TANGO-W

Transformative capacity in energy-food-water

Definition of New Skills & Role Requirements

3rd Jan 2024

Lead Partners: Austrian Institute of Technology & Smart Innovation Norway

Authors: Doris Wilhelmer (AIT), Pia Weinlinger (AIT), Anja Wingstedt (SIN)

Version: 0.9

URBAN EUROPE

European Commission

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 101003758

Disclaimer

About TANGO-W

The TANGO-W project is an applied research project that develops urban transformative capacities (UTC) as a novel governance ability at the interface of food, energy, and water. TANGO-W follows Wolfram's (2016) capacity building approach, adopting a needs and requirements-based focus on the capacity building priorities of urban stakeholders. At the heart of TANGO-W is the two-level capacity building approach. At the urban level, TANGO-W designs and implements Urban Living Labs 2.0 (ULL). At the European level, TANGO-W establishes a transdisciplinary Community of Practice (CoP) as an integrative coordinating transformation system. Both provide the spaces for the development of UTC according to the needs of urban actors in several dimensions (i.e., transformative governance formats, shaping new transformation roles, self-organisation, and technical skills and tools). At the same time, the ULLs and CoPs act as novel governance formats at the local and EU levels to accelerate urban change in a desired, sustainable direction. The activities of TANGO-W result in policy recommendations for replication and upscaling measures as well as in training concepts and pilot courses that support capacity building in TANGO-W fellow cities.

Technical references

Project acronym	TANGO-W
Project title	Transformative cApacity in eNerGy fOod and Water
Project coordinator	Doris Wilhelmer PhD, Austrian Institute of Technology GmbH (AIT) Phone: +43 664 6207668 Email: doris.wilhelmer@ait.ac.at
Project duration	April 2022–February 2025

Deliverable no.	2.4 Definition of new skills & role requirements (M21)
Dissemination level	M23
Work package	WP2
Task	Task 2.4 Counsellor & Civil servant transformative roles and competences;
Lead beneficiary	Task 2.3 Living LAB 2.0 concept design
Contributing beneficiary/beneficiaries	Lucane Aguiar Borges (NR), Lisa Rohrer (NR), Doris Wilhelmer (AIT), Pia Weinlinger (AIT), Peter Biegelbauer (AIT), Manfred Kofranek (AIT), Jolanta Dvarioniene (KTU), Thomas Nacht (4ER), Robert Pratter (4ER), Maria Lennartsson (Stockholms Stad), Donatella Acquaviva (Campus Roslagen), Amelia Stromberg (Campus Roslagen), Helena Rødseth (Marker), Hilde Marie Wold (Halden), Tanja Friess (Weiz), Kristina Kamicaityte (Alytus), Stefan Guggenberger (Klagenfurt); Eichler Georg (Klagenfurt), Anja Wingstedt (SIN)
Due date of deliverable	30th November 2023
Actual delivery date	3rd January 2024

Document history

Version	Date	Author	Summary of changes
0.1	21st Aug 2023	AIT	TOC created
0.2	23rd Aug 2023	AIT & SIN	TOC committed
	18th Oct 2023	AUT & SIN Marker & Halden & Norrtälje & Stockholm & Alytus & Weiz & Klagenfurt; 4ER, NR, KTU;	Contributions of ULL's and RO's (strategies, role requirements)
0.3	1st Nov 2023	AIT & SIN	1st draft created
0.4	15th Nov 2023	AIT & SIN	2nd draft created
0.5	20th Nov 2023	AIT & SIN	Final Draft for Review
0.6	25th Nov 2023	AIT & all RO's & all ULL PM'S	Sent for 1st Review
0.7	4th Dec 2023	AIT & SIN to NR & IPAK	Review of all
0.8	3rd Jan 2024	AIT & SIN	Final Version generated
0.9	1st March 2024	AIT	Final submission EC portal

Abbreviations

4ER	4ward Energy Research
AD Board	Advisory Board
AIT	Austrian Institute of Technology
City Dep	City Departments
CON	Consultants
CoP	Community of Practices
CR	Campus Roslagen
DEC-Board	Decision Board
EXP-Teams	Expert-teams
F2f	Face-to-face
FEW Nexus	Food-Water-Energy Nexus
GSI	Green Space Index
KTU	2nd Jan 2023
NPO	Non-profit organisation
NR	Nordregio
PM	Project management
PT	Project Team
RO	Research organisation
SIN	Smart Innovation Norway
SRS	Stockholm Royal Seaport
Stakeh	Stakeholder
TANGO-W	Transformative cApacity in eNerGy fOod and Water
TraFo	Transformation Room
ULL	Urban Living Lab
UTC	Urban transformative capacity
WP	Workpackage

Contents

Contents 0
Tables 1
1 Goals of the report 2
2 Initial Situation of public administration 4
2.1 The dynamics of European public administrations 4
2.2 Basic mechanisms for coordination and governance of municipalities 5
2.3 Distinct orientations in Central, Nordic and Eastern European countries 7
3 Initial Situation of European Research Organisations 9
3.1 Paradigm Shift: History of transformative research from an RIFS perspective 9
3.2 Definition of terms 10
3.3 Leading differences: What paradigms characterise the term "transformative research" best? 13
3.4 TANGO-W research partners' understanding of transformative research 16
3.5 TANGO-W ROs' different approaches to transformative research compared 23
4 Requirements for roles, skills and abilities of actors of transformation 28
4.1 Role requirements resulting from current recruiting processes 28
4.1.1 Skill and role requirements for civil servants 28
4.1.2 Skill and role requirements for researchers 30
4.1.3 Similarities and differences: skill and role requirements of researcher and civil servants 32
5 Required new roles and skills for transformative civil servants and researchers 33
5.1 Preconditions resulting from Wolfram & transformative research 33
5.2 Role requirements resulting from Wolfram and transformative research 35
5.3 Role-Requirements resulting from systemic Guiding differences 38
5.4 Feedback from researchers on new practical requirements 42
5.5 Complex contexts require flexible solutions and governance approaches. 53
5.6 Core competences as learning objectives for transformative researchers and civil servants 54
5.6.1 Different core competences and learning objectives 54
5.6.2 Common core competences and learning objectives 56
6 Conclusions: learning objectives and learning content for transformative professional groups 59
7 OUTLOOK to the TANGO-W curriculum 60
8 References 61

Tables

Table 1:Research approach and strategic orientation of the AIT (source: analysis of the 2023 mini-questionnaire on the research approaches of tango-w research organisations) 17

Table 2 Research approach and strategic orientation of NR (source: analysis of the 2023 mini-questionnaire on the research approaches of tango-w research organisations) 19

Table 3 Research approach and strategic orientation of 4ward energy gmbh (source: analysis of the 2023 mini-questionnaire on the research approaches of tango-w research organisations) 20

Table 4 Research approach and strategic orientation of the KTU (source: analysis of the 2023 mini-questionnaire on the research approaches of tango-w research organisations) 21

Table 5 Research approach and strategic orientation of SIN (source: analysis of the 2023 mini-questionnaire on the research approaches of TANGO-W research organisations) 22

Table 6 Research approach of TANGO-W RO-partners (source: comparative analysis based on self-descriptions and questionnaire evaluation) 27

Table 7 Summarized role requirements for civil servants 29

Table 8 Summarized role requirements for transformative researchers 31

Table 9 TANGO-W Good practice playbook, page 5 (Source: Wolfram, M & Frantzeskaki N. 2016). 34

Table 10 Requirements resulting from Wolfram 36

Table 11 Requirements resulting transformative research 38

Table 12 New requirements for civil servant project managers and transformative researchers 41

Table 13 Requirements for civil servants and researchers from the perspective of TANGO-W practitioners 44

Table 14 New role requirements and learning objectives from the perspective of the researchers interviewed 52

Table 15 Different learning objectives resulting from the interviews 56

Table 16 Joint learning objectives resulting from the interviews 59

1 Goals of the report

Climate and demographic change, combined with digitalisation and individualisation, are inexorably driving the transformation of cities, regions and nations. As those responsible for regulating processes and shaping change, politicians and administrators of small, medium and large municipalities, as well as research organisations, are at the centre of the action. Reflections by Austrian researchers have shown that, over the last 40 years or so, cities have increasingly taken on the role of central implementers and thus also of central drivers of physical/technological and social/societal change. In particular, successful lateral entrants in city-internal innovation projects are increasingly seeking contact with urban and regional development agencies and transformative researchers in order to obtain external support for their inherently, structurally and socially complex innovation projects.

Developments in recent years show that decision-makers in public administration can no longer rely on simply coordinating and regulating the needs and demands of civil society. Their task as local actors in implementing national and regional strategic goals and finding local responses to climate change, energy, food, health, etc., requires a new understanding of their role: political and administrative decision-makers must not only see themselves as part of a changing system, but must proactively shape and drive change in the system of which they are a part. This means that, in addition to their current understanding of their role, they must also examine and adapt established routines, procedures and regulations where they have become barriers to necessary change. Politicians and administrators are therefore facing a paradigm shift in the way they define their role and prioritise their responsibilities.

We are currently witnessing a similar development in research organisations. In the last two decades of the twentieth century, technology push initiatives have increasingly given way to transdisciplinary and participatory research approaches in which real problems in cities and regions are addressed and experimentally solved by transdisciplinary research consortia from civil society, politics, administration and science. Grand challenge and mission orientation are two key words for the fact that research projects are increasingly oriented less towards individual technologies or processes and more towards future-oriented strategies and missions, thus focusing more on issues that affect society as a whole. The resulting transdisciplinary approach brings users, citizens and all relevant stakeholders onto the stage for the first time in relation to a specific issue, as the problems and requirements of specific situations can only be understood, and context-specific solutions found in cooperation with all those concerned. Participation, transdisciplinarity and experimental research in collaboration with those being researched have increasingly found their way into national and European research programmes over the last decade. The role of the basic researcher in an ivory tower, far removed from social and societal realities, is increasingly becoming an obsolete model. Conversely, research is now expected not only to analyse the conditions for change and develop new technologies, but also to enable and initiate social change in the process of research. In this way, research becomes a field for collective research-based experimentation and learning that brings about the change in action it purports to achieve.

Both public administrations and research organisations have thus already taken a first step towards changing their traditional roles and competencies and are faced with the challenge of distinguishing which specific role elements, structures, procedures and expertise need to be preserved and where new playing fields for social and methodological learning, innovation and change need to be created.

D2.4 "ULL2.0_TANGO-W / New Skills & Role Requirements" aims to develop and offer initial answers to these questions. It builds on the existing interim results of D2.2 Playbook and D2.3 Design Guide and

requires knowledge of the necessary boundaries and key success criteria for successful change, as well as knowledge of the fundamental differences between mechanistic and systemic control approaches in the cooperation between researchers and those being researched.

D2.4 "ULL2.0_TANGO-W goes one step further by recognising the contexts of drivers and actors of urban change as important dimensions of influence on and, in part, as a playing field for initiating and enabling change.

For the first time, the role models and requirement profiles for civil servants and researchers that are common in Northern, Central, Eastern and Southern Europe come into view, which, as structural elements of organisations, serve to further institutionalise role-specific actions and procedures against the background of generational change in administration and research, and thus also to establish them for the future. From this perspective, recruitment processes open the doors of organisations to applicants whose expertise, skills and abilities offer the greatest possible interface with existing role models and routines and who are therefore considered suitable for taking up and continuing traditional routines and procedures in the best possible way.

The expected outcome of D2.4 "ULL2.0_TANGO-W / New Skills & Role Requirements" should provide a first sounding and outline of new role requirements and necessary skills/potential for the future generation of civil servants and researchers and thus create the necessary basis for the design of a TANGO-W curriculum for transformative civil servants and researchers (D5.2 Curriculum & Skills Training). At the same time, the new role descriptions and job profiles represent an offer to European communities and research organisations to incorporate useful elements of them into current recruitment processes, thus opening the doors for the emergence of a new generation of transformative researchers and civil servants.

2 Initial Situation of public administration

2.1 The dynamics of European public administrations

European municipalities operate in a dynamic environment characterised by a mixture of formal rules, informal practices and resource structures. These elements both limit and enhance their capabilities for transformative change. Furthermore, municipalities are not homogeneous entities, but consist of different sub-governments, each with their own interests, resources and objectives. The degree of autonomy and independence of these municipalities varies widely across European regions and countries, reflecting the different institutional contexts within the EU (Kronsell/Mukhtar-Landgren, 2018). What they have in common is that municipalities represent a crucial intersection where politics meets administrative execution.

The relationship between public administration and politics is an ever-evolving landscape that is currently characterised by the discourse on depoliticisation. Depoliticisation, as discussed for example by Skoog and Svensson 2023 or Flinders and Wood 2014, refers to the transfer of political functions and responsibilities to independent institutions, bodies or experts. Depoliticisation is particularly pronounced in complex policy areas that require extensive collaboration and are fraught with ambiguity, such as areas of sustainability. In the context of European municipalities, there's a growing practice since the 1980s of delegating services to external entities. This outsourcing trend underscores a pivotal challenge: while it might streamline certain operations, it also raises questions about the internal strength and capability of public administrations. Given that local governments are the most immediate layer of government for citizens, offering the most direct visibility and impact, enhancing their internal capacities becomes essential.

Furthermore, civil servants emerge as key figures in this evolving landscape. Contrary to the traditional view of them merely implementing political directives, these officials can also initiate and shape policy agendas (Skoog/Svensson 2023). Their role is crucial in maintaining consistency and coherence over the long term, particularly in the face of transformative policies aimed at substantial change (Braams et al. 2021, Weber and Rohracher 2012). This role of civil servants emphasizes the importance of strengthening public administrations from within to ensure they are equipped not just for today's challenges but also for future demands in governance and policy implementation.

The traditions of public administration since 1900

The traditions of public administration have changed over the years and so have the roles of civil servants. These traditions are essentially accepted normative frameworks that present themselves as legitimising narratives of public administration to the role of government (Bourgon, 2011). Historically, three main traditions in the field of public administration have been identified in the literature since 1900 (Stout 2013, Braams et al. 2021, Hammerschmid et al. 2023, Pollitt & Bouckaert, 2017). These include traditional Weberian public administration, which has a hierarchical structure, New Public Management, which is based on market-oriented principles, and the network tradition, which is characterised by cooperative and collaborative approaches. In academic discussions, these traditions are often discussed as coexisting or even competing realities (Hammerschmid et al. 2023). It can also be observed that elements from these different traditions coexist and recur at different points in political processes (ibid.).

The traditional Weberian tradition of public administration, which emerged in the early 20th century, was a reaction to earlier practices that failed to deliver services on the basis of rights. Max Weber therefore defined a new framework based on a structured hierarchy that emphasised procedural accountability and predictability. In this system, civil servants are seen as neutral and competent professionals who strictly adhere to laws and regulations (Braams et al. 2021; Stout 2013). This tradition emphasises specialisation and expertise and adheres to core administrative principles to ensure continuity and democratic bureaucratic accountability. The hierarchical structure is the main coordination tool that clearly delineates the roles of managers and executors, as Hammerschmid 2023 notes. This rigid bureaucratic structure is often criticised for inhibiting innovation and resisting change due to its rigid bureaucracy (Braams et al, 2021). In this tradition, civil servants are supposed to take on tasks in which they follow the instructions of their political superiors instead of steering the direction themselves (Braams et al 2021).

In contrast, the New Public Management (NPM) approach emerged in the 1980s as a reaction to the perceived disadvantages of the bureaucratic system, particularly its inefficiency and rigidity (Braams et al 2021, Pollitt, 2003). Influenced by market-oriented theories, NPM emphasises managerial independence, performance management and competitive principles and aims to revitalise the public sector with business-like methods and values (Hammerschmid et al. 2023; Pollitt 2003). Civil servants are expected to focus on efficiency, effectiveness and the delivery of better services (Hammerschmid et al. 2023). This tradition also advocates decentralisation and deregulation. In this tradition civil servants act as entrepreneurs, embracing the tenets of deregulation, market non-intervention, competitive practices, and awareness of costs (Braams et al 2021). The NPM tradition led to the outsourcing of local services to private or non-profit entities through various means such as contracting out, privatization of functions/assets, corporatization, and competitive bidding. Yet, in recent times, there has been a noticeable shift in some countries and sectors towards re-municipalization and the insourcing of local functions that had been previously outsourced, indicating a move beyond NPM practices (Schwab et al 2017).

In the late 1990s, the collaborative tradition, also known as "Network governance", emerged, spurred on by challenges such as terrorism, environmental problems and digitalisation. The tradition emphasises the management of societal change through self-organisation, interdependence and the exchange of resources between different actors (Braams et al 2021). In this tradition, different interest groups (e.g. citizens) should be able to exert direct influence on political processes. Different actors should be encouraged, including citizens, to actively participate and influence policy processes by advocating for bottom-up initiatives. In this framework, civil servants act as facilitators of equal interactions and are seen as experts who promote the integration of new practices, perspectives and insights. The role of civil servants in this tradition involves concentrating on forming emergent alliances and bringing various actors together to develop an accepted solution by all of the stakeholders (Braams et al 2021).

