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User-Centric Approaches to Digital Transformation (DT) in Environmental Impact Assessment

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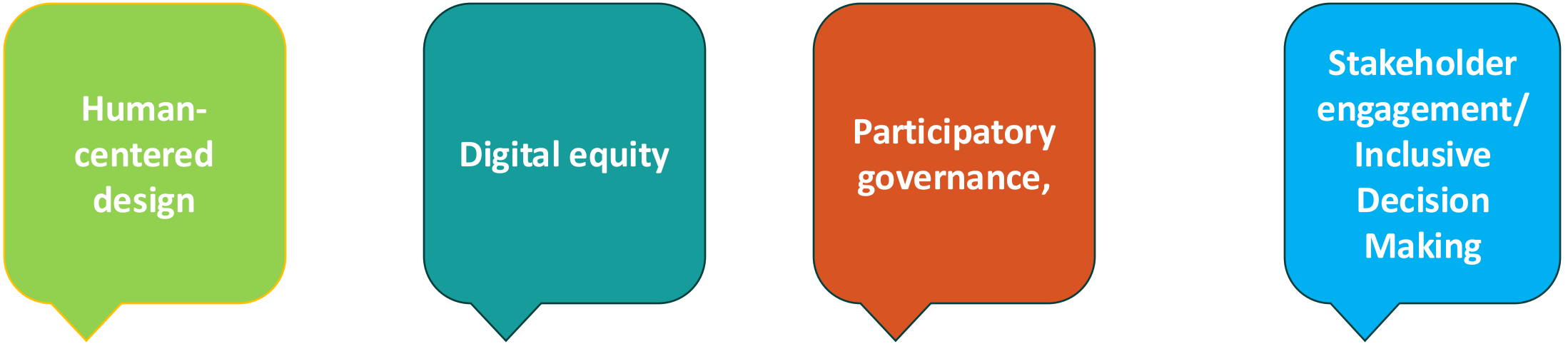
IAIA 25 BOLOGNA ITALY

Research Rationale: Reimagining Digital Transformation in Environmental Assessment

The study draws on interdisciplinary insights from environmental science, digital transformation theory, and user experience (UX) research to develop a framework for investigating the design use cases for EIA systems that are responsive to the diverse needs of their users.



Trends to Note in the Emerging DT Paradigm in Impact Assessment

Approaching DT with a single-use/magic wand attitude and not as a continuous agile process with shifting priorities

Priorities (Tiersky, 2017) whether increasing the efficiency of current operations is the priority across different jurisdiction

Requirement and cost : for Upskilling and Infrastructure for DT

Data Protection, Data democracy, and Ownership

Employment disruption (Vasile et al., 2024) .....Work performed by people vs. computing machines (Newman, 2016)

Identifying the role of DT in Environmental Impact Assessment:

