journals.
- **Community** – Discuss, collaborate, and get support through our GitHub repository and open-source community of stakeholders.

2.2 Data Repository

Explanation: The development and dissemination of all data-sets, software and models will fully conform to the already established strategy in the data management plan and the ethics guidelines (EBP). Before uploading resources into the repository, we will consult with relevant partners, including the EUR data steward and the ETICAS project ethics officer. Moreover, DBC will provide advice on the technical deployment of the resources on the website.

Website text: Explore datasets produced and aggregated by TWIN4DEM. Our online platform will serve as a FAIR data point, with data archived in repositories like OSF, the European Open Science Cloud (EOSC) and GitHub.

Each dataset will include:

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- **Full metadata** (variables, methodology, data source) using the OSF metadata standard.
- **Open formats** such as CSV, XML, JSON, and RDF.
- **Persistent identifiers (DOI)** – linking to Open Science Framework and GitHub repositories.

Key Datasets Available:

- **Interlinked Database on Executive Aggrandisement:** A novel database linking legal acts to individual parliamentary votes, public statements by politicians, and reactions from civil society actors and international organisations.
- **Synthetic Datasets:** GDPR-compliant synthetic datasets that combine textual data with non-textual sources (socio-economic, electoral, survey) to create copies of societies and political systems for analysis.
- **Multilingual Textual Corpora:** Curated corpora of legal documents, parliamentary debates, etc.

2.3 Software & Models

Website text: Access the open-source code and documentation for the innovative tools developed in TWIN4DEM. All software is made openly available on **GitHub** to support transparency, replication, and reuse.

Example entry:

- **Tool Name:** Initial TWIN4DEM DT model
- **Description:** A prototype Digital Twin of a democratic system, developed as an **agent-based model (ABM)** to simulate the complex interactions between political agents (executives, MPs, judges) and influencers (citizens, EU) that can lead to executive aggrandisement. The model is designed to test various "what-if" policy scenarios in a fine-grained simulation environment.
- **Repository:** GitHub/twin4dem/dem-twin-sim
- **License:** Open Source. The consortium may combine open and proprietary technologies to attain a market solution.
- **Installation:** Available as a **Python** package, with potential components in **R** and **Netlogo**.

2.4 Tutorials & Training

Website text: Learn how to use TWIN4DEM data and tools through our hands-on resources, designed to bridge the gap between Social Sciences and Humanities (SSH) and Computational Social Sciences (CSS).

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- **Getting Started Guide:** A step-by-step introduction to downloading data and running your first simulation.
- **Interactive Notebooks:** Preconfigured Jupyter notebooks (run online via Binder).
- **Webinars & Video Tutorials:** Recorded training sessions by TWIN4DEM experts.
- **TWIN4DEM Training Camp:** A dedicated training event for approximately 40 early- and mid-career researchers from different SSH disciplines, providing skills to engage with and apply CSS methods in democracy research.

2.5 Publications & Methodological Documentation

Explanation: Scientific publications will be disseminated primarily through high-impact academic journals.

Website text: Access project deliverables, methodological papers, and scientific publications related to TWIN4DEM.

Open-access journals (OA Gold approach).

- **Target Journals:** *Nature Human Behaviour*, *Political Analysis*, *American Journal of Political Science*, *Journal of Artificial Societies and Social Simulation*.
- **Methodological Reports:** Access detailed documentation, including the conceptual model of executive aggrandisement, data annotation guidelines, and model validation processes.

2.6 Community & Support

Website text: Join the **TWIN4DEM open-source community** to share ideas, ask questions, or collaborate with SSH scholars, CSS experts, and democracy stakeholders.

- **GitHub Discussions** (for technical support and collaborative development).
- **Mailing list / Newsletter** (for updates on project progress, new tool releases, and event invitations).

Collaboration Contact – Opportunities for joint work and scaling up the Digital Twin models to new countries or policy areas.

2.7 Licensing & Ethical Use

Website text: All TWIN4DEM resources are released under open licenses, such as **CCO** or **CC-BY** for data, to maximize reuse. The project is committed to the highest ethical standards,

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with all research activities overseen by a dedicated **Project Ethics Officer (PEO)** and an **External Ethics Advisory Board (EEAB)**. Users must respect data privacy and **GDPR** principles.

The project promotes an ethics-driven, privacy-by-design, and human-centered approach through the development of training materials and guidelines on **algorithmic fairness**.

2.8 Updates & Versioning

Website text: Stay informed through our changelog, covering dataset updates, software releases, and methodological improvements. Following an **AGILE methodology**, the toolbox and its components will be refined and updated iteratively based on expert validation and feedback from the user community. The updated TWIN4DEM methodological toolbox (D6.4) will be ready in December, 2027, which is the deadline for D6.4.

3 References

[Home - twin4dem.eu](https://twin4dem.eu)