2.2 Basic mechanisms for coordination and governance of municipalities

Since the 1980s, governance has gained significant importance in the public sector. The shift from "government" to "governance", particularly influenced by NPM reforms and decentralization efforts initiated during that period, led to the adoption of local self-governance structures in most European countries (Tasan-Kok/Vranken, 2011). This change has transitioned local governments to more decentralized, organizationally separated, and self-governing spaces (Leixnering/ Meyer/ Polzer 2021). The role of municipal self-governance has been underscored as a means to enhance democracy, increase citizen participation, and distribute power more equitably (Kiurienė 2020). This approach is supported and

reinforced at the European level through for example the European Charter of Local Self-Government (1985), the Treaty of Lisbon (2007), and the New Leipzig Charter (2020). The New Leipzig Charter, for example, emphasizes the empowerment of cities to become agents of transformation, advocating for local governments to be endowed with the necessary capabilities for effective action. This is seen as crucial for serving the public interest and addressing urban development challenges. It stresses the need for cities to develop comprehensive and sustainable urban development strategies that cover all areas of the city. Despite its emphasis on the autonomous capacity of cities, the idea of "municipal self-government" does not belittle the importance of supra-local tiers of government, rather, it purports the descaling of policy competences and an increased role of local authorities (Mocca, 2021).

There are differences between municipalities when it comes to formal or legislative features, including size and the division of tasks between governmental levels. Accordingly, the degree of local independence and autonomy varies considerably between different countries in Europe. The success in delivering public services is largely dependent on the ability of local authorities to take decisive action. Local self-governance entities are pivotal in addressing diverse challenges across social, economic, cultural, and regional domains. Positioned closest to the citizens, municipal bodies are key to advancing public administration, providing a responsive and effective level of administration for public service delivery (Blahodarnyi et al 2022). Most often, local self-governance in municipalities happens not in isolation but in conjunction with cooperation with various governmental and non-governmental actors. This means that local governance involves engaging with a range of actors, including community groups, non-profit organizations, and other non-state entities, to effectively manage and address local issues and needs (Leixnering/ Meyer/ Polzer 2021). Furthermore, while local self-government involves a degree of autonomy, it also requires interaction and coordination with higher levels of government. This suggests that an essential aspect of governance, whether local or otherwise, is the ability of institutions to coordinate actions and policies effectively across different sectors and levels of government, as well as with non-governmental actors. This coordination is crucial for addressing complex challenges that transcend traditional bureaucratic boundaries, ensuring that various actors work together in a cohesive and integrated manner. Depending on the predominant tradition of a local administration, the form of coordination, cooperation and the type of actors involved may look different (Hammerschmid et al 2023). Generally, a distinction can be made between vertical and horizontal coordination (Lægreid & Rykkja, 2015 Sørensen, 2018). Vertical coordination refers to interactions between different levels of government (e.g., between the state and municipalities or regions and municipalities), whereas horizontal coordination can occur across sectors or between municipalities and citizens (Sørensen, 2018). In the Traditional Public Administration model, there is a focus on internal collaboration within the public sector, primarily through vertical coordination across various levels of hierarchy (Hammerschmid et al 2023). This model relies on rules and directives to ensure coordination, as noted by Pollitt & Bouckaert 2017. The NPM tradition, however, expands the scope of collaboration to include the private sector, reflecting a shift towards outsourcing many functions and creating a multi-actor approach to task coordination formerly managed by the public sector. Urban development has thus evolved into a collaborative effort among a diverse group of stakeholders, including public authorities, semi-independent public organizations, private companies, and civil society organizations, sharing responsibilities and risks in pursuing decentralized objectives (Tasan-Kok et al 2011). Despite a tendency towards centralized control, NPM maintains vertical coordination but with a notable hierarchical influence over outcomes (Hammerschmid et al 2023). The Network Tradition further enhances the inclusion of non-governmental actors, promoting horizontal collaboration and encouraging public sector actors to work together more cohesively across policy areas.

This decentralized management of actor networks supports a collaborative and less hierarchical governance structure (Lægreid & Rykkja, 2015; Torfing, 2019).

Nevertheless, the dynamics of multi-actor cooperation that bring together various actors present a complex array of challenges that necessitate careful navigation and innovative solutions. At the heart of these challenges is the often conflicting and competing interests and aims of the stakeholders involved. Adding to this complexity is the need for coordinated action within organizational hierarchies that are inherently complex. The involvement of multiple actors introduces a level of complexity that demands effective coordination, particularly challenging within governance systems characterized by intricate hierarchical structures. In such environments, hierarchical structures may hinder the smooth execution of projects within the municipality. Addressing this complexity requires institutional innovations that can manage the intricate relationships between multi-actor and multi-level stakeholders effectively. Navigating the complexities of multi-actor cooperation thus demands a comprehensive understanding of actor dynamics, alongside the development and implementation of innovative governance structures and coordination mechanisms.

2.3 Distinct orientations in Central, Nordic and Eastern European countries

The legal tradition within a country significantly shapes the core values guiding administrative actions, the implementation of local self-governance and administration, and the dynamics between politics, citizens, and administrative bodies. The differences in the structure of local self-government systems depend on many factors: on the prevailing idea of organising power and governance in a country at local level, as well as on the tradition of local administrative systems in the various European countries (Blahodarnyi et al. 2022). Following Schwab/Bouckaert/Kuhlmann, six types of local administrative systems in Europe are often defined in the literature (see Bouckaert/Kuhlmann 2016, Schwab/Bouckaert/Kuhlmann 2017). Due to our ULLs, only three typologies of local administrations are discussed below, namely the Continental European Federal Type (CEF) for Austria, Nordic Type (NO) for Sweden and Norway, Central Eastern European Type (CEE) for Lithuania. Here, a distinction can be drawn between two distinct types: 1) traditional Western bureaucratic models, and 2) post-communist models, which have experienced considerable administrative transformations and systemic shifts post-1990 (Kuhlmann/Wollmann 2019. During these transformations, several countries have reconnected with various pre-communist administrative traditions, incorporating historical institutional legacies. These typologies form the contextual conditions in which civil servants operate and must therefore be seen as an understanding of their room for manoeuvre. Institutional change or transformative change can have different effects in the respective contexts of the individual countries. Their way of trying out new roles and experimenting with them in order to bring about transformative change and build capacities is also determined by the respective contexts, because they encounter existing institutional arrangements and institutional "legacies".

The Continental European Federal Type (CEF)

The countries of the Continental European Federal Type (Germany, Austria, Switzerland) have an administrative culture that is deeply rooted in legalism and strict adherence to the rule of law (Schwab/Bouckaert/Kuhlmann 2017). This culture is significantly influenced by the principle of subsidiarity, which emphasises the importance of subnational or decentralised levels of administration (Kuhlmann/Wollmann 2019). The local governments in these countries, which are often led by influential

mayors, play a central role (Schwab/Bouckaert/Kuhlmann 2017). This structure emphasises the strong position of local government as a special and essential feature of the CEF type. The constitutional protection of local self-government in these countries is of crucial importance. It not only gives the municipalities a legally recognised general responsibility, but also equips them with a broad, multifunctional task profile (Kuhlmann/Wollmann 2019). In addition, these local authorities enjoy strong political and democratic legitimisation, which is also supported by active citizen participation.

The Nordic Type (NO)

In comparisons of political systems on both global and European scales, Nordic nations typically stand out as a unique group. These countries, all of which embrace parliamentary democracy, share an administrative tradition that is characterized by a strong culture of the rule of law, transparency, and the administration's openness to the public (Sandberg 2023). In the Nordic model, the system stands out for its open and transparent civil service. Transparency and openness are key principles here, emphasizing citizen accessibility to information and participation. Like the CEF model, subsidiarity is a foundational principle, but the NO model features an even higher decentralized administrative structure (Schwab/Bouckaert/Kuhlmann 2017). Local governments in this model are both politically and functionally empowered, enjoying a higher level of financial and functional autonomy than in the rest of Europe. This means that local and regional governments have a strong mandate to make decisions within the legal responsibilities given to them concerning education, healthcare, and social services (Sandberg, 2023). The internal administrative hierarchy is rather weak compared with the rest of Europe. The West Nordic model, characteristic of countries like Norway, is founded on the concept of consolidated power, allowing government ministers to have control over operations within their respective departments. Conversely, the East Nordic model, prevalent in Finland and Sweden, limits government control by providing significant independence to administrative authorities (ibid). In Sweden, civil servants operate with a notable level of independence from higher authorities and the directive influence they may wish to exert. Additionally, public officials bear individual responsibility for their decisions (Mäenpää/Fenger 2019).

The Eastern European Type and the Baltics

After 1945, Eastern Europe's administrative structures were shaped by the Stalinist model imposed by the Soviet Union, characterized by centralized party rule and the absence of separation of powers, known as the Soviet Tradition (Kuhlmann/Wollmann 2019). This ensured the unity and indivisibility of state power, with local administrative units acting on behalf of the state. The fall of communism in 1990 marked a significant transformation, as countries abandoned the socialist state organization for the Continental European model (ibid). However, the legacy of the Soviet Tradition varied, with some countries making a complete break and others retaining elements of socialist administration, affecting administrative functionality. In the early 1990s, the Baltic states began their post-communist transition. Despite initial continuities, the approach towards EU membership in the late 1990s spurred significant governance reforms, including municipal organization, central government restructuring, and legal framework development through civil and public administration laws (Bileišis et al 2017). Lithuania's public administration is characterized by a strong reliance on legal regulation, a response to social and economic instability. This legalism, tied to both Soviet heritage and EU requirements, ensures procedural supremacy of law but comes at the cost of economic or managerial efficiency (Pivoras, 2013). The Lithuanian experience highlights the complex legacy of transitioning from a Soviet past to EU membership, balancing between legalistic rigor and the need for administrative efficiency and openness.

3 Initial Situation of European Research Organisations

3.1 Paradigm Shift: History of transformative research from an RIFS perspective

Founded in 2008 under the patronage of Angela Merkel following the Potsdam Nobel Laureate Symposium "Global Sustainability - A Nobel Cause", the Research Institute for Sustainability (RIFS - Helmholtz Centre Potsdam) conducts research with the aim of understanding, promoting and shaping social change processes towards sustainability. It sees itself as transformative, transdisciplinary and co-creative in the sense that problem understanding and options for action are developed in cooperation between science, politics, administration, business and civil society. In his programmatic discussion paper 2020, Simon Meisch describes the development of the science system towards transformative research as follows:

Mode 1

In the traditional scientific paradigm (Mode 1), research questions are generated and processed according to the logic specific to each discipline (both natural and social sciences). The validity of the research is based primarily on the consensus that exists within the scientific community about its methods and values. Mode 1 research is understood as providing robust knowledge about reality that can be taken up and used by policy makers to give legitimacy to policy decisions. This understanding is based on the idea that increasing scientific knowledge reduces uncertainty for policy makers and increases the legitimacy of their decisions.

Mode 1 research has its strengths within certain analytical boundaries and assumptions. It seeks to reduce ignorance and uncertainty through experimental quantification methods (see Funtowicz & Ravetz 1993; Strand 2018). When confronted with real-world realities, this can lead to a form of constructed ignorance in which members of a scientific community do not see what they do not see, i.e. they cannot consciously deal with the limitations of their approach.

In contrast, Mode 2 research, according to Simon Meisch, aims to generate socially robust knowledge: It addresses urgent and relevant issues, openly communicates uncertainties and unknowns, allows for a (conflicting) plurality of perspectives on a problem, and recognises that both the methods it uses to generate knowledge and the facts it brings to light are always value-laden. In order to generate reliable knowledge, researchers engage with different disciplines (interdisciplinarity) as well as with affected stakeholders from civil society, business and politics (transdisciplinarity). Mode 2 research can thus be characterised by a paradigm shift from interdisciplinarity to transdisciplinarity.

Mode 2

From the perspective of Mode 2, science in dialogue with politics, civil society and the private sector can no longer limit itself to developing strategic options and recommendations for the relevant stakeholders. Science is often not in a position to provide reliable knowledge, evaluated according to established scientific standards, on issues that are pressing for society as a whole, as the social implications of scientific findings (e.g. global warming) are often highly controversial. Sustainable solutions always touch on notions of the good life and moral obligations, as well as individual lifestyles or shared lifestyles (see Hulme 2009; Grundmann 2016).

Mode 3

This has led to calls for a transformation of the science system towards Mode 3 research that goes beyond the integration of non-academic actors in scientific knowledge production processes (transdisciplinarity): This transformative science operates explicitly within social contexts, in which it accompanies and supports transformations towards sustainable development in cooperation with affected actors (cf. Schneidewind & Singer-Brodowski 2014). A distinction is made here between transformation research and transformative research in the sense that transformation research describes mechanisms and development paths of social change in a descriptive and analytical manner and anticipates possible effects of planned transformation measures, while transformative research generates solutions in cooperation between researchers and those being researched, which achieve a useful and thus good fit both with regard to existing problems and with regard to questioned and jointly redesigned lifestyles and world views.

This requires reflexivity in the sense of mutual questioning and thus dialogue in the sense of joint processes of searching, learning and experimenting, which leads to capacity building of all participants in the process of an iterative learning-by-doing process that involves all participants (Bartels and Wittmayer, 2018; Beers and Van Mierlo, 2017; Greenwood and Levin, 2007; Loorbach, 2010). This refers not only to the collaborative (transdisciplinary), but also to the processual nature of transformative research. Fostering societal learning and the creative development of new ways of acting, thinking and/or organising society does not happen through a one-off engagement. It requires iterative, dynamic and collective processes involving action and reflection (Greenwood and Levin, 2007). Participatory foresight and backcasting processes, urban or living labs, participatory action research and revlexive monitoring are cited as exemplary methods of this approach (Wittmayer, J.M., Loorbach, et al. 2021).

3.2 Definition of terms

If one wishes to approach the definition of transformative research, then a first important step is to distinguish transformative research from transdisciplinary research, as well as from the transformation research approach commonly used in urban planning and the action research approach originating in democracy research/group dynamics (see WBGU 2011, pp. 21f. and 322-352):

Transdisciplinary research:

Transdisciplinary research addresses societal issues in its research questions and seeks appropriate solutions to complex problems in experimental research settings (living labs). It is essential that it involves stakeholders from politics, civil society and the private sector in the research setting of the respective research organisation. In the tradition of first-order cybernetics, research here still claims to recognise realities, but relies on cooperation with relevant stakeholders to increase the likelihood of implementing 'good solutions'. Solutions emerge from a combination of scientific expertise with the demands of existing living environments and normative ideas about the 'good life'.

Transformation Research

Transformation research examines the conditions, mechanisms and causes of processes of social change. In most cases, it assumes that success factors and obstacles to transformation processes can be identified and revealed as "realities". Transformation research generates descriptive or analytical knowledge. Even if transformation research itself does not refer to a specific transformation process, its knowledge of the

"laws of transformation" in the sense of an impact assessment of interventions self-reflectively anticipates their future effectiveness and application.

A good example of "transformation research" (Jost, Gerhard (2021) is transition research (Walther A., Stauber B. Rieger-Ladich, M. Wanka A. et al. 2021), which sees the "playing field" of societies with their respective social structures and roles that create inequality as the context for the respective life course development paths. She describes "rites of passage" in biographies as the mediation of practical knowledge for individual transformation of the world and self-reference with the help of images, through which social roles and structures are preserved, entire collectives are discriminated against/excluded, and power relations are affirmed, with the rites of passage themselves seen as changeable. Inasmuch as this approach - like many traditional social science approaches - claims to describe and evaluate "true social realities" using various methods (statistics, textual theory, etc.) and attempts to make these scientific truths usable in case-specific counselling, it remains within the traditional subject/object separation of first-order cybernetics.

Action Research

From its origins in social psychology, action research has spread over several generations of researchers into a variety of fields (management theory, education, social research, development cooperation, organisational development, psychosocial work, etc.). It has inspired concepts such as action learning or the work of the Tavistock Institute.

By abolishing the subject-object separation in the research process for the first time, action research can be seen as the first step from transdisciplinary research and transformation research to transformative research. The abolition of the separation of subject and object goes back to Kurt Lewin (MIT 1948). As part of his reflexive change cycle of 1) (project) planning, 2) social intervention and 3) joint reflection on the effects, he was the first to re-establish a relationship between the researcher and the object of research by abolishing the subject-object separation (group dynamics "National Training Laboratory", MIT).

The focus is on the inevitable social bias of all researchers as socio-historical individuals, and on researching the effects of social interventions in relation to the difference between what is planned and what is realised. The essential point here is that the objectivity and neutrality of the social sciences is in principle impossible, because the researcher is always already part of the society he is studying. In this way, action research differs from the usual dissociation of the social sciences from the social reality they describe, and describes the traditional dissociation as an implicit alliance of science with the social powers and their powers of definition.