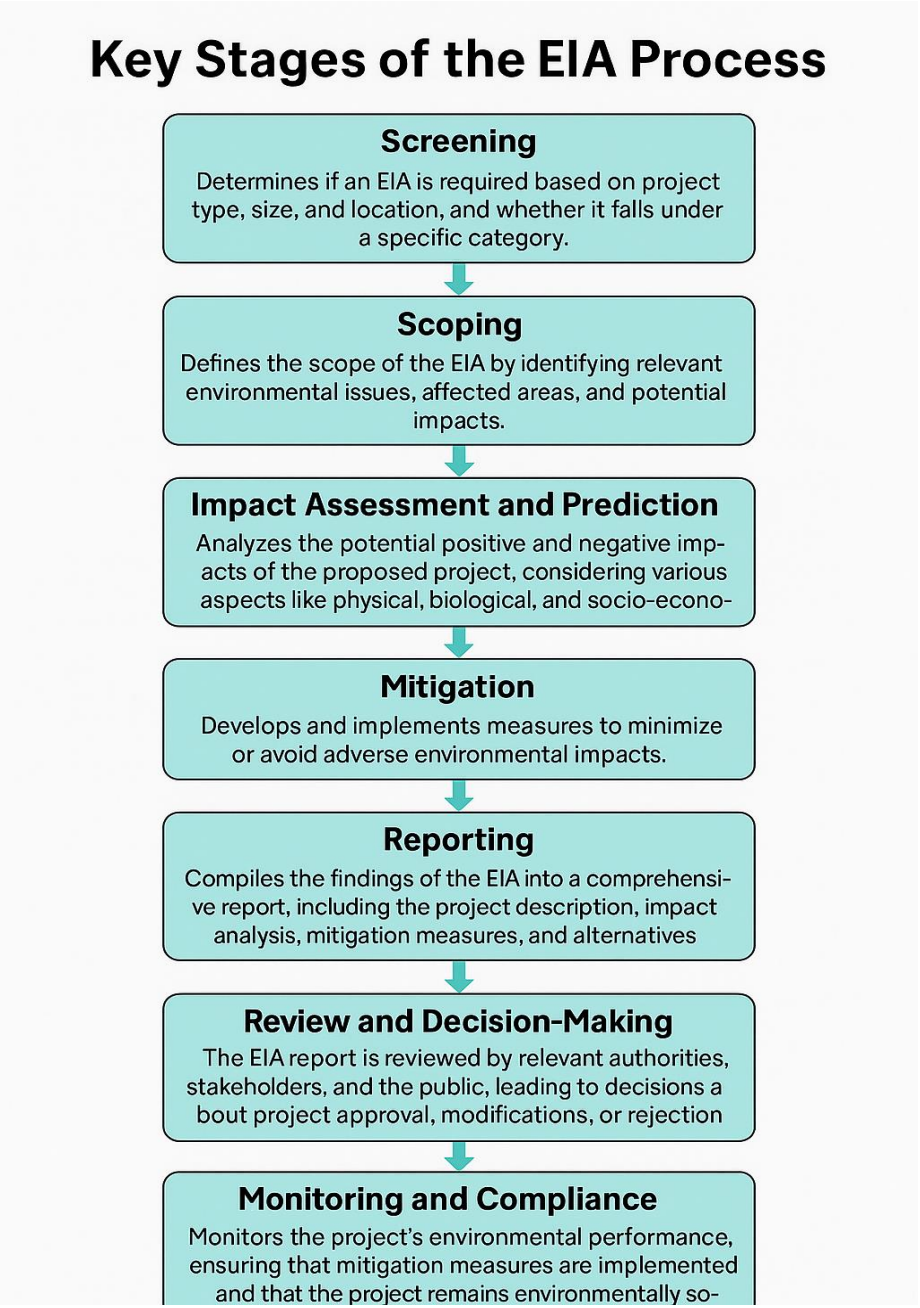
Substitution : as replacement for a function/process