From the perspective of action research, research can only take place in direct cooperation between researchers and those being researched within the framework of emancipatory political practice, which builds awareness of the changeability of social practice in the joint research process and thus increases the practical relevance and transparency of science. This presupposes the participation of researchers in social projects and aims at the changeability of social practices by understanding their socio-economic conditionality. At the same time, action research presupposes the recognisability of social practice through shared reflection. The primary aim of action research is to create awareness of how everyday actions can transform the respective contexts. In the process, the people being researched become co-researchers. The generalisability of action research refers exclusively to the methodological approach, never to the outcome of the individual results.

Transformative research:

Since the first Club of Rome report in 1972 (Meadows et al., 1972), we have accumulated a great deal of knowledge about humanity's role in climate change - but we are still far from effectively reducing it. Such persistent problems form a special category of problems, also referred to as "wicked problems" (Rittel and Webber, 1973) or even "super wicked problems" (Hisschemoller and Hoppe, 2001; Levin et al., 2012). Such problems are complex because they have multiple causes and consequences; uncertain because they are not always reducible to knowledge and possible solutions change the perception of the problem; difficult to manage because they involve a large number of interacting actors who may not agree on values or facts; hard to grasp because it is unclear how to structure them; and deeply rooted in our current structures and institutions (Loorbach, 2007; Rotmans, 2005; Schuitmaker, 2012). Moreover, we face many of these problems and societal dilemmas simultaneously, such as inequality and inclusive development, health crises or climate change (Wittmayer, J.M., Loorbach, D., et al. 2021).

Transformative research emerged as a term in the 2000s and, like action research, broke with the scientific paradigm of the separation of subject and object. It claims to be a driving force for change and aims to facilitate social change processes by developing solutions and supporting their implementation through inter- and transdisciplinary research practice.

Transformative research is understood here as a process analogous to action research, but largely without an implicit and thus unquestioned, politically normative, emancipatory basic orientation: In contrast to action research, transformative research is based on constructivism in social science research: The cooperation between researchers and research subjects as co-researchers is not about recognising reality. Rather, it is about hypothesising about reality, because the observer does not see what he does not see. The focus is on the joint generation of the fit and usefulness of worldviews in such a way that the inclusion of all existing knowledge and experience leads to solutions that expand everyone's options.

From the point of view of the TANGO-W team (D. Wilhelmer), a further difference to action research is that the researcher also makes his own role in relation to the system being researched and the effects of his own actions in the system the object of research and observes himself as an observer. Accordingly, the reflexive intervention cycle expands from the three steps of action research to the six steps of the systemic loop: 1) revealing one's own researcher's lens of goals, values, and observational differences, 2) hypothesising, 3) intervention planning, 4) intervention, 5) evaluation of the effects of the intervention, and 6) evaluation of the effects of one's own researcher's lens on the process and outcome, and changing one's researcher's lens. As with action research, generalisation and replication are possible only in relation to the application of systemic procedures and methods in different contexts, not in relation to the outcomes of the research.

It is essential that interventions do not aim to change people, but to create contexts in which regions, cities, organisations and people can change in a self-determined way. This contextual control is made possible by a) the creation of a transformation space (real-world laboratory with rules for cooperation between national and local clients and process and technical experts) and b) the joint implementation of intervention architectures and intervention designs as joint control instruments of researchers and researched in the research process.

On the one hand, real-world laboratories as ULL 2.0 set-ups generate actionable knowledge in terms of evidence-based strategies for understanding and shaping change. On the other hand, real-world labs use

real-world experiments to contribute to structural change and thus to shaping and embedding change. (Schäpke 2017)

In the interaction system of the transformation space, transformative researchers position themselves as process and technical experts vis-à-vis the local clients and research subjects: a) impartial with regard to different groups of actors (e.g. clients, stakeholders, etc.), b) construct-neutral with regard to different substantive solution concepts of experts, and c) change-neutral with regard to the question of whether a certain situation should be maintained or changed.

Above all, the neutrality of change distinguishes transformative researchers from action researchers and their fundamental political-emancipatory claim in the research process. Through the critical evaluation of their own research perspective (goals, approach) and their own actions with the research subjects in the transformation space, transformative researchers build up a distance to themselves and the research subjects in such a way that goals of change and changes in their own role as researchers are elements of the research result alongside the further development of methods and content-related solutions. In this way, transformative researchers d-reflexively avoid the possible instrumentalization of their research activities by prevailing values, one-sided programme goals and/or limited client interests.

3.3 Leading differences: What paradigms characterise the term "transformative research" best?

Why guiding differences?

In order to be able to describe the history of the development of traditional research towards transformative research, we need to know which paradigms/criteria for defining transformative research in contrast to the so-called traditional natural and social sciences we have to pay attention to. A central question is therefore what the identity-forming paradigms or guiding differences of transformative research in the scientific system are and on the basis of which requirements these have changed over the decades and in what way.

The paradigms described below for differentiating transformative research from other scientific approaches claim to represent essential guiding references for the possibility of differentiation. At the same time, they do not claim to be complete in the sense of a comprehensive taxonomy in the sense of the ancient Greek τάξις /order' and νόμος /law'.

- Sustainability as an intervention function: a normative consensus (climate change mitigation) replaces the multiplicity of different interests and objectives.
- Transdisciplinarity: The search for appropriate solutions to complex problems involves all stakeholders in relevant sectors.
- Solution orientation: Transformative research focuses on solving complex real-world problems rather than following the socio-historical motives and interests of individual researchers.
- Process orientation rather than single events: Transformative research sees research as a co-creative process of experimentation and learning over several months or years: workshops that build on each other enable the development of joint solutions.
- 1st & 2nd order cybernetics: subject-object relationship: The researchers do not stand outside the system under study, but are always part of it and analyse in the research project whether their contributions are beneficial or detrimental to the transformation process. The aim is to enable temporary, appropriate and socially acceptable solutions that go beyond any claim to objectivity.

Key difference (1): The "sustainability goal" as an impetus for a common reorientation

Transformations towards sustainability are characterised by the simultaneity of increasingly urgent decisions, diverse and often contradictory values, systemic complexity (especially at the porous interface between nature and culture) and epistemic uncertainties (Simon Meisch, p. 6). In addition, many established scientific approaches, methods and quality criteria are inadequate to address these challenges (cf. Ravetz 2006; Fjelland 2016; Jasanoff 2010).

The need to develop new paradigms of knowledge production that go beyond the current disciplinary boundaries and epistemic limitations of exclusively disciplinary research has been recognised since the 1990s.

Transformative research reveals the sustainability orientation of the respective research project and reformulates local urgencies, needs and thematic priorities in the course of circular goal-setting processes. The implicit focus on sustainability is methodically used in the goal-setting process as an impulse for a redefinition that results from local needs and creates shared orientation knowledge about the direction transformative co-research should take.

Guiding difference (2): Transdisciplinarity as a prerequisite for appropriate solutions

Transdisciplinary research goes beyond the academic community and engages with stakeholders from politics, civil society and the private sector from the development of a research question and throughout the research process. It addresses urgent and relevant issues, openly communicates uncertainties and unknowns, allows for a (conflicting) plurality of perspectives on a problem, and recognises that both the methods used to generate knowledge and the facts it brings to light are never objective, but always driven by interests and values.

Transdisciplinary research therefore seeks appropriate solutions to complex problems and involves stakeholders (policy, civil society, private sector) in the research setting. In the process of finding solutions, it combines scientific consensus with existing, different lifestyles and ways of life, and existing value conflicts regarding different ideas of the good life, moral obligations towards future generations, etc.

Guiding difference (3): Solutionism as a paradigm

The focus on solution orientation (solutionism / Strohschneider 2014) excludes questions posed by researchers whose aim is to improve the understanding of the world within a particular discipline. By focusing on solution orientation and feasibility, innovative technologies gain importance as tools for problem solving compared to other sciences. If, for example, climate change is defined as a problem that can only be solved with the help of the natural sciences, this establishes a primacy of scientific and/or technological forms of knowledge over others (such as local knowledge or the arts) within transdisciplinary research (cf. Rudiak-Gould 2013). Transformative research is challenged here not to uncritically adopt technoscientific narratives about the relationship between science and society and thus unintentionally become a technology-push driver that in reality hinders sustainable development anchored in society as a whole.

At the same time, the solution orientation excludes the category of unsolvable problems as transscientific problems (see Rittel & Webber 1973), because they cannot be solved by simple problem-solving methods or by scientific solutions in the logic of a discipline. Rather, intractable problems require provisional and

'best possible' solutions that are subject to constant social (re)negotiation (see Ravetz 2006; Grundmann 2016). Many of the challenges addressed by transformation and transformative research fall into these categories.

At the same time, the focus on solutions attracts criticism from post-political opponents: there are fears that it risks contributing to the "atrophy of the political" in sustainability research by "softening" the traditional boundaries between politics and science (Strohschneider 2014). Critics strongly reject the substitution of scientific expertise for political responsibility. (Meisch, Simon 2020, p. 11) For example, they argue that the negotiation of conflicting paths of socio-political development is replaced by the assumption of a common focus, e.g., on climate change mitigation. Political decisions would then be reduced to decisions about the type and application of technologies and management methods, rather than fundamental choices: What matters is which technologies and management measures can meet the urgency of the problem. It is important to note that transformative research, despite its claim to integrate conflicting social groups by generating socially relevant knowledge, can never be an adequate substitute for the political sphere and debate.

Guiding difference (4): Development process rather than single events

Transformative research sees research as an interactive and co-creative process between researchers and research subjects as co-researchers. Transdisciplinary settings use individual events at specific project milestones to gather interdisciplinary expertise or to further test science-based solutions within a clearly defined framework in real-life contexts. Transformative research goes beyond this by creating a learning and transformation space for ongoing experimentation and learning processes for researchers and those being researched. The continuous process is made possible by setting up a social architecture (involving the right people) and implementing a process architecture (a series of thematic workshops and decision-making meetings for the co-creative development of new solutions) and is timed by the transformative researchers and local clients from communities and regions. The process begins open-endedly, with the clarification of a common question and the aim of developing a clever solution that is appropriate to the complexity of the problem.

Guiding difference (5): Socio-economic "fit" instead of "objectivity".

(2nd order cybernetics)

As historically, socially and economically embedded beings, researchers cannot stand outside of society and thus outside of the system under study. Their physical contextualisation always makes them part of the system under study, which they observe through the lens of their own goals, interests and basic assumptions. At the same time, the mere knowledge of their presence influences the actions of the research subjects even before they have made any interventions. Researchers thus become part of the system being researched and thus part of a scientific-social process of negotiating possible solutions to problems. Even under the condition of maintaining social impartiality and content neutrality towards all possible explanatory models, they influence the scientific-social negotiation process by their presence and by setting up and moderating the research setting. Acknowledging the epistemological impossibility of objectivity (there is no description without an observer, and every observer borrows his/her glasses and instruments from the context in which he/she is located), transformative research aims to find socially feasible and accepted solutions over time.

From this perspective, it also seems helpful that sustainable development is often criticised as unfair. It is therefore necessary that transformative research never assumes the existence of a social consensus (e.g. on issues of climate change), but rather specifically encourages and promotes public debate on pressing issues. Against this background, transformative sustainability research must clarify what exactly transformative research means when it claims to integrate the perspectives of different knowledge carriers in moderated processes in a "content-neutral" way: What exactly is meant by "integration"? (cf. Strohschneider 2014; Rohe 2015; Grundmann 2007).

In any case, the prerequisite is that transformative researchers are prepared to put the interests and goals implicit in the research project up for discussion in public debates alongside their expertise and thus become part of a joint goal-setting process for the research project itself. In this way, questioning and developing research methods becomes a prerequisite for qualitative, transformative research.

3.4 TANGO-W research partners' understanding of transformative research

Global society faces many "wicked problems" that are unlikely to be solved by traditional disciplinary research methods. The currently available scientific knowledge needed to transform relevant sectors such as energy, mobility, production and consumption, etc. is not sufficient to convince decision-makers that environmental impacts must remain within planetary boundaries. As academic research traditionally follows a rather linear process of knowledge creation and dissemination, it cannot effectively address the complex and interrelated challenges that lie ahead. Transformative research aims to address these factors directly, bridging the gap between knowledge and action, working in an integrative way with different types of knowledge and engaging with different societal actors in a co-creative way. This not only has implications for how knowledge is generated as input to policy, but also highlights the need to change the way policy is made towards new transformative practices, such as more critical, reflective and experimental approaches, shared learning journeys, opening up established structures to new actors, interdisciplinary collaboration and mutual understanding, as well as trust and a shared vision. In this way, different perspectives can be brought together, leading to new insights and solutions beyond silo thinking.

Faced with the question of how EU research organisations are currently facing these challenges and how they are addressing the issue of "transformative research", we decided to understand and use our own TANGO-W research organisations as typical examples of the European research landscape. Therefore, each TANGO-W research organisation was asked to prepare and submit a self-description of its research with regard to "transformative research" as a contribution to Deliverable 2.4. In order to allow a basic comparison, they were additionally asked to provide answers to the following questions:

- Is there a strategy document in which the organisation explicitly refers to "transformative research"?
- To what extent are transdisciplinary projects part of the research work?
- Is the organisation's own contribution seen as "context governance" or as expertise input?
- What is the role of researchers and stakeholders in the research process?
- To what extent do the role of the researcher and the research methods themselves become the object of research?

In the following, we will briefly summarise for the reader a) the respective self-image as a research organisation and b) the core statements of the answers to the questions per partner.

We are aware that the following description of all TANGO-W research organisations is in no way representative of the situation in all EU research organisations. At the same time, however, we believe that

they reflect existing trends in Europe quite well and can provide a better understanding of the focus of different research organisations in Europe.

Strategy and orientation of the Austrian Institute of Technology GmbH - AIT

The following table provides an overview of the AIT's research approach and strategic direction:

1	Is transformative research mentioned in the strategy?	Transformative research has a prominent place in the strategy
2	How important is transdisciplinarity to you?	The transdisciplinary approach is central for AIT.
3	Do you apply context governance?	AIT sees itself as part of the transformative governance formats: Living Labs are deliberately used as a setting for joint context governance between ROs and City representatives.
4	What is your role of a researcher?	Researchers from Innovation Systems and Policy" department see cooperation partners as co-researchers with whom results are jointly developed. The researchers in the technology-driven departments see cooperation partners as stakeholders who need to be introduced to or involved in topics.
5	Are you making yourself the object of research?	Questioning and optimising one's own role and goals in the research process is happening but still quite rare.

TABLE 1: RESEARCH APPROACH AND STRATEGIC ORIENTATION OF THE AIT (SOURCE: ANALYSIS OF THE 2023 MINI-QUESTIONNAIRE ON THE RESEARCH APPROACHES OF TANGO-W RESEARCH ORGANISATIONS)

In contrast to action research, the AIT's approach to transformative research is based on constructivism: the collaboration between researchers and research subjects is not about recognising reality. Rather, it is about formulating hypotheses about reality because the observer does not see what he does not see. It is therefore about jointly generating the fit and usefulness of world views in such a way that solutions emerge that expand the possibilities of all social actors (Heinz von Foerster 2017, Foerster/Pörksen 2006). Transformative research is understood here as a process analogous to action research, but without its political-normative, emancipatory orientation. A further difference to action research is that the researcher also makes his/her own role in relation to the system being researched and the effects of his/her own actions in the system the object of research and observes him/herself as an observer. Through the critical evaluation of their own research lens (goals/values/methods) and their own actions in the transformation space, transformative researchers build a distance to themselves and to the research subjects, so that the further development of their own research role as well as the goals, values and methods are components of the substantive research outcome.

Accordingly, the reflexive intervention cycle expands from the three steps of action research to the six steps of the systemic cycle: 1) disclosure of one's own research lens with goals, values and observational differences, 2) hypothesising, 3) intervention planning, 4) intervention, 5) evaluation of the effects of the intervention, and 6) evaluation of the effects of one's own research lens on the process and outcome and modification of the research lens. Interventions and processes can be repeated, but not results. It is essential that interventions do not aim to change people, but to create contexts in which regions, cities, organisations and people can change in a self-determined way.

From AIT's perspective, transformation governance therefore plays a central role in shaping the research and innovation (R&I) landscape by providing the framework and structure within which transformation processes can be implemented and successfully realised. Given AIT's focus on the priority areas of "energy transition", "mobility transition", "circular economy" and "climate neutral cities", AIT believes that governance mechanisms and sound decision-making principles are central to the entire policy cycle - from

identifying emerging policy needs, setting the agenda, prioritising, supporting implementation, to monitoring and evaluating actions. Adaptive or agile governance elements that can respond to evolving technology landscapes, radical change, or the dynamics of (environmental and/or societal) crises, as well as societal needs, are critical to long-term sustainable pathways. In essence, the nature and effectiveness of governance has a direct impact on the development and impact of R&I in a given context.