Extension: improvement to exiting functionality

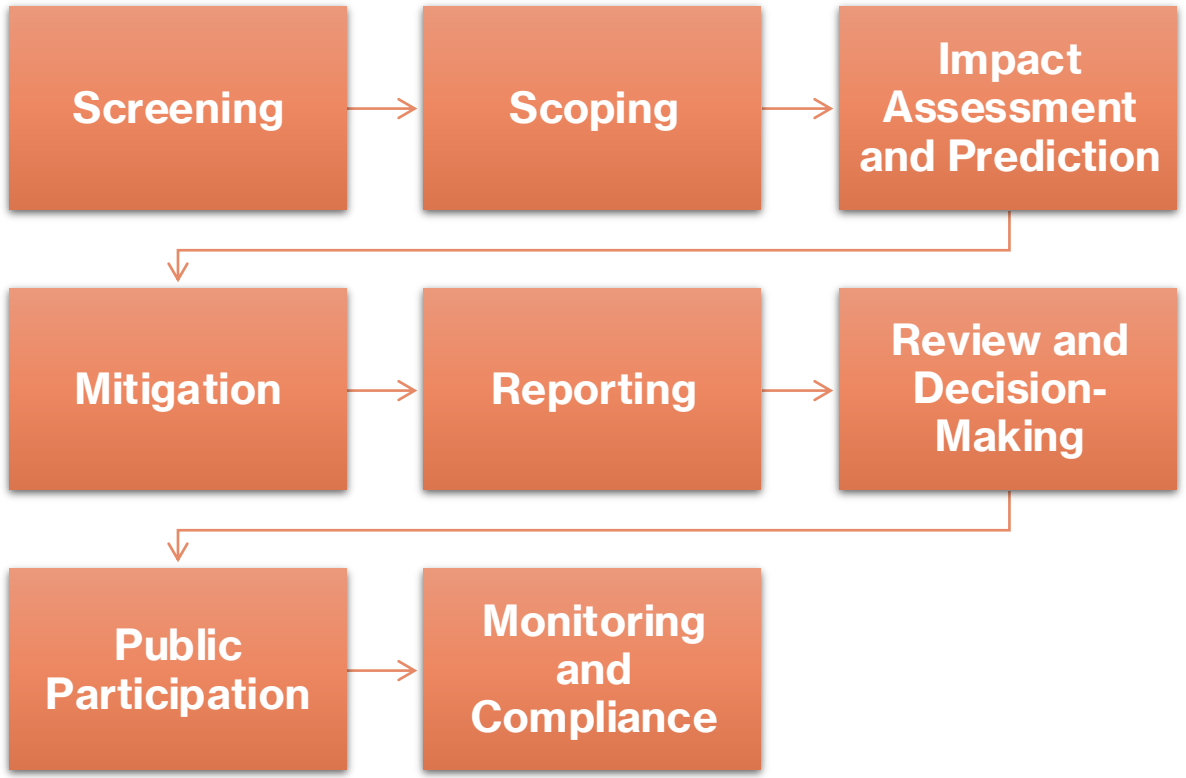
Transformation : refine the entire process and implementation

Cyber Security and the Singularity Factor

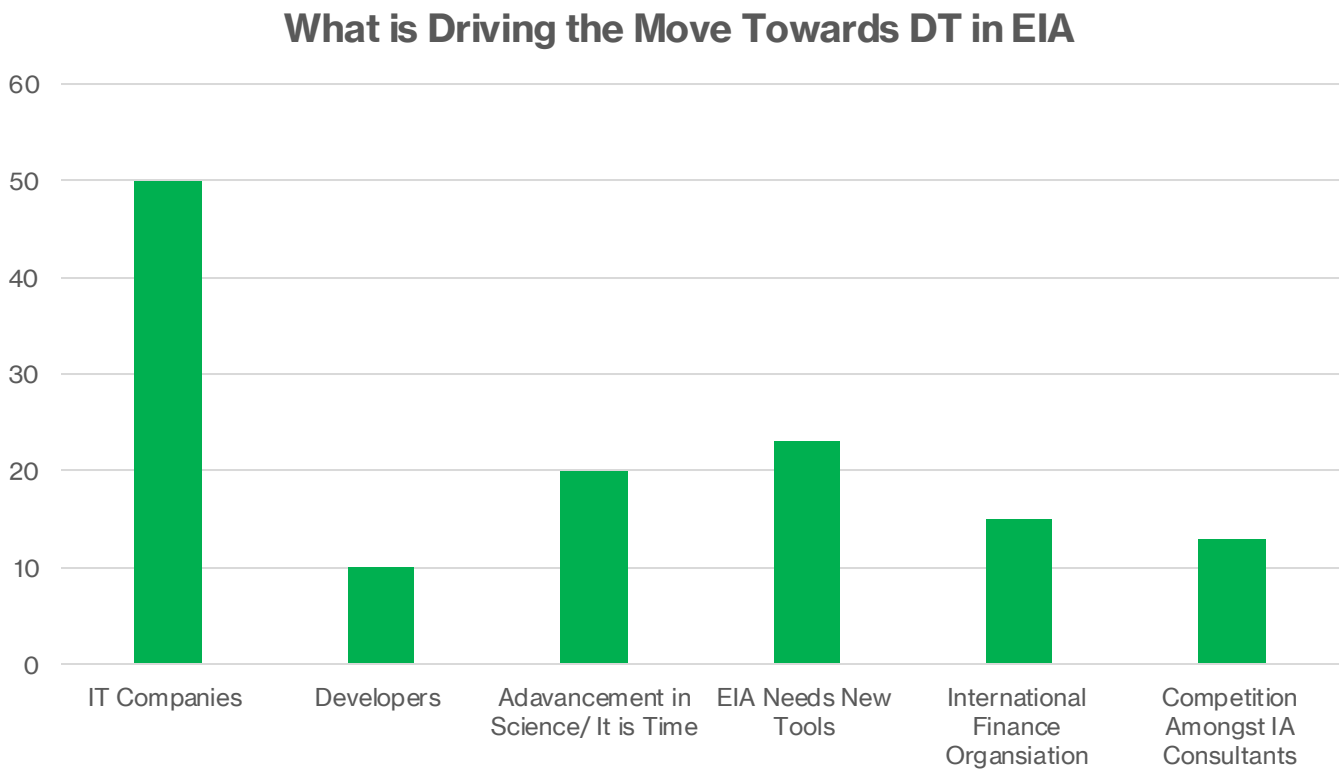
- Deploying AI Cybersecurity Agent & Blockchain
- Enforcing ethical safeguards in the design and use of AI in IA