Strategically, through the governance of transformation, the AIT seeks to advance the state of the art in transformative governance. This is about deepening multi-level governance, with a focus on effectively translating priorities and concepts into policy agendas, empowering niche actors and embracing responsible innovation. But it is also about enhancing the current knowledge and capabilities of public administrations to respond to and manage socio-technical systems and to trigger regime change through capability-based governance to improve the adaptive capacity and resilience of cities and regions in the face of challenges.

Against this backdrop, AIT strategically drives transformative research, focusing on transformative science-policy-society interfaces, experimental sensemaking practices and novel interdisciplinary engagements. The development of new inclusive and adaptive policy tools and research designs to support change can help policy and society overcome crises of legitimacy and restore trust in governance and institutions. Strategically, the AIT aims to strengthen the legitimacy of transformative policies as a complement to existing procedural legitimacy. This in turn is based on the involvement of key actors and stakeholders, whose knowledge is to be effectively combined with the results of transformation research (futures research/modelling) in such a way as to best support participatory processes for developing collective strategies and agendas for transformative policies and pathways. (Weber M et al. (2023): AIT STRATEGY 2024-2026; Centre for Innovation Systems & Policy. In: AIT Internal Strategy Paper November 2023)

To implement the transformative research approach, the AIT Competence Unit "Transformation Governance" uses the format of Living Labs, which are understood as a contextual control of transformation processes and, as a central research method, enable joint experiments between researchers and research subjects that address real-world/transdisciplinary issues and represent a place for scientific and social learning. In addition to content-related solutions, "system knowledge" about social dynamics and processes is generated which, beyond transferability and repeatability, can be used as an impulse for change processes in other contexts and thus increase the social innovative power of the respective context/subsystem. In contrast to Forrest & Wiek 2014, Frantzeskaki & Kabisch 2026, it is not assumed here that action-guiding knowledge is generated in the form of robust strategies and instructions on which changes enable the desired change regardless of different contexts and which actors have to do what at what point in time in order for success to materialise. In the tradition of constructivism, this is based on hypotheses and probabilities, but not on certainties and realities. The AIT understands transformative research as promoting transformation by enabling the development of innovations in relevant sectors by all relevant stakeholders in collaboration with research partners in a joint process of experimentation and learning.

The AIT understands real-world laboratories and living labs as communicative, transformative spaces that are limited in time and in the number of actors involved, and that include researchers as well as clients and stakeholders (those being researched). The clarification of common goals with the research participants enables both a complementary distribution of roles (content expertise/project management lies with the client/city, for example, and expertise in transformative governance methods lies with the researchers)

and the tailoring of joint intervention architectures (social/temporal) and intervention designs to the respective contexts and tasks.

A key point here is the communicative feedback of interim results from the transformation space to decision-makers and their operational routines, in order to find links between new content and procedures and existing routines at an early stage and to test them in everyday life. A high percentage of the content-related research results of Living Labs/Real World Labs are seen as successes of the stakeholders in their role as co-researchers, as the implementation successes are understood as co-production of the research process. Feedback from research participants/co-researchers on the usefulness of the role design and the specific methods used is used as an impetus for changes in the further development of the role and the methods.

Setting up living labs/real-world labs is therefore about context steering through a) the establishment of a 'transformation space' (client/transformative researchers/stakeholders) and b) the joint application of intervention architectures and intervention designs by the transformative researchers and local authorities. In the transformation space, the transformative researchers position themselves in relation to the clients and stakeholders in a) a neutral way towards different groups of actors (e.g., clients, stakeholders, etc.), b) a constructional neutral way towards different content-related solution concepts and c) a change neutral way towards the question of whether a certain situation should be maintained or changed. It is above all the neutrality towards change that distinguishes modern transformation researchers from action researchers and their fundamental political-emancipatory claim in the research process.

Strategy and orientation of Nordregio - NR

The following table provides an overview of the NR's research approach and strategic direction:

1	Is transformative research mentioned in the strategy?	Transformative research is not part of theory, but the goal of practice.
2	How important is transdisciplinarity to you?	Inter- and transdisciplinary research: Transdisciplinarity is the means to promote learning and knowledge generation for policy makers at all levels.
3	Do you apply context governance?	NR does not see itself as part of the governance formats. Governance is only seen and researched as an internal instrument for cities.
4	What is your role of a researcher?	ULLs bridge the gap between theory and practice. If the results can be used by cities and ROs alike, then both can be considered as researchers.
5	Are you making yourself the object of research?	NR works with hypotheses and questions results. It does not question its own role and goals.

TABLE 2 RESEARCH APPROACH AND STRATEGIC ORIENTATION OF NR (SOURCE: ANALYSIS OF THE 2023 MINI-QUESTIONNAIRE ON THE RESEARCH APPROACHES OF TANGO-W RESEARCH ORGANISATIONS)

NORDREGIO is a governmental, non-profit research institute within the broad research fields of regional development, policy and planning. With the mission to provide Nordic policymakers and practitioners with new knowledge and tools to support the formulation and implementation of effective socio-economic and environmentally sustainable regional development policies, Nordregio facilitates the cooperation between Nordic stakeholders and generates Nordic synergies. The research also contributes towards the implementation of global policy objectives, including those outlined in the United Nation's Agenda 2030 and Sustainable Development Goals (SDGs), and the European Union's Macro-Regional Strategy for the

Baltic Sea Region, Green Deal, Urban Agenda, Digital Agenda, and Circular Economy and Bio-Economy Initiatives.

The research conducted at Nordregio applies both traditional and transformative approaches with a growing tendency towards the latter, as delivering insights into the policy areas mentioned above requires the combination of different conceptual approaches to address wicked problems that our societies face today. The research Nordregio performs on transformation towards sustainability includes several sub-themes such as just green transition, bio-economy and circular economy, resilience, digitalisation, innovation, skills and labour markets, social inclusion and health and wellbeing. These themes are explored in diverse types of territories (e.g., urban, rural) and different geographies (e.g., Nordic, Pan-European, Arctic), and the projects implemented across these sub-themes are usually transdisciplinary as they integrate knowledge across academic disciplines and with non-academic stakeholders. This contributes to appreciating insights on transformation, assisting in the development of new frameworks and innovative responses to societal challenges.

Strategy and orientation of 4ward Energy Research GmbH – 4ER

The following table provides an overview of the 4ER's research approach and strategic direction:

1	Is transformative research mentioned in the strategy?	Transformative research is not part of the strategy because 4ER is a very small research organisation and does not work with strategy documents.
2	How important is transdisciplinarity to you?	4ER works primarily inter- and transdisciplinary.
3	Do you apply context governance?	4ER primarily requires expertise. Context governance is left to other research partners.
4	What is your role of a researcher?	In its cooperation with cities, 4ER sees itself as an input provider and the city representatives as implementers (mechanistic input/output model).
5	Are you making yourself the object of research?	4ER does not see itself as part of the research object. The objectives are content-related and come from the research community or clients.

TABLE 3 RESEARCH APPROACH AND STRATEGIC ORIENTATION OF 4WARD ENERGY GMBH (SOURCE: ANALYSIS OF THE 2023 MINI-QUESTIONNAIRE ON THE RESEARCH APPROACHES OF TANGO-W RESEARCH ORGANISATIONS)

4ward Energy Research (4ER) is a non-profit, independent research organisation based in Graz, Austria. The research organisation's approach includes the application of both traditional and transformative research methods, with a focus on the latter to achieve real impact in the energy sector. 4ER's mission is to address various challenges in the energy sector, ranging from technical areas such as energy systems analysis to interdisciplinary and transdisciplinary topics such as energy poverty, diversity, laws and regulations, and market dynamics. While traditional methods guide technical projects, transformative research principles are actively applied in transdisciplinary research where we embrace unconventional ideas, challenge paradigms and develop new approaches. Despite the inherent risks associated with transformative research, 4ER embraces the challenge and develops projects that not only generate new knowledge, but also bring about tangible and positive change in the energy sector.

Collaboration with national and international partners is central to 4ER's work, as researchers recognise the importance of working with research institutions from different disciplines. This commitment to transformative research requires a holistic approach, recognising that complex energy challenges require insights from multiple disciplines. Active collaboration with institutions outside 4ER's immediate focus, such as environmental sciences, materials engineering and social sciences, enriches the understanding of

interrelated issues. This interdisciplinary collaboration fosters a synergy of ideas and enables 4ER to develop comprehensive solutions that take into account both the technical aspects of energy and the broader societal and environmental impacts. Through these partnerships, 4ER ensures that its research is not only cutting-edge but also versatile, contributing to a robust and sustainable energy future.

4ER recognises that transformative research is more than an academic goal; it is a guiding principle that is essential to address the complexities of the evolving energy landscape. 4ER seeks to push conventional boundaries, foster innovation and actively apply transformative methods to achieve tangible, real-world impact. By embracing transformative research, 4ER is positioning itself at the forefront of driving positive change in the energy sector, influencing not only current practices but also shaping the trajectory of future progress towards a more sustainable and resilient energy future.

Strategy and orientation of Kaunas University of Technology - KTU

The following table provides an overview of the KTU's research approach and strategic direction:

1	Is transformative research mentioned in the strategy?	Transformative research is not part of the strategy. It focuses on sustainability issues.
2	How important is transdisciplinarity to you?	KTU focuses on interdisciplinary research between different scientific disciplines. Transdisciplinary development of socially relevant solutions is not a goal of the KTU.
3	Do you apply context governance?	The use of transformative architectures to support transformative research is new to KTU.
4	What is your role of a researcher?	In the case of Living Labs, the researcher is seen as part of the ULL as he/she conducts research and moderates for the civil servants.
5	Are you making yourself the object of research?	The researcher's own role is not included in the analysis of the results (impact monitoring). The aim is to extend the results of research for the benefit of society.

TABLE 4 RESEARCH APPROACH AND STRATEGIC ORIENTATION OF THE KTU (SOURCE: ANALYSIS OF THE 2023 MINI-QUESTIONNAIRE ON THE RESEARCH APPROACHES OF TANGO-W RESEARCH ORGANISATIONS)

KTU's vision is to be internationally competitive as an interdisciplinary university and to transfer new knowledge and innovations to business and politics. To this end, KTU develops innovative solutions in basic and applied research for today's and tomorrow's challenges within the framework of national and international R&D&I projects. The aim is to mobilise the Lithuanian academic community. Strategically, KTU focuses on the themes of "Industrial Transformation" and "Digital Transformation" on the one hand and "Smart Cities and Resilient Communities" on the other until 2025:

Technologies for a sustainable future: artificial intelligence and robotics; biomedical engineering and medical technologies; chemical and environmental technologies; diagnostic technologies; applied mathematics; electronics and electrical engineering; functional materials and technologies; information and communication technologies; food systems and biotechnologies; mechanical engineering and transport technologies; construction technologies; applied and medicinal chemistry; sustainable energy.

Sustainable socio-cultural development: architecture, urban activities, and cultural heritage; audiovisual arts; educational environments and technologies; financial technologies; economic analysis and competitiveness; business models; innovation management and entrepreneurship; organisational development; industrial design; digital media and culture; public administration.

Research results are disseminated to the national and international business and public sectors, as well as to students through teaching.

The university's R&D&I infrastructure is represented in the Open Access Centre Information System (APCIS) and is managed through the faculty laboratory centres and the laboratories of the research institutes, with research equipment concentrated in large structures to increase operational efficiency. The APCIS system also includes more than 1,200 research services offered by university researchers, which can be used by companies, public organisations and researchers.

Strategy and orientation of Smart Innovation Norway – SIN

The following table provides an overview of the SIN's research approach and strategic direction:

1	Is transformative research mentioned in the strategy?	Transformative research is not mentioned in the strategy. The focus is on the green transition in Norway.
2	How important is transdisciplinarity to you?	SIN cannot distinguish between interdisciplinary and transdisciplinary work. They define their work as interdisciplinary, although they already work with transdisciplinary approaches in Living Labs.
3	Do you apply context governance?	SIN utilises expert knowledge to drive innovation within the framework of Living Labs and anchor it in society in the long term. Living Labs are seen and used as an important instrument for realising transformation.
4	What is your role of a researcher?	The aim of SIN is not only to generate new knowledge as part of the ULLs, but also to embed it in the communities in the long term.
5	Are you making yourself the object of research?	SIN is not itself the subject of research and evaluation. It is analysed with other consortium partners to determine whether a research project can serve as a basis and impetus for new projects.

TABLE 5 RESEARCH APPROACH AND STRATEGIC ORIENTATION OF SIN (SOURCE: ANALYSIS OF THE 2023 MINI-QUESTIONNAIRE ON THE RESEARCH APPROACHES OF TANGO-W RESEARCH ORGANISATIONS)

Smart Innovation Norway is a company that focuses on innovation and research within the energy, transport, and smart city domains. While Smart Innovation Norway is not a research organization in the traditional sense, it actively engages in transformative research through its various projects and collaborations.

Smart Innovation Norway applies transformative research by seeking innovative and disruptive solutions to address complex challenges in energy, transport, and smart city sectors. The company actively promotes interdisciplinary collaboration, bringing together experts from different fields to foster knowledge exchange and cross-pollination of ideas.

Through its research projects, Smart Innovation Norway aims to create paradigm shifts and introduce new approaches to tackle emerging challenges. This involves exploring cutting-edge technologies, such as artificial intelligence, Internet of Things (IoT), and renewable energy solutions, to develop transformative solutions that can drive sustainable development and societal impact.

Additionally, Smart Innovation Norway actively collaborates with research organizations, universities, and industry partners to leverage their expertise and resources. This collaborative approach enables Smart

Innovation Norway to tap into the latest research findings and innovative ideas, further enhancing its transformative research efforts.

The shift to transformative research is important for Smart Innovation Norway as it enables the company to address complex challenges, drive innovation and competitiveness, create societal impact, leverage emerging technologies, and foster collaboration and knowledge exchange. These factors contribute to the company's success in the energy, transport, and smart city domains and position it as a key player in shaping a sustainable future.

Smart Innovation Norway's strategy highlights the importance of transformative research in driving innovation, market disruption, interdisciplinary collaboration, technological advancements, sustainable development, and collaboration and knowledge sharing. These strategic elements demonstrate the company's commitment to transformative research and its recognition of its significance in creating impactful solutions and driving positive change in the energy, transport, and smart city sectors.

3.5 TANGO-W ROs' different approaches to transformative research compared

Transformative research, a term gaining prominence since the 2000s, signifies a departure from traditional scientific paradigms, emphasizing a more interconnected approach between the researcher and the subject. This method, having roots in the work of the National Science Foundation (NSF) in the USA, and echoed in the National Institutes of Health's (NIH) concept of "translational research" or "high-risk, high reward" initiatives, underscores the potential for significant impacts in sectors like biomedical and behavioral research. The European Research Council aligns with this view, describing transformative research as "frontier research."

In the realm of social sciences, transformative research diverges from action research by basing itself on constructivism. This is well-articulated by Heinz von Foerster (2017) and Foerster/Pörksen (2006), who stress the importance of collaboratively generating hypotheses about reality rather than merely recognizing it, an approach that inherently changes the role of the observer and the observed. This method expands the typical action research model, involving a more complex six-step systemic loop that includes self-reflection by the researcher on their role and impact within the research system.

The self-descriptions from chapter 3.4 are then analysed according to the following criteria (guiding differences) already presented in chapter 3.3:

Sustainability as an intervention function	**Transdisciplinarity**
A normative consensus (climate change mitigation) replaces the multiplicity of different interests and objectives.	All stakeholders in the relevant sectors are involved in the search for appropriate solutions to complex problems.
Solution-orientation	**Process orientation instead of individual events**
Transformative research focuses on solving complex real-world problems, rather than following the socio-historical motives and interests of individual researchers.	Research as a co-creative process of experimentation and learning by a group of actors over several months or years.
2nd order cybernetics	
The researchers do not stand outside the system under study, but are always part of it and analyse in the research project whether their contributions are beneficial or detrimental to the transformation	

process. The aim is to enable temporary, appropriate and socially acceptable solutions that go beyond any claim to objectivity.

In its projects, the **AUSTRIAN INSTITUTE OF TECHNOLOGY GMBH - AIT** focuses primarily on mitigating climate change through new technologies and processes in the areas of energy, mobility, (circular) economy and digitalisation. In addition to technology development and implementation, the focus is on the implementation of transformative governance formats to strengthen sustainable measures and ensure inclusion as a means of securing prosperity and democracy in Austria. The involvement of stakeholders in their role as end users or co-researchers is already considered a research standard for transdisciplinary research projects aimed at developing appropriate socio-technical solutions in the respective living environments of those affected. Enabling feasible solutions to complex social problems always takes precedence over the simultaneous development of knowledge and methods. In addition to the evaluation of the suitability of the socio-technical solutions developed, the transparent questioning and further development of one's own research role, research objectives, research questions and research methods is gradually being incorporated as a new research topic into the impact monitoring of research processes: In contrast to practice, the application of second-order cybernetics has already become an AIT standard in the field of publishing.