Complete Digital Transformation of Key Stages of the EIA Process:



The Political Ecology of DT in EIA ; Identifying the Driving forces for DT



- Competition amongst consultancy firms - showcasing new and advanced method for doing the same thing
- Science and Innovation Advancement
- Need within the practice space for efficiency and effectiveness

EIA "As is": Challenges in Current Practice

- ✓ **Too Slow and Cost implication**
- ✓ **Large Files and report to read**
- ✓ **The Demand out-balances available man-power –** There are More EIA application today
- ✓ **Box-Ticking and Proceduralism**
- ✓ **Poor Integration with Decision-Making**: Environmental findings are sometimes sidelined in final project approvals
- ✓ **Limited Influence on Design**: EIAs are often initiated too late to meaningfully influence project planning and alternatives
- ✓ **Variable Quality of Reports**: Inconsistent standards, lack of peer review, and weak enforcement result in superficial assessments
- ✓ **Weak Follow-Up**: Monitoring and post-decision compliance are frequently neglected, making mitigation commitments unenforceable
- ✓ **Tokenistic Participation**: Public consultation may be minimal, poorly facilitated, or limited to elite stakeholders.

Screening: User Requirements/Use Cases

Proponents	Practitioners	Regulators	Community Groups & Local NGOs	Statutory Consultees
Pre-Application Checks	Submit Application	Receive Application /Online project tracking dashboard	Information on the Project	Notice of Screening Report
Yes/No to EIA	Get Screening Report	Evaluate Application	Let us know the benefits to the Community	Access to Project Summary
Automated screening checklists	Online EIA screening application	Identify the Environmental Context of Project i.e. sensitive Ecosystem	Identify project location early> Right Holders and Stakeholder	
Geospatial environmental sensitivity mapping	Digital project risk profiling	Digital screening decision support tools	Access to Project Summary	
	Report historical precedents on project site	Inter-agency collaboration portals-sharing screening report		
		Notification and communication modules		

Scoping: User Requirements/Use Cases

Proponents	Practitioners	Regulators	Community Groups & Local NGOs	Statutory Consultees
Scoping Report	Automated scoping Process	Receive Preliminary Scoping Checklist	Make input to Scoping	Notification on scoping events
Automated scoping checklists	Report of Scoping	Issuance of Scoping reporting	Open data access to scoping decisions and criteria	An interface to make recommendations and input
	Online EIA scoping progression/ application	Evaluation of Scoping Review and Report	SMS Notification to Community Members	
	Digital project risk profiling	Initiate Scoping Workshop with all Stakeholders	A Community-sourced environmental concern platforms	
		Payment System	Scoping checklist for Community participation	
		Report and retain Outcome of Scoping Workshop/Review of project design		