In practice, the AIT focuses on transformative research through the establishment of Living Labs (Participatory Foresight Processes in the sense of Agenda Setting Processes as door openers for Living Labs) as a means for transformative context governance of transformation processes. Transformation processes are understood as co-creative processes of experimentation and learning over several months or years, involving researchers as well as all other stakeholders. The labs serve as transformation spaces (communication set-ups) for joint experiments by researchers with key stakeholders and deal with real and transdisciplinary issues and the generation of systems knowledge about social dynamics. Through the co-creative development and piloting of transdisciplinary socio-technical solutions, this approach goes beyond the production of action-oriented knowledge and focuses on testing hypotheses and probabilities rather than assuming certainties and realities in the context of real laboratory experiments. This expands the innovation space for collaborative learning and the development of transformative capacities of researchers, civil servants and end-users.

In the field of sustainability, **NORDREGIO - NR**, like AIT, focuses on research projects aimed at mitigating climate change through various socio-technical solutions. NR'S commitment to knowledge transfer through policy advice and dissemination also explains its strong interest in disciplinary and interdisciplinary research results from the fields of urban development, mobility, energy and water as inputs for new projects to expand climate neutrality and sustainability. In addition, NR organises transdisciplinary workshops with various stakeholders as part of agenda-setting processes to develop appropriate future strategies for tackling complex issues. Participatory processes are largely understood as individual workshops or a series of workshops with different stakeholders: Such dialogue-based formats primarily enable short-term knowledge transfer, but still lack the necessary continuity for medium- or long-term learning and transformation processes. Nevertheless, these participatory processes increasingly focus NR's attention on developing solutions to real problems. Constructivism in the sense of self-critical analysis and questioning of one's own goals, values and questions is not yet part of NR'S research repertoire.

NR thus integrates both traditional and transformative approaches to regional development, policy and planning. In particular, NR'S work in the field of agenda-setting processes, contributing to global policy

goals such as the United Nations' Agenda 2030, can be seen as transformative research with transformative elements, covering a range of topics from green change to digitalisation, which are subsequently implemented through transdisciplinary research projects: transdisciplinary research is practised here in the sense of integrating knowledge from academic disciplines and non-academic expertise and experience.

4WARD ENERGY RESEARCH (4ER) also focuses on sustainability projects to mitigate climate change using innovative technologies and economic models, such as innovative tariff/charging models in the national regulatory environment. In addition to its strong core expertise in basic energy technology and economics knowledge, 4ER is increasingly focusing on transdisciplinary research approaches to develop unconventional ideas and solutions, e.g., in the area of energy poverty, in real-world laboratories (e.g. regulatory sandboxes) by involving practical partners, end-users and decision-makers from local authorities. Due to the strategic positioning of its core expertise in energy economics and technology, 4ER leaves the design and implementation of medium-term learning and transformation processes for stakeholder groups to other consortium partners. The existing basic understanding of the need for continuity in medium-term learning and transformation processes helps 4ER to establish appropriately competent consortium partners to govern the transformation processes.

In this way, 4ER combines traditional and transformation research as well as transformative research methods to address complex energy challenges and find solutions. As part of its transdisciplinary approach, 4ER focuses on unconventional ideas and novel approaches in collaboration with various partners from research, policy, and society to develop comprehensive system solutions to both technical and societal challenges in the energy sector.

KAUNAS UNIVERSITY of TECHNOLOGY – KTU: As a university, KTU also focuses on sustainability projects at national (Lithuania) and EU level. Due to its role as a mediator of knowledge in teaching, the acquisition and transfer of expert knowledge is a priority in academic practice. Academic disciplines and interdisciplinary cooperation in research projects characterise everyday research. The involvement of stakeholders, practitioners and end-users in research projects is seen primarily from the perspective of knowledge transfer, but not from the perspective of jointly developing solutions to problems. Accordingly, the KTU currently has relatively little understanding of the necessary combination of content input with interactive and creativity-promoting process consulting methods. As workshops are mostly used by the KTU on a situational basis to impart knowledge or to harmonise results, there seems to be little experience available and applicable to the KTU in designing and supporting medium-term transformation processes with stakeholder groups. This 'knowledge transfer approach' is also supported by the nature of communication between the municipalities and their citizens: the municipalities appear to develop their solutions to problems primarily internally, on the basis of expert papers from universities, and only invite local, relevant stakeholders for information purposes.

KTU can therefore be seen as a good example of the implementation of interdisciplinary research. Areas of development for the KTU appear to be both the establishment of transdisciplinary research settings involving a wide range of different stakeholders, and the real-life solution orientation of jointly developed research results. Revealing and questioning one's own research perspective in the research process (second-order cybernetics) can also be seen as a future field of learning for KTU.

Therefore, KTU's innovative solutions are currently mainly focused on basic research in individual disciplines and interdisciplinary, applied research to help overcome current challenges in various areas

such as artificial intelligence and sustainable energy. KTU's research activities are aimed at supporting Lithuania's sustainable economic, social, and cultural development and reflect the university's academic and interdisciplinary research strategy.

SMART INNOVATION Norway - SIN's projects focus primarily on sustainability issues. SIN is actively involved in transformative research in the fields of energy, transport and smart cities: SIN's strategy emphasises interdisciplinary collaboration and research into cutting-edge technologies to develop solutions for sustainable development and social impact. It uses the top-down project management approach common in industry. One of SIN's unique project management methods is that some of SIN's employees work for both a Norwegian municipality and SIN itself. The daily practice of personally combining both roles and logics (business/research and municipality) in daily activities enables a need-based transfer and implementation of knowledge in municipalities through daily translation services between existing municipal needs and accessible SIN knowledge. As part of the top-down project management approach, the organisation and facilitation of interdisciplinary and transdisciplinary workshops with a clear solution focus are also part of the daily tasks of the SIN organisation. In transdisciplinary projects, the dominance of the management perspective - as opposed to the innovation and development perspective - seems to favour a focus on effectiveness/results to the detriment of transformation and learning. The need to prove oneself as a commercial enterprise in the research sector and to constantly acquire follow-up projects to fund staff and SIN as an organisation seems to be one of the reasons why medium-term learning and experimentation processes with community stakeholders are often seen as too costly and therefore not feasible in reality. This limits the possibility of expanding co-creative process governance and workshop formats beyond a certain basic methodological repertoire and thus unintentionally reduces the transformative effect of current local research projects. The frequent turnover of SIN staff also means that only a few, more experienced managers seem to be focused on critically questioning their role and relationship in cooperation with the cities. Here, too, the implementation of the second-order cybernetic approach can be seen as an area for development, in the sense that the current economic and results primacy may inadvertently lead to a reduction in the targeted, transdisciplinary transformation processes.

The analysis of the TANGO-W research organisations shows that the orientation towards sustainability in the sense of climate protection is a strong common basis for all organisations. Analogous to the scientific community, the applied research organisations and business-related research companies of TANGO-W show a wide range between a high, disciplinary scientific orientation (Eastern Europe) and a strong, transdisciplinary transformation orientation (Northern and Central Europe). The self-critical questioning of one's own role in the co-creative process of transformation research seems to be more or less in its infancy in all of them, especially as the demands to moderate dialogical learning processes and to see oneself as part of them directly shake the identity as a knowledge organisation. At the same time, the analysis shows that applied research has increasingly moved in the direction of transdisciplinarity and solution orientation in recent years. Even where the difference between transdisciplinarity and interdisciplinarity is not clearly identifiable, research practice shows the application of both approaches. Transdisciplinarity seems to have become, or is becoming, the new standard in research: Co-creative work with a wide range and diversity of stakeholders and the forced access to real-world laboratories and living labs at both national and EU level seem to have led ROs to slowly develop a repertoire of methods for implementing and accompanying co-creative problem-solving processes and to increasingly understand them as medium-term learning and transformation processes of specific groups of actors.

On the other hand, access to transdisciplinary problem-solving processes seems to be more difficult for universities that are committed to single disciplines. Accordingly, university representatives seem to position themselves more in the role of experts and less as cooperation partners in problem-solving processes. The self-reflective ability to disclose one's own role (including goals/methods) beyond normative settings for the purpose of self-correction in dialogue with project partners and to optimise it in terms of both problem-solving goals and the scientific nature of research appears to be in its infancy.

Each of these TANGO-W organisations is seeking its own way of dealing with the demands of transformation as a coping strategy for complex, real-life problems against its socio-cultural background. Whether through living labs, regional development initiatives, innovations in the energy sector, interdisciplinary university research or industry-oriented projects, the core of the largely transdisciplinary research lies above all in the task of promoting the ability to work together and to develop effective solutions for society. The newly emerging focus on self-reflection and self-optimisation of the role of researchers in the research process will not only contribute to further knowledge growth (transformation research) in the future but xwill also ensure that research projects in the process of experimentation and testing contribute to the implementation of innovative structures, governance settings, procedures, processes and technologies in practice and thus directly to the transformation of our societies.

The table below shows a comparison of the five TANGO-W research organisations in relation to the success criteria for transformative research:

	ANALYSIS CRITERIA	AIT	NR	4ER	KTU	SIN
1	**SUSTAINABILITY**	yes	yes	yes	yes	yes
2	**TRANSDISCIPLINARITY**	yes	yes	yes	Interdisci-plinarity	yes
3	**SOLUTION-ORIENTATION (Societal objectives)**	yes	yes	yes	Scientific objectives	yes
4	**PROCESS-ORIENTATION**	yes	partly	partly	no	no
5	**CONTEXT GOVERNANCE (Process-consulting)**	partly	no	no	no	no
6	**RESEARCHER-ROLE**	partly Learner	Expert	Expert	Expert	Expert
7	**STAKEHOLDER-ROLE**	Learner	Learner	Learner	Learner	Learner

TABLE 6 **RESEARCH APPROACH OF TANGO-W RO-PARTNERS (SOURCE: COMPARATIVE ANALYSIS BASED ON SELF-DESCRIPTIONS AND QUESTIONNAIRE EVALUATION)**

4 Requirements for roles, skills and abilities of actors of transformation

4.1 Role requirements resulting from current recruiting processes

This chapter presents a comparative analysis of civil servant and researcher role requirements across four European countries: Norway, Sweden, Austria, and Lithuania. The objective is to understand the similarities and differences in these roles, focusing on specific responsibilities and requirements for research and civil service positions in academic and municipal settings.

4.1.1 Skill and role requirements for civil servants

The roles presented in Table 7 reflect the administrative structures and cultural contexts of each TANGO-W country, illustrating different approaches to public service management. While each country exhibits unique focus areas (e.g., education in Norway, urban planning in Sweden, public relations in Austria, financial management in Lithuania), commonalities include the need for strategic planning, administrative oversight, and sector-specific skills.

	Roles	Key responsibilities	Required skills
Norway (Halden, Marker)	• Municipality manager for education • Municipality manager for plan, environment	policy implementation, overseeing municipal services within the department, strategic management and development of the relevant area, participation in political meetings and decisions, financial management, Assisting reporting and decision-making; data analysis (for environment); cooperation with political representatives & stakeholders & public	leadership, communication skills, strategic planning, project management, interdisciplinary cooperation, financial management, expert knowledge in the area of responsibility, data analysis and evaluation, stakeholder engagement, networking and collaboration
Sweden (Norrtälje, Stockholm)	• Sustainability Strategist in the Municipality • Project manager in the city	Development of urban strategies with other municipal departments and companies, project management, coordination with various stakeholders, representation of the municipality in networks, leading of projects, providing expertise in the field, inform decision makers and politicians, developing and expanding internal and external networks, producing reports and analyses for decisions, holding trainings and presentations	strategic communication, project coordination & management, technical expertise, financial management , cross-organisational/departmental coordination (knowledge of cross-organisational methods and processes), adaptability and openness to learning and understanding new areas, analytical skills, networking and collaboration both internally and externally, Interdisciplinary working, ability to think long-term, while effectively managing short-term tasks, creativity, data analysis, personal responsibility
Austria (Weiz)	Public Relations Officer	organisation of events, planning and realisation of	Event management, networking and stakeholder

		marketing measures, Monitoring advertising measures and activities, Network and stakeholder support, social media support, need analysis of young people, Addressing social issues	engagement, cultural and social understanding (youth), strategic planning, communication and writing skills, analytical skills, project management
Lithuania (Alytus)	Specialist in financial and investment management	preparation and implementation of funded investment projects, advising on matters within the field to inform decisions, strategic planning, administrative responsibilities, and financial oversight, information management	Project management, financial expertise, strategic decision-making skills, administrative management capabilities, communication, operational planning, accountability/responsibility

TABLE 7 SUMMARIZED ROLE REQUIREMENTS FOR CIVIL SERVANTS

There are different skills required which encompass the personal, professional, and interpersonal competencies that allow civil servants to engage effectively with their work environment, colleagues, and the public. On the other hand, there are skills required that refer to specific methodologies, processes techniques, or tools that civil servants have to employ. These skills are about the "how" — the approaches and methodologies used to plan, execute, and evaluate municipal operations and projects.

Project management is a common theme that runs through all job profiles and emphasises the importance of leading teams und projects towards common goals. This is not just about leadership, but also about promoting cooperation between disciplines and individual departments and breaking down silos, as explicitly required in Sweden and Norway. Successful project management involves strategic planning, agile execution and control to ensure that resources are used wisely and objectives are met.

All job profiles also show a great need for **communication skills and stakeholder engagement**. Whether it is engaging with political representatives, involving citizens or working with stakeholders, networking and collaboration skills are required in all countries.

Expertise in the related field also plays a central role in all of the countries. Whether in education, environmental planning, sustainability or financial management, a deep understanding of the subject area ensures that civil servants can provide well-informed advice and lead and manage projects with confidence.

In the context of public service, **accountability and responsibility** are fundamental qualities that are required in all countries. These qualities include a commitment to act with integrity, transparency and a sense of duty to the public interest.

Networking and collaboration are other important skills for civil servants, enabling them to build and maintain relationships both within the municipality and with external stakeholders. Civil servants in all the countries analysed should be able to identify and engage relevant stakeholders in dialogue and collaboration and build alliances and partnerships that can support and improve the delivery of public services.

Strategic planning and management are technical/methodological skills that are required in all countries. These skills reflect the need for civil servants to keep an eye on both the current needs and future aspirations of their municipalities. Strategic planning involves the formulation of clear, long-term goals

that meet the current and future needs of the community and the development of detailed action plans that describe the steps necessary to achieve these goals.

Equally important are **financial management** skills that emphasise integrity and transparency in the use of public funds. **Analytical skills** and data analysis are also emphasised in all roles, underlining the importance of fact-based decision-making. In an age where data is plentiful, the ability to gain insights from information is critical to developing strategies and initiatives that effectively address complex societal problems.

However, there are of course differences in the skill requirements for the different roles, as each role must fulfil certain objectives and associated qualification requirements. But there are also differences between countries and their country specific public administration traditions and models. In the Nordic countries, for example, the focus is not only on technical expertise but also on the ability to work together, build consensus and work across disciplines and departments, reflecting an approach that emphasises collective action and broad participation. The emphasis on creativity, adaptability, and openness to learning in the Nordics suggests a dynamic approach to public service, ready to embrace new challenges and innovate solutions.

4.1.2 Skill and role requirements for researchers

Table 8 reflects the researcher skill and role requirements of each TANGO-W country. Across the countries, researcher roles are integral to the advancement of knowledge, with a strong emphasis on specialized research and academic contribution. Commonalities across the roles include the requirement for in-depth knowledge in specific fields, analytical and research skills, and the capacity for interdisciplinary collaboration.

	Roles	Key responsibilities	Required skills and knowledge areas
Norway (SIN)	project management in specialized areas such as energy and Smart Cities	leading research programs, coordinating and engaging public and private stakeholders, innovating in project management practices, quality assurance of outputs, financial management and resource optimization, knowledge sharing and collaborations across departments	Expertise in the related field, stakeholder management and engagement, strategic thinking, industry expertise, networking, presentation and public speaking skills, decision making and problem solving, collaboration and teamwork, adaptability and flexibility
Sweden (NordRegio)	Research fellow sustainable regional development, urban planning, and policy development	Academic and applied research, policy analysis, contributing to the field, collection and processing data, tasks of an administrative character, tendering for projects	strong research backgrounds, analytical skills, expertise in the related field, policy expertise, working independently, working collaboratively, communication, networking
Austria (4ER, AIT)	Researcher in the fields of energy and	Academic and applied research, contributions	deep knowledge in specialized fields,

	sustainable development, innovation research (analysing innovation processes and systems)	to the broader academic community, developing strategies for decision makers, exchange with the public and private organisations, project management, Project acquisition, Identification of new research priorities, Establishing a network of project partners, Preparation of research proposals	research methodology expertise, networking and communication skills, Implementation-oriented and impact-oriented thinking, problem-solving skills, teamwork, proactivity, time management, self-initiative, reliability
Lithuania (KTU)	scientific employee	Academic and applied research, scientific development, and engagement in scholarly activities; creation of intellectual property (publishing & carrying out national and international projects); supervision of research works, educational activities (popularization of science, educational articles, public lectures, participation in radio and television programs, etc.), scientific internships or scientific exchange programs	experience in scientific research, knowledge of the laws and other legal acts of regulating the activity of a researcher; ability to solve problems independent; analytical, organizational, communication skills; abilities to prepare scientific works;

TABLE 8 **SUMMARIZED ROLE REQUIREMENTS FOR TRANSFORMATIVE RESEARCHERS**

The similarities in the required skills for researchers across Norway, Sweden, Austria, and Lithuania highlight a set of core competencies that are essential in the research landscape, regardless of the specific focus area or country. A foundational requirement across all countries is the need for researchers to possess **deep knowledge and expertise in their respective areas of study**. This expertise enables them to contribute to their fields, whether it be energy and smart cities in Norway, sustainable development in Sweden, or specific thematic areas in Austria and Lithuania.

Furthermore, in all of the countries the ability to **communicate complex ideas** clearly, both in writing and verbally, is crucial. Additionally, **networking skills** are vital for engaging with the broader academic community, stakeholders in public and private sectors, and for establishing a network of project partners. These skills facilitate collaboration, knowledge sharing, and the dissemination of research findings.

The **ability to work collaboratively** within a team is another common requirement. In Norway, there is an explicit requirement to work in a diverse environment and to promote knowledge sharing and collaboration across departments and disciplines. This reflects the interdisciplinary nature of modern

research challenges and the need for researchers to collaborate with others to innovate, share knowledge, and achieve common goals.

Researchers are expected to have a strong background in **research methodologies** and **analytical skills**. These competencies allow them to conduct rigorous academic and applied research, process and analyse data, and contribute new insights and knowledge to their fields.

Project management skills, including coordinating resources, leading research programs, ensuring quality assurance, and managing finances, are emphasized across all four countries. These skills are essential for the successful execution of research projects, from conception through to completion.

What stands out is that Norway requires explicit in their job description the need for the researcher to be adaptable and flexible. This approach highlights a culture deeply invested in continuous learning and agility, where researchers are expected to pivot and innovate in response to evolving methodologies, research focuses, or stakeholder needs. Lithuania on the other hand uniquely specifies knowledge of the laws and other legal acts regulating researchers' activity, highlighting a regulatory or compliance aspect to research not explicitly mentioned by the other countries. Austrian job descriptions highlight proactivity and effective time management as essential skills for researchers. The Austrian approach can be perceived as somewhat traditional, with a possible implication that researchers are expected to operate within more structured frameworks.

Overall, these differences and similarities create a landscape of a diverse European research environment in which each country tailors the qualification requirements for researchers to its own organisational ethos, cultural values and strategic priorities. From the innovative and comprehensive job advertisements in the North, particularly in Norway, to the more regulatory approach in Lithuania, each country has besides its similarities its own unique requirements and expectations for researchers.

4.1.3 Similarities and differences: skill and role requirements of researcher and civil servants

The comparative analysis of skill and role requirements for researchers and civil servants in Norway, Sweden, Austria and Lithuania reveals a complex landscape of professional expectations characterised by both common competences and different operational requirements. The general skills required in both environments and the specific characteristics that define their professional roles are outlined below.

Common requirements

Both researchers and civil servants are required to have **extensive expertise in their respective fields**. This expertise is essential as it enables researchers to drive research in areas such as energy, smart cities and sustainable development, while civil servants apply their knowledge to effectively manage and innovate public services.

Communication and networking skills are another important shared competency to clearly articulate complex ideas and challenges and engage with different stakeholders.

In addition, the emphasis on **project management** in both roles emphasises the importance of coordinating resources, leading teams and ensuring the successful delivery of projects. This competency reflects the common need for strategic planning and management and highlights the parallel between managing research projects and managing public services to align with policy and societal goals.

Diverging paths: role focus and environment

Role focus is the most obvious difference. Civil servants are the administrators of the public service, their roles are deeply embedded in the mechanisms of policy implementation and administrative management. Their work is inherently focussed on the operational and administrative. Researchers, on the other hand, are dedicated to the pursuit of knowledge, whether through academic or applied research, and focus primarily on innovation, discovery and the expansion of knowledge.

The operational environment of the two functions reflects the contrasting nature of their work. Civil servants work within the structured boundaries of government policy and regulation, a world where procedures and compliance provide the framework for work. Researchers, on the other hand, work in an environment defined by the search for knowledge - in a space characterised by academic freedom, research and the pursuit of funding for scientific investigation. This distinction not only influences their daily activities, but also shapes their professional ethos and the freedoms and constraints within which they work.

In terms of stakeholder engagement, both roles involve interaction with a variety of external parties, although the nature and objectives of these interactions differ. Officials work with stakeholders in the public and private sectors to facilitate policy implementation and service delivery, while researchers work with stakeholders to advance scientific knowledge and applications.

5 Required new roles and skills for transformative civil servants and researchers

5.1 Preconditions resulting from Wolfram & transformative research

Preconditions for transformative and resilient cities according to Wolfram

According to Wolfram, in order to achieve sustainable change through transformation projects, key success factors must be examined in advance and, if they do not already exist, they must be created. This means creating an environment that is conducive to the success of a transformation process.

It is necessary to check whether there is an urgent need for change and whether the planned change project and its project manager have sufficient support in the city or region. It is important to check whether there is a strong political will in the city or region to initiate and implement the change. Without clear project management and, above all, political support, change projects will be redimensioned and fragmented in such a way as to render all efforts for the urban system ineffective.

It is also important to consider whether sufficient resources are planned and made available for the implementation of the change project.

Change requires the cooperation of a wide range of stakeholders, authorities, businesses and communities. All the changes sought by the transformation project must bring added value to the local, central stakeholders and reflect the existing goals and interests in the urban system in the best possible way. Only in this way can appropriate solutions be jointly developed and sustainably implemented.

Change needs to be geared towards meeting the major challenges of the future and therefore requires a clear focus on long-term planning and sustainability. Only a holistic approach will take into account the protection of natural resources and the prospects for future generations, going beyond the possible short-term interests of individual politicians and companies. It also includes careful planning of investments in infrastructure and public services that can withstand the challenges of climate change.

According to Wolfram, however, change should also be geared towards extending and maintaining social security and prosperity: "Successful urban transformation would require a collective commitment to equity and social justice, ensuring that all residents have equal access to opportunities and resources.

Through iterative goal-setting processes and feedback loops between local actors, the TANGO-W project is gradually implementing its ULL transformation spaces. These ULL transformation spaces provide the space for collaborative, goal-oriented learning and change processes of all local actors in cooperation with TANGO-W researchers.

Wolfram's Criteria for the success of local authority transformation projects	
– Need for change, – Political will to implement change, – Definition of desired outcomes, – Holistic - transdisciplinary approach,	– Long-term planning, – Clear medium-term and short-term planning, – Collaboration between all stakeholders, – Equal access to resources for all, – Investment in infrastructure and public services.

TABLE 9 **TANGO—W GOOD PRACTICE PLAYBOOK, PAGE 5 (SOURCE: WOLFRAM, M & FRANTZESKAKI N. 2016).**

Wolfram's success criteria for transformative change focus specifically on cities and emphasise the importance of political will, cooperation, transdisciplinarity and equity as pillars for transformative change. However, he overlooks the fact that successful change always requires external perspectives and impulses as well as neutral facilitation of cooperation processes between a wide range of stakeholders in order to gain broad acceptance and thus implementation support from all local actors concerned. This is where national and European transformative research projects come in, alongside urban and regional development agencies.

Preconditions for transformative research – Tango-W Success criteria

While Wolfram's criteria focus on the conditions for initiating and sustaining transformative change in the urban environment, the TANGO-W success criteria highlight the conditions for the success of transformative research projects in which transformative change can take place. As decision-makers from cities and regions are seen as key actors of change alongside local stakeholders, the focus here is on the cooperation formats, roles and rules of cooperation that research projects should have in order to ensure that researchers and civil servants can successfully steer transformation processes together.

The table below summarises the conditions for the success of transformative research projects (see also chapter 3.3 Leading Differences...).

Sustainability as an intervention function	Transdisciplinarity
A normative consensus (climate change mitigation) replaces the multiplicity of different interests and objectives.	All stakeholders in the relevant sectors are involved in the search for appropriate solutions to complex problems.
Solution-orientation	**Process orientation instead of individual events**
Transformative research focuses on solving complex real-world problems, rather than following the socio-historical motives and interests of individual researchers.	Research as a co-creative process of experimentation and learning by a group of actors over several months or years.
2nd order cybernetics	
The researchers do not stand outside the system under study, but are always part of it and analyse in the research project whether their contributions are beneficial or detrimental to the transformation process. The aim is to enable temporary, appropriate and socially acceptable solutions that go beyond any claim to objectivity.	

As authors, we assume that a transformation-supportive environment must include both the urban success factors described by Wolfram and transformation-supporting cooperation formats, roles and rules of the play in research projects in order for change to be successful. In our view, successful transformation, and thus sustainable transformation, can be achieved if policy and research find a way to work together and manage change together. However, this requires a willingness to learn, to recognise and respect the possibilities and limits of the other side.

5.2 Role requirements resulting from Wolfram and transformative research

Wolfram's preconditions for successful change represent a list of generalised requirements for attitudes, values, approaches, competencies, and resources in the context of communities. Based on the assumption that a) change can only succeed in successful cooperation between civil servants and researchers, and b) therefore a basic understanding of the dynamics within communities is an important prerequisite for success for transformative researchers, the aim of this chapter is to translate this list of generalised, normative requirements to the action level of both civil servants and researchers.

In the systemic tradition we understand the action level not only as the observable, physical actions in the "here and now", but above all as the internal system of actions already carried out by persons/target groups in the past. The internal system thus includes all experiences with communicative actions that have already been used or will be used in the future, such as "attitudes", "abilities", "competences", "skills", "knowledge" and their results, such as the existence of cooperation networks that have been built up over the years.

The operationalisation of Wolfram's generalised requirements in attitudes/skills/competences is carried out here separately for civil servants and transformative researchers on a role- and task-specific basis. In doing so, we are guided by the following two different core tasks of civil servants and researchers in supporting the realisation of change:

1) looking at the system as a whole, including a clear focus on goals and outcomes, as the core task of transformative civil servants, and 2) coordinating communication using interactive, analytical and creative methods to support the development of solutions, as the core task of transformative researchers.

Civil Servants | WOLFRAM	Researcher | WOLFRAM
Understanding change processes and enjoying the variety of possibilities	Understanding change processes and enjoying the variety of possibilities
The ability to inspire people with your own vision. Ability to develop visions and translate them into strategic goals and mid-term (research) projects	Expertise in methods for developing visions and deriving strategic goals in participatory processes.
Personal need/value to look after the common good of all stakeholders	Understanding the overall system of the city in its environment.
Understand procedural and operational planning processes and be able to use them to implement innovation.	Process and methodological expertise to win over decision-makers in operational departments for innovation and the "infiltration" of new ideas into operational processes.
Good relations of trust with the administration.	Linguistically compatible with civil servants.
Understand and be able to assess the relevance, pace of development and service provision of public infrastructure.	Understand and be able to assess the relevance, pace of development and service provision of public infrastructure.
Appreciation and enjoyment of communicating with people.	Appreciation and enjoyment of communicating with people.
An attitude of impartiality: The ability to change perspectives and understand the diversity of stakeholder needs and interests.	An attitude of impartiality: The ability to change perspectives and understand the diversity of stakeholder needs and interests.
Ability to prioritise the goals of sustainability and the common good over personal interests and needs.	Neutral approach as a counselling researcher: Social neutrality (equal value of all existing needs/interests) and construct neutrality (equal value of all content in its function as a contribution to an appropriate and socially acceptable solution).
Balancing conflicts of interest and deciding on temporary solutions.	Methodological expertise to 'triangulate' and prioritise conflicts of interest against a common objective.
Strong solution orientation, persistence and openness to multiple iterative feedback processes until successful implementation.	Methodological expertise in circular goal clarification and coordination processes.
Courage to make unpleasant decisions and the ability to translate their necessity.	Coaching and supervision expertise to support decision makers

TABLE 10 **REQUIREMENTS RESULTING FROM WOLFRAM**

Translating the guiding differences of transformative research into role requirements, it is also true that successful change can only be based on successful cooperation between researchers and civil servants. This means that the guiding differences for transformative research are also relevant for civil servants. It is a relief for civil servants that the paradigm of transdisciplinarity reflects their own common problems and

goals to which research must be oriented. By definition, civil servants are already the central experts compared to researchers. However, even here, at the centre of their core competence, civil servants need the ability to develop cross-silo thinking in order to formulate research objectives from an overall perspective for the city. All the other key differences in transformative research represent important role requirements for both researchers and civil servants, insofar as they represent success criteria for the development of sustainable solutions in complex urban and regional contexts: Without processes that go beyond a single event, no learning and thus change processes can take place that can redefine and implement routines at the level of action. At the same time, all routines are only a means to an end for the implementation of new or proven solutions to complex urban needs for the expansion of sustainability at the urban level. Above all, the basic assumption is that civil servants and researchers are important cooperation partners in complex change processes in which a single project leader can easily get lost in the complexity. The necessary establishment of a new basis for cooperation, with clear roles and rules for cooperation, in turn requires a departure from previous urban development routines and can only succeed through mutual feedback processes and meta-reflection on the part of both cooperation partners. In this process, the question of one's own role and the extent to which it preserves or changes the context of the transformation project becomes a central issue and thus an impulse for self-questioning and self-change.

Civil Servants | transformative Research	**Researcher | transformative research**
Sustainability as an intervention function: Interest and expertise in sustainability goals and solutions related to environmental protection, mobility, energy, health, social integration, etc.	Sustainability as an intervention function: future trends and lessons from sustainability research in different sectors of public administration.
Transdisciplinarity: thinking and acting across silos, coordination and communication skills.	Transdisciplinarity: Methodological expertise in transformative formats (e.g. structuring ULLs through social, temporal and content-related architectures), systemic intervention methods, analytical and creative workshop methods.
Solution orientation: Recognising the need for change (case for action) and being able to communicate this convincingly. Consistently aligning all decisions and actions with the desired, sustainable impact (impact assessment).	Solution orientation: An attitude to research that sees research as a search for solutions to social problems; methodological expertise in problem analysis and an ability to understand the need for change in the real world. Ability to see one's own expertise and that of research colleagues as a means of solving problems and to use it in a solution-oriented way (process perspective rather than content expertise). Consistent focus on the desired impact (impact assessment) of all problem-solving activities.
Process orientation rather than single events Willingness to question one's own goals, interests and opinions in a participatory problem-solving process. Willingness to participate in a goal-oriented but open-ended process; willingness to invest time and money in addition to day-to-day business; openness to discovering new perspectives and learning new methods in cooperation with experts and process facilitators. Willingness to abandon proven procedures and solutions based on jointly	Process orientation rather than one-off events: Expertise in setting up "transformation spaces" with clear roles and rules of cooperation for all participants. Being able to use the role of a contractor in cooperation with civil servants for consultation processes for upcoming goals and decision-making processes. Knowing and being able to use circular, systemic interaction methods at the level of questioning and setting up working groups. Expertise in setting up a joint steering architecture to work with

developed results in favour of new, as yet uncertain solution options.	city decision-makers in steering the transformation project. Methods Expertise in establishing a secure and appreciative culture of cooperation in the project. Negotiation skills.
2nd order cybernetics Willingness to reflect on and, if necessary, change one's own goals and personal way of organising roles in the transformation process.	2nd order cybernetics Willingness to reflect on and, if necessary, change one's own goals and personal way of organising roles in the transformation process. Willingness to disclose and change one's own criteria of observation and evaluation. Willingness to question and develop one's own methods and their application.

TABLE 11 **REQUIREMENTS RESULTING TRANSFORMATIVE RESEARCH**

5.3 Role-Requirements resulting from systemic Guiding differences

Transformation needs actors. The initial questions of Piaget[1], Bateson[2] and Watzlawick[3] were: If someone does something and wants to achieve something with his actions, then he can either succeed and achieve his goal or he can fail. If an actor does not achieve what he is aiming for, he will usually change his approach, his strategy. Through feedback he learns to act more appropriately. But he can also reflect on himself, on his goals, wishes, values and norms. This reflection work would then be learning how to improve the original learning. Double loop learning is called the learning of learning (Argerys[4]), it enables the breaking of thought patterns and has a self-governance effect.

In systemic counselling, attitude and actions are not thought of as separate from each other. The attitude (value system) shows what the counsellor focuses on in his observations, descriptions, and evaluations and how the systemic counselling process with its interventions is set up. The attitude of the counsellor becomes visible in the action (intervention). Guiding principles of action for systemic counsellors are (a) impartiality towards persons, contents, and basic orientations such as problem/solution orientation, change/preservation, as well as context sensitivity, respect towards persons and disrespect towards ideas. Their goal is to initiate and accompany long-term and sustainable learning and renewal processes to make systems (organisations) more survivable, successful, and effective. That is the point around which everything revolves. The constructivist roots come to the fore in that the counsellor's internal system (thinking, feeling, possibilities for action) are taken as the starting point. Steps of systemic counselling that want to enable transformation should be able to connect to the communication patterns of the client system without simply reproducing its patterns and thus prolonging the status quo by "more of the same". The roles of content expertise and decision-making responsibility clearly lie with the decision-makers of the client system, while systemic counsellors take responsibility for designing transformational facilitative communication processes.