Impact Assessment and Prediction/Mitigation: User Requirements/Use Cases

Proponents	Practitioners	Regulators	Community Groups & Local NGOs	Statutory Consultees
Database for Assessment	Automated environmental baseline data retrieval/Mitigation	Approval	Access to anonymized data reporting	Consultees Assessment Report
Timeline/Quick Returns	Integration with GIS/Impact Visualization Tools	Real-time Monitoring	Inclusion in the Assessment Process	
Automated Analysis	Intergration Across National and International Database/Automated Project Design Review	Daily Report Logging	Rightsholders Comment	
Reporting every stage of IA	Collaboration with Regulators	Learning- Daily Lessons Learnt Logging/Issues Logging	Access to all data findings	
Notifications on all events	Culturally-sensitive digital engagement tools	Virtual Site Visit	Allow Video and voice reporting	
	Digital consent logging systems			

Reporting: User Requirements/Use Cases

Proponents	Practitioners	Regulators	Community Groups & Local NGOs	Statutory Consultees
Advance Notification of End of IA	Automated Report Submission system	Automated Report Review	Reporting system to Community groups	Notice of IA report submission
Advance Copy of report before submission	Get Screening Report	Approval of Report	Prevent tampering and modification to Community Voice	Approval of Contribution
Automated Review Checklist	Online EIA screening application	Notify Review Panel/Community	Search/Read	Summary Generating System
	Digital project risk profile Review	Initiate Review Panel	Download	
	Storage and Access	Search/Fast Automated Readers		
	Upload/Download	Generate Impact Statement		

Review and Decision-Making: User Requirements/Use Cases

Proponents	Practitioners	Regulators	Community Groups & Local NGOs	Statutory Consultees
Notification of Panel selection	Automated Review Selection/Subject Matter Expert Based	Receive Application /Online project tracking dashboard	Context Review	Notification on Review Decision
Contest Panel selection	Capacity to Review Performance of Reviewers Over time	Evaluate Application	Community Review	
Automated summary	Online participation in review panel	Automated Review		
Request Appeal	Compliance Checks	Generate Criteria for Review		
		Issues Environmental Statement		

Public Participation: User Requirements/Use Cases

Proponents	Practitioners	Regulators	Community Groups & Local NGOs	Statutory Consultees
Community Engagement	Remote Community Engagement	Receive Community Engagement report	Geo-tagged public feedback tools	Community Concerns Tracker
Checklist for SCR	Checklist	Enforce Public Participation	Community risk perception surveys	
		Identify the Cultural Context of Project i.e. sensitive Ecosystem	SMS/USSD-based notifications – real time update	
			Privacy and Anonymity	
			None-technical Report	
			Feedback	

Monitoring and Compliance: User Requirements/Use Cases

Proponents	**Practitioners**	**Regulators**	**Community Groups & Local NGOs**	**Statutory Consultees**
Checklist	Notification	Request Monitoring	Environmental Indicators	Automated Alert system
Timing	Generate Reports	Evaluate Report	Reporting Enviromental issues	Notification
Automated Notification	Digital project risk apraisal	Activate Intervention	Community Inclusion	
	Automated Warning Systems	Real-time Tracking		

Shaping and Reshaping Cultural Landscapes : The need for a Proactive Approach by IA Practitioners on the Emerging Nexus in the Age of AI

- **Climate change** and environmental degradation
- **Urban expansion** and infrastructure development
- **Globalization** and cultural homogenization
- **Technological shifts** (e.g., smart cities, renewable infrastructure)
- **Social justice and decolonization demands**
- **Protection of Indigenous Identities and Knowledge**

Recommendations Use cases for DT in EIA:

- DT to enhance collaboration
- DT to break down the walls around the silos
- DT for Inclusion/Accessibility and Accountability
- DT to specific Functional, Strategic, Cultural, Analytical, and Technical Requirement
- Context Factors : DT for Context Awareness
- Interactive Iterative Design/Agile system with yearly review
- ANY To ANY Intergration
- Extensive Change Management

Please send me an email to ask any question or make your contribution to shape the DT for IA

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