Research organisations that aim for a transformative effect of their interventions are well advised to take on the role of a systemic counsellor in urban transformation processes, thus enabling a balance between goal- and outcome-orientation on the one hand and the initiation and support of solution-oriented,

[1] Jean Piaget (1973): Structuralism. Olten, Freiburg (im Breisgau): Walter, 1973.
2 Bateson Gregory (1985): Ecology of the mind. Anthropological, psychological, biological and epistemological perspectives. Editor: Suhrkamp paperback science.
3 Watzlawik, P. (2010): How real is reality? Delusion, deception, understanding. Piper, Munich 1976; 9th edition.
[4] Argyris Chr., Schön D. (2008), The Learning Organisation. Fundamentals, Method, Practice
Publisher: Schäffer-Poeschel 8.10.2008

complex social processes on the other. Role reflection and critical questioning of collaborative settings create the opportunity to learn which actions are more likely to maintain the system and which patterns can be disruptive and thus enable change. Learning to learn (Argerys) here becomes "learning to change oneself and thus the system", because changing one's own role directly changes previously established collaborations and thus represents the starting point and lever for pattern interruptions in the system. For the first time, roles and rules of cooperation become the subject and the precondition for the success of transformative research, i.e. the process itself becomes the content and at the same time the precondition for the success of change. We call the space in which roles and thus communication can be changed, reflected upon and readjusted in terms of impact the "transformation space".

Transformative researchers are therefore well advised to create local transformation spaces and interventions based on real-world laboratories or living labs that enable all stakeholders to experiment with open-ended, new perspectives and solutions, thus building urban transformation capacities. The aim is to enable intrinsic, bottom-up transformation processes beyond the pressure of time and results. The permanent balancing of unsolvable, contradictory demands is one of the new major challenges for transformative researchers, who can only successfully initiate and accompany transformation processes in ULL 2.0 in the sense of disrupting previous patterns from their role as system consultants. This, however, means a massive change for researchers who have traditionally derived their self-image and definition of research success from the development of new expert knowledge and corresponding publications. In the sense of complementary consulting, the acquired expert knowledge becomes a treasure trove of solution models that can be offered and used - or not - by decision-makers and stakeholders in the development process, depending on the goal and transformation process. Instead of being offended that the clients (decision-makers in cities and regions) do not do what the researcher recommends, the focus shifts from the content to the process, i.e., to the type of cooperation between the relevant actors that enables or hinders the way in which the solution models introduced are used and transformed into suitable solutions. In contrast to systemic counsellors, transformation researchers can draw on a wealth of research on sustainability issues and communicate it in a way that is appropriate to the need and occasion.

The role of civil servants in urban transformation processes is very different from that of transformation researchers. While both (researchers and civil servants) need a systemic view to identify, interrupt and change communication patterns in cities, civil servants focus in parallel on keeping an eye on the basic strategic direction of the city as a whole, assigning all interventions and measures in operational implementation planning to a comprehensive strategy, and knowing which actors need to be activated for which issue and which existing solutions in the system need to be linked. Successful urban transformation processes need officials who can see the dynamics and patterns of their city from an external perspective and assess their advantages and disadvantages in the context of their region or given national guidelines. Researchers are an important resource for providing an external perspective and using it to shape change. In addition, public officials also need tools such as new cooperation architectures and governance instruments, in which they can examine and re-stage their own role and jointly govern the achievement of sustainability goals in cooperation with new types of actors and researchers.

Table 12 outlines the role requirements for transformative researchers and transformative civil servants (including project management roles) and assigns them to researchers and civil servants based on the different core tasks mentioned above: Researchers and public servants are positioned here as enablers of change, using systemic insights and multiple perspectives to guide and support sustainable change in organisations and communities. Central to this is a clear transdisciplinary focus on the needs of cities and

the use of interdisciplinary knowledge to develop tailor-made solutions within the framework of new types of cooperation architectures. The targeted use and integration of differences requires a move away from previous sectoral silo thinking in favour of multi-perspectivity and the abandonment of the search for singular truths, specialist knowledge or ideal solutions. On the basis of multi-perspectivity, problems and patterns of cooperation can be understood in a new way and context-dependent solutions can be found.

Although the demands on civil servants and researchers may seem similar in some respects, it is precisely their different core tasks and roles that are a prerequisite for successful urban change in the context of their transformative cooperation.

ROLE Transformative Researcher	Guiding differences	ROLE Transformative Civil cervant | PM Role
Perceive oneself as part of the system to be changed - instead of "the others should change".	**Point of view of the actor**	Perceive oneself as part of the system to be changed - instead of "the others should change".
Focus on communication patterns instead of content and integration of contradictions	**Focus on communication patterns**	Focus on communication patterns and desired outcomes and allow for contradictions
Multi-perspectivity of hypotheses instead of a fitting expertise (truth)	**Focus on diversity**	Multi-perspectivity of hypotheses rather than a one-size-fits-all view of the problem
Assumption of ongoing change of contexts and their interactions; distance from general solutions;	**Context**	Focus on the interactions between the community and its context
Circular interactions instead of causal logic	**Explanatory pattern**	Circular interactions coupled with process-immanent causal logic (e.g. regulations)
Support of all project members in developing appropriate solutions instead of input of own expertise	**Openness to results**	Knowledge of different solution options and support of all project members in developing and deciding on the appropriate solution.
Thinking in alternatives instead of pushing for unique solutions	**Description of reality**	Thinking in alternatives
Making competences and potentials visible and questioning the impact of desired change goals - instead of recommending change goals	**Alignment**	Clarification and pursuit of goals using existing competences and potentials
Being impartial to existing goals, interests - instead of recommending a "more correct" goal	**Social neutrality**	Role distance from one's own department and clear definition of an experimental space in which goals and actions can be questioned.
Questioning different, substantive solution options instead of favouring one's own solution proposals or common RO solution proposals	**Content neutrality**	Distance from existing routines and ideas of solutions; willingness to experiment with half-finished solution possibilities
Introduction of solution orientation as a difference to the traditionally analytical problem orientation	**Orientation**	Linking problem orientation with solution orientation

Building future options instead of analysing the past and listing best practices	**Temporality**	Building options for the future instead of focusing on the past
Making competences and resources visible instead of diagnostically pointing out deficits	**Strengthening of the system**	Making competences and resources for problem solving visible
Expertise in the type of questions - distancing from expertise in content	**Expertise**	Enabling questioning of existing expertise through systemic questions
Matching on time instead of right and wrong	**Assessment dimension**	Fitting for time instead of right and wrong
Understanding and valuing existing solutions and future alternatives;	**Neutrality towards "change" and "preservation**	Bringing the possibility of change as a perspective into the system without devaluing the present.
Supporting self-organisation and bringing in expertise of structures/models for self-organisation beyond instructive steering from outside	**Development logic**	Supporting self-organisation and implementing structures/ models of self-organisation instead of top-down interventions
Circular processes instead of linear progress and control models	**Development logic**	Circular processes instead of linear progress and mechanistic control models
Networking of disciplines to achieve a superordinate or transdisciplinary goal	**Overarching goal**	Cross-community thinking instead of SILO thinking in support of overarching goals
Self-management, self-organisation, personal responsibility, autopoetry	**Steering/ Governance Mode**	Simultaneity of external control (hierarchy) and self-management (personal responsibility, self-control, self-organisation)
Equidistance to all actors beyond hierarchy: ambassador / translator for all goals and interests - instead of fulfilling the wishes of the client or implementing the goals of the RO	**Transformation architecture**	Working on the change project at eye level with stakeholders from different levels of the municipality while valuing the role of the mayor as "boss"
Trust in and support of the system's own dynamics - beyond the end of the project; support;	**Long-term thinking and action**	Clear long-term goals and flexible adjustment of short- and medium-term goals in the sense of achieving the long-term goals; steering
Instead of technology push	**Complementary teams (process and content)**	Linking process know-how with the existing content-related knowledge in the administration

TABLE 12 NEW REQUIREMENTS FOR CIVIL SERVANT PROJECT MANAGERS AND TRANSFORMATIVE RESEARCHERS

5.4 Feedback from researchers on new practical requirements

In order to test the requirements for civil servants / transformative researchers derived from the literature by Marc Wolfram and from the guiding differences of systemic organisational development (Wilhelmer 2009, Ebbeke Nohlen 2009, Karl Prammer, Fredl Janes 2000) from the perspective of practitioners from research and administration, AIT conducted a reflection with civil servants and researchers from the TANGO-W consortium as well as interviews with representatives of research organisations outside the TANGO-W consortium (Vienna University of Technology, Centre for Social Innovation Vienna).

The reflection on new roles/role requirements in the TANGO-W consortium took place following a role play in the **context of the f2f CoP of Alytus on 5-6 October 2023.**

The aim of the role play was to visualise the different requirements and objectives of municipal clients and local ULL stakeholders in the context of a simulated "negotiation meeting" between a project manager and his project team, and the resulting conflicting requirements for ULL project managers and their transformative research process consultants. After the evaluation of the role play, the observers conducted a brainstorming session on the requirements for civil servants and researchers. The reflections of twelve civil servants (Halden, Marker, Norrtälje, Stockholm, Alytus, Klagenfurt, Weiz) and seven researchers (Nordregio, SIN, KTU, 4ER, AIT) are presented in the table (see below) in the logic of systemic leadership differences.

The main differences on which the sorting in the table is based show that the attention of the practitioners in action is primarily focused on finding goals in and with the overall system at the beginning of the project and on the possibilities of describing and explaining/understanding local dynamics during short-term interventions. What is considered important here is a) the empowerment of stakeholders and b) the ability to assess whether the conditions for the success of transformative projects are in place at all, or when a project should be cancelled or terminated prematurely. It is also striking that, in contrast to c) solid expertise, the focus on a variety of future options, openness to results and substantive neutrality towards different solutions are not considered relevant by practitioners. Observing, questioning and changing one's own role in the intervention and change process (RO/civil servant perspective) is also not seen as an important prerequisite for success.

Civil Servants | TANGO-W	Leading difference	Researcher | TANGO-W
3 years working experience in the city administration (knowledge of basic processes)	**Context**	Focus on the interactions between the city and its surroundings
Ability to identify other cities and cooperation partners and to work with them to learn and replicate		
Knowledge (experience) of the resources required for project implementation and the ability to negotiate these before the project begins		Securing resources as part of clarifying the assignment (resources for the assignment; resources for the project).
Observation of the city from an external perspective as an overall system	**View of the overall system**	Observation of the city from an external perspective as an overall system

Do not accept/execute top-down orders; circular processes instead of control methods;	**Overarching goal**	Circular definition of project objectives at the start of the project
Willingness to bring the entire system into the room during the project launch		Ability to bring the entire system into the room during the project launch
Always have the overarching, common goal in mind and visualise it		Impartiality for the objectives of the various stakeholders
Ability to judge when personal decisions need to be made and where co-creative processes are required	**Assessment dimension**	Supporting context-appropriate decision-making for personal decisions or co-creative processes with relevant stakeholders
Be aware of existing power strategies and decision-making routines	**Focus on communication patterns**	Recognising the patterns of maintaining power and the routines of decision-making
Knowledge of the culture and the unwritten rules of the political fractions to understand the changes run in the balance of power after elections		Focusing on the interactions between the fractions and understanding the patterns for maintaining power
Ability to assess the level of interest in the project and to stop the project if neither the mayor nor the clients and project members are interested in the outcome	**Development logic**	Support for the decision to implement the project by the client and all relevant stakeholders.
Ability to motivate stakeholders to make the project their own project	**Strengthening of the system**	Ability to motivate stakeholders to make the project their own project
Negotiating skills: think in alternatives instead of pushing for unique solutions	**Description of reality**	Thinking in alternatives
Solution-orientated approach: never address a problem without proposing one or more solutions	**Orientation**	Linking problem-orientation and solution-orientation
Ability to recognise unwritten rules in administration and politics and to reconcile contradictions between the two	**Context**	Focus on the interaction between administration and politics
Ability to questionhe strengths and weaknesses of its own management structures in order to enable transformative effects of the result for stakeholders/clients	**Neutrality towards "change" and "preservation"**	Introduce the possibility of change as a perspective into the system without devaluing the present.
Have a vision and stick to it tenaciously, be patient. (Trust in the system's own dynamics)	**Long-term thinking and action**	Clear long-term goals and flexible adjustment of short- and medium-term goals in order to achieve the long-term goals; steering

Joint understanding with the politicians responsible for the municipal utilities at management level and at the operational level of the municipal utilities	**Social neutrality**	Role distance to one's own department and clear definition of an experimental space in which goals and actions can be scrutinised.

TABLE 13 **REQUIREMENTS FOR CIVIL SERVANTS AND RESEARCHERS FROM THE PERSPECTIVE OF TANGO-W PRACTITIONERS**

As mentioned at the beginning, in addition to the role reflections with TANGO-W practitioners, **interviews were also conducted with researchers** in Austria outside the TANGO-W consortium. The following questions were asked in the interviews:

- How have research projects changed in recent years?
- How does 'change' appear as a theme in your research projects?
- How does this affect you and your role as a researcher?
- What are your own motives and goals in dealing with the changing demands of your role?
- In your opinion, which skills and knowledge - related to change - should be further developed by administrators?

In contrast to the TANGO-W practitioners, the interview partners did not receive any information about the TANGO-W project in advance, so as not to unintentionally influence the reflection of their own research practice with advance information. Due to the small interview sample (three researchers from two Viennese research organizations: the Vienna University of Technology and the zsi | Centre for Social Innovation Vienna), the evaluation of the interviews primarily provides further background information on the context and the development of transformative research in Europe as well as flashes from observations on the initial conditions for an energy system transformation in individual EU countries. On the other hand, the reflection on the changing role requirements for researchers and civil servants over the last 10 years will be used to confirm or extend the results of the TANGO-W role-reflection.

EU research funding policy as a driver of change for research projects

The general tenor of the researchers is that the programme logics and issues of EU research programmes and their calls have a direct impact on research. The researchers point out that the governance dimension in research projects has become more important in recent years as a result of the EU's new mission orientation, not least because of the clear strengthening of inclusive, participatory approaches in responsible research approaches. This has greatly increased the importance of social science support for technological innovation processes: More and more Innovation Actions would build on organisational change and coordination of relevant stakeholder groups, in contrast to the previous focus on innovation and technology.

In contrast to the innovation actions, however, the current technology development programmes continue to "only" address technological solutions without taking into account their contextual embedding and sustainable anchoring in the respective social context. The researchers interviewed report that relevant technology experts continue to criticise the fact that the HORIZON 2020 projects already include too many social dimensions instead of focusing primarily on increasing the EU's technological and economic competitiveness.

Due to the cyclical development of research programmes at EU level, research funding policy would repeatedly move back and forth in terms of transformative capacity. It is criticised that the concept of innovation used at EU level has maintained and strengthened the technology push in recent decades - in contrast to the mission-oriented research programmes, which clearly focus on the expansion of transformative research approaches.

From the search for the many paths to the EU energy transition…

Transformation is perceived by researchers as an explicit topic of research projects. Social transformations play a crucial role as drivers of social and societal change in the areas of energy supply/distribution/ consumption, individualisation of the health care system, etc.

Transformation itself is understood by researchers primarily as a change in social practice in the sense of structural change in socio-technical systems - in conjunction with organisational and institutional change. Social transformations often begin with changes in legal frameworks and traditional values. The increased focus on both a) the legislative (parliament) and executive (administration) and b) changing values increases the need for direct collaboration between transformative researchers and civil servants. This cooperation between research and administration was first established by the Horizon Europe research programme, with its focus on experimenting with governance structures as an important prerequisite for the success of transformative projects in Europe.

But how can transformation be initiated and coordinated in Europe? Although the majority of researchers and representatives from politics and administration recognise the need for fundamental transformations from the perspective of advancing climate change as a central issue, according to the researchers interviewed, top-down regulations for sustainability projects in Europe are currently only found in isolated cases. Instead, the approach of soft governing via a shared vision of the necessary energy transition in Europe is practised.

For EU research projects, the grand vision of the energy transition acts as a meta-goal and a thematic bracket: it gives a common direction to the mutual learning processes of countries in the framework of joint prototyping and replication in real-world laboratories. The Transition LABs build on the different starting conditions of the individual EU countries and aim at initiating and replicating socio-technical solutions for the energy transition in different countries and contexts.

The different starting conditions in individual EU countries and their very different collaborative cultures are a key success factor for the initiation and support of the energy transition by research organisations: In Spain, for example, the researchers observed that transition ideas are currently being taken up very strongly by business parks (Google) and regions and integrated into corporate and regional strategies as well as municipal environmental plans. As there are traditionally very high, competitive targets between regions in Spain, which cannot be achieved without the involvement of large players, large TECH companies are currently playing an important driving and implementing role in relation to the successful realisation of the energy transition. The observing researchers found that in Spain it would be more important to involve stakeholders, municipalities and civil society actors more closely in the change processes and to ensure that the energy transition can also be supported more strongly by private individuals in the future (e.g., through energy communities). According to the researchers, the aspect of energy democracy, i.e., the involvement of households, is currently still neglected. In Spain, the concept of energy transition as energy democracy seems to be stagnating at the level of the Societal Innovation Strategy Paper, without being put into practice. This, in turn, would reinforce the prevailing pattern that without TECH Park companies, no sustainable developments can currently be realised. In order to change this, Spain has already invested a lot in the development of participation in recent years, with the aim of expanding the opportunities for participation in the implementation of the energy transition. Similarly, to Spain, France has a more centralised tradition of cooperation and control, and is particularly involved in solar, wind and geothermal energy for sustainable solutions.

In contrast, the researchers found that Nordic countries such as Finland and Sweden are open to renewable energy sources and technologies and have a great deal of experience in smart specialisation and large scale location processes: Smart specialisation is a strategic location concept aimed at promoting structural change towards knowledge and innovation-driven growth. Regional development priorities should be set where existing knowledge and technologies promise success. In Finland, where there is a lot of wind

energy, the starting point for a successful energy transition based on wind energy would be incomparably better than in Poland, for example.

Poland itself is described as a traditionally coal-rich region that is still strongly committed to fossil fuels. At the same time, there is still little experience of working with different civil society groups. In Poland itself, therefore, soft governance through a Green Deal vision of energy transition is completely unattractive and irrelevant from this perspective. The path of small steps towards the development of a renewable infrastructure requires different arguments and time cycles.

In Lithuania, according to the researchers' observations, competences and tasks are very much concentrated at the state level, supplemented by municipal competences at the municipal level. As the Lithuanian regions, on the other hand, have few competences and little cohesion, the establishment of committed stakeholder networks in Lithuania appears to be rather difficult. In Scotland, on the other hand, there is a high level of interest in energy transition among stakeholders in rural regions and villages. Here, too, the willingness of regional government representatives to participate actively in energy transition research projects has increased in recent years, even if no funding is available. A strong Leader Region approach would combine the cultures of Scotland and Finland.

A Transition LAB within Horizon Europe would have to be able to deal productively with all these differences and build on them, while involving and activating a wide range of partners from the public sector, universities, science parks, regions, companies, NGOs and civil society.

In the health sector, unlike the energy sector, the motivation for change would be driven primarily by the fact that many sub-systems and services in the EU are no longer functioning satisfactorily. This opens up the willingness of decision-makers to innovate. In health care, problems generally arise when roles and resources are shifted between different departments or organisations. According to observers, a major obstacle to transformation in the health sector is the primacy of the medical paradigm of evidence-based medicine, in which only what is statistically 'objectively' measurable is valid. This contrasts with the need to institutionalise new, qualitative, social processes to which the criteria of 'truth' and 'objectivity' do not apply. The complex interactions involved seem very alien to representatives of the health system. As they require more time to monitor and govern than medical interventions, they would usually be beyond the reach of decision-makers in the health care system. Devaluing individuals or professional groups would be a reaction to not being able to understand or control social processes well. The researchers see a strategy for success here in the use of change agents within the system itself, who understand both the science and the dynamics of social systems and are able to drive change in the system from within. Observations show that interdepartmental and inter-institutional processes for generating ideas lead to success time and again, but that the implementation of the ideas identified as necessary then repeatedly comes to nothing.

In addition to a basic understanding of the different European cultures, it also seems to be very important for transformative projects to be able to deal well with a wide variety of stakeholders and their respective interests. For example, a workshop in Spain that offered no prospect of developing future markets or product ideas and had company bosses discussing with villagers would quickly fall apart. The need to know and understand each stakeholder group well in advance would significantly increase the preparatory work for each workshop, as it is important to find out exactly how much unfamiliarity is conducive to innovation and at what tipping point it becomes a hindrance.

It seems to be important for research projects to meet the individual countries in their respective starting situations in a good and appreciative way, thus empowering them to build on their existing strengths and to choose their own pace of transformation on their way to energy system transformation. Too much pressure without valuing what already exists would encourage resistance rather than change. In this sense, a single vision of the energy transition can in no way be used as a generalised, soft governance instrument that works everywhere.

New demands on the roles and skills of researchers

The expansion of participation in research in recent decades has led to a greater awareness of existing real-life problems and thus to an increase in transdisciplinary efforts to find socially relevant solutions. However, participation also requires greater competence in dealing with the conflicting motives and interests of a wide range of stakeholders, and a new attitude to one's own role as a researcher as an observing, intervening, analysing, temporary member of the system being researched.

The researchers interviewed stated the following goals for their transformative research: a) To change existing social, economic and ecological structures of inequality. Under the motto "engage - reflect - change", they want to transform the world towards a more socially just, ecological and inclusive vision and thus counteract further deterioration. On the other hand, it is also about remaining curious and learning as researchers. The role of research within universities would also have the task of c) shifting the imaginary boundaries between science and society and between research and communication through new, practice-oriented communication formats in order to provide small citizens' initiatives with problem-solving skills. In this sense, d) as transformative researchers, they would like to empower people to understand their world better and to change it so that it becomes a better world in terms of a better quality of life for all. Helping people to help themselves" has thus become part of the attitude of transformative researchers.

The researchers interviewed by the AIT emphasise that one of the core tasks of researchers today is to bring together all the relevant actors in the system in order to work with them to create impulses for change in the system.

Successful collaboration could then make it possible to build cross-sectoral coalitions for change. These intersectoral coalitions for change would be necessary both for understanding and subsequently developing multiple approaches to solutions that best take into account and incorporate the interests and perspectives of stakeholders on the way to a new solution. Recognising, valuing and making productive use of the diversity and plurality that exists in Europe is seen here as a key new competence and quality for successful transformation processes.

What changes does this require of researchers?

While the main task so far has been to analyse (technological, economic, social) problems and power constellations that promote or impede transformation according to certain criteria, the new challenge is to leave behind, at least in part, the safe field of competence of analysis, evaluation and diagnosis. What is now required is an understanding of the most diverse actors as part of complex cycles of influence within transformation processes, in which the researcher acting more recently also as a designer, observes and analyses himself as one of the various actors influencing the overall system.

What is needed is the establishment of transformation architectures for functioning cooperation and feedback processes for the development of solution strategies that gain sufficient acceptance and implementation energy in the system to enable relevant transformations. In recent years, this has led to the primary purpose of transformation research - the independent analysis of the prerequisites for the success of change - being extended to include the initiation, design and content stimulation of transformation processes. The difference between systemic counselling and transformative research is that in the process of experimental, co-creative design of transformation processes, useful communication architectures, roles and rules of cooperation as well as mechanisms of action in change processes are designed from the role of transformative research and at the same time analytically researched. This makes it possible to experimentally investigate and analytically understand the prerequisites for successful change not only from a quasi-artificial external perspective, but also from the internal perspective of a participating actor. The big difference here is that the researcher does not suddenly enter the system. Even the researcher who observes and analyses from the outside has always been part of the actor system as part of the

research project and has thus influenced other actors, even if unintentionally. The difference lies rather in the perception of one's own role, i.e., in the ability to recognise that one has always been part of the transformation system even as a "mere analysing and observing actor" and to use this recognition productively both for the transformation process and, in contrast to action research, for the scientific knowledge process.

Transformative research is currently expected to bring together all interest groups and professionals involved in specific problems as a collective system and to build solution networks in which new perspectives and the resulting new practice can be tested and established through experimentation. This participatory, multiple approach to action and transformative research has made change management an important part of the research agenda.

Researchers' findings from participatory processes show that many actors experience the social structures inherent in the system as unchangeable and would suffer from patterns of behaviour that are perceived as rigid and dysfunctional. Only the researchers' external view of their situation would open up new perspectives and thus new possibilities for understanding and action. This, in turn, would help some of them to change from their complaining victim role to a responsible creator role and to regain control of their situation. Based on this experience, it would not be so important to understand complexity objectively, but to be able to deal with it proactively. Traditional technicians and doctors in particular would find it difficult to access this new attitude of observing and shaping social systems because of their evidence-based input-output logic.

In the past, the basic idea of research projects was to develop new innovation ideas in a problem-centred way, i.e., to explore how the basic problem could be jointly understood and which solution concepts would be appropriate. However, the new requirement for research would be to go one step further at this point: instead of ending the research after handing over a concept to the client, it would now be required to test the corresponding proposed solutions with the affected interest groups themselves in experimental settings and to jointly evaluate their suitability. This step would greatly increase the responsibility of research for its solution concepts. According to the researchers interviewed, this new approach would be described in proposals as 'working with stakeholders at eye level' and 'action research'. Although this new paradigm of responsible research has already entered the mainstream, some funding agencies are still reluctant to incorporate it into their evaluation and selection practices.

With the expansion of participation, transdisciplinarity would also have become the dominant research paradigm in recent decades: Clients from politics and business would become increasingly open to different social problems and commission research projects to solve them. The research projects, in turn, would examine the problems from a scientific, policy and research perspective from a variety of angles and would also consult international approaches to solutions. Silo and disciplinary thinking would have to give way to attempts to describe, explain, evaluate and shape overarching, self-reinforcing cycles of change. Among other things, this has led to the recognition that the influences and impacts of climate change developments need to be addressed in all sectoral initiatives and research projects.

These developments confirm the need for research to address systemic dynamics: It is now recognised that sectoral systems such as energy, mobility, health, etc. cannot be fully understood due to their complexity. The realisation that an objective recognition of the overall system is epistemologically impossible due to the fact that research always unintentionally influences the system itself through accompanying observation and analysis still seems to be reserved for a minority of social science researchers who have taken a closer look at constructivism as a basis for systemic theories: This is also shown by the interviews with the three researchers from the Technical University and the Centre for Social Innovation (ZSI) in Vienna, who also refer to the basic assumption of constructivism that an observation can never be made without an observer in its respective socio-economic-historical context and therefore cannot claim any objectivity. Systemic constructivism is accepted here as an epistemological basis that facilitates the

understanding and description of social and socio-technical problems and frameworks (regulations, social agreements) and the assessment of the significance of these descriptions. In the growing group of transformative researchers, the consensus in favour of constructivism as a useful epistemology seems to be gradually gaining ground.

And what are the learning strategies adopted by researchers and research organisations?

In order to meet these new demands, different learning strategies are chosen by different actors:

At the organisational level, cooperation is often sought (e.g., on the part of technical universities) with transformative researchers from other research organisations (e.g., ZSI, AIT), whose researchers have already been able to acquire new approaches and interventions in the field of transformative participation processes. The mix of traditional transformation knowledge and the ability to carry out transformative interventions in complex social systems that is necessary for transformative projects is thus a) mainly controlled by the composition of research consortia in which traditional research knowledge is combined with new intervention skills.

Research organisations whose researchers have already acquired more experience and know-how in the field of transformative participation processes seem to delegate the necessary learning processes to the level of personal learning and b) buy in appropriately trained people via recruitment processes or c) encourage learning by doing learning processes.

Accordingly, b) the recruitment strategy of research organisations often consists of "buying in" scientists with previous experience, e.g., trained spatial planners who have already gained experience with co-creation methods and systemic intervention methods through their university training. The researchers interviewed report that over the last few decades 'spatial planners' have always been ridiculed and devalued as 'too interventionist' by so-called 'serious researchers'. They were criticised for only doing 'co-creation in public space'. Even then, they called themselves "action researchers". However, this trend has been reversed in recent years: the increasing demand from policy makers not only to identify problems, but also to provide solutions, has led to a first appreciation of the existing knowledge and skills of the group of spatial planners. This research discipline would now have a good mixed identity in terms of knowledge and methods from both research and (systemic) consultancy. However, as a result of recruitment measures, it would be rare for trained systemic organisational developers to switch to the research side. What would make such a change difficult would be, on the one hand, the obvious loss of income on the research side and, on the other hand, the lack of knowledge about how the research system works and the theories and methods that are commonly used there. However, if the change is successful, such people can take on the role of experienced learning mentors, sharing communication settings from the field of context management and intervention in research, and supporting the experimental learning-by-doing processes of their colleagues. However, according to a researcher at the AIT, even highly professionalised organisational developers in research organisations who are respected in the consultancy market are accused of being too interventionist and therefore devalued and marginalised in their research work.

It seems to be more common in research organisations to delegate learning processes to the personal level of new graduates or experienced researchers. In this respect, the researchers interviewed reported that they had acquired the necessary skills and knowledge of intervention methods mainly c) from their literature studies and in learning-by-doing processes of experience: the prerequisite for this would be to be able to understand the initial situation in the system and thus also the central questions and objectives of the actors. This would form the basis for a targeted search for intervention methods. The personal appropriation of the new interventions would then take place through learning-by-doing processes.

In research organisations today, it seems to be rare to find a mix of skills in individuals whose skill portfolio combines (social) scientific methods with a systemic attitude and knowledge of intervention. As transformative researchers in today's research landscape, such individuals still tend to move between the

stools of traditional disciplines or transformation research on the one hand and the approach of systemic attitudes and consultancy on the other. This increases both the ability to learn and act creatively and the loneliness caused by not belonging to a particular discipline.

In any case, this cooperative link between transformational and transformative research has become an important step towards increasing the transformative capacity of European collaborative research projects in recent years.

Changes in the role and skills of transformative civil servants

According to the researchers interviewed, Living Labs and Real-World Labs are now a very successful context-governance tool at the municipal level to enable transformation in terms of realising the energy transition in EU cities.

In the context of large cities such as Vienna, Paris, Stockholm, etc., innovative ULLs are regularly implemented to break rigid patterns of cooperation within urban policy and to enable cross-sectoral cooperation between different administrative units.

According to the observations of the researchers interviewed, such "cultural islands" (Schein, E.H. 2010): can only survive through the high level of commitment of individual district managers, NGO managers or researchers, for example. A prerequisite for success would be to hide such innovative experiments as far as possible from the eyes of the mayor and his local council, in order to protect them from premature scrutiny and criticism and thus from a possible premature end.

According to the researchers interviewed, the necessary pioneers in the administration of large cities are usually to be found at middle level. Here, they usually have a high level of project responsibility as part of their official function. In the city of Vienna, for example, higher-level administrative units could be approached - but not the planning directorate itself.

Entrepreneurs in the administration would usually be people with a good understanding of the system. As project managers in the administration, they would focus the revolutionary energy with the help of their experience and knowledge of which internal processes should be ignored with impunity and which should not be violated. These people would know what makes politicians tick and would therefore ensure that no one on either side was playing games during the project. A quality criterion for these entrepreneurs in the administration would be that they never lose sight of their vision throughout the experiment and adapt the measures to the changing contextual conditions. An experimentally flexible approach to realising one's long-term vision seems to be the central Ariadne's thread of successful transformation. Learning these skills would take time and support.

At the same time, the ULLs and Living Labs would provide a communication and collaboration environment in which administrators and transformative researchers can use their different perspectives and knowledge to learn from and with each other about how to initiate and support change in the urban system. They therefore represent an optimal learning context for personal 'learning by doing' for researchers and civil servants, if this collaborative implementation process is understood as a learning process and accompanied by appropriate supervision.

How does this affect you and your role as a transformative researcher or civil servant?

It is striking that the researchers interviewed directly formulated learning objectives when describing the new role requirements. Compared to the reflections of the TANGO-W consortium, the ability to be reflexive and to expand the previous role interpretation by changing the self-concept and previous routines is surprisingly important. This may be due to the fact that two of the three interviewees categorise themselves as transformative researchers.

It is also surprising that, despite the call for a systems perspective and systems theory from both civil servants and researchers, the focus on observing and changing communication patterns is not addressed. This may be because the terms 'communication patterns' and 'routines' have become synonymous. It is also noteworthy that, despite long-term thinking in terms of decades of research programmes, dealing with temporality in the sense of modelling different future options does not play a role, but rather the focus is on understanding the problems and developing multi-perspective solution models. Here, despite the transdisciplinary solution orientation, the research approach still seems to be anchored more in a past-oriented, analytical approach, as opposed to modelling futures and governing from a desirable future.

It is also noteworthy that, with regard to solutions, a context-dependent, temporal limitation of jointly developed solutions is not explicitly addressed, although, in contrast to the reflections of the TANGO-W consortium, the openness of results takes up more space. However, this is understood more as the ability to develop solutions across disciplines and silos.

Transformative Researcher	Leading differences	Transformative Civil Servants
Go beyond the conceptualisation. Realise more yourself! Staff shortage in relation to transformative researchers	**Perspective of the actor**	Reflexivity. Adaptation of routines, goals, and self-concepts to changing contexts. How much of the role? How much of the person as an entrepreneur? Lack of personnel as a handicap
Institutionalise a knowledge platform for people. Open access to good practices.	**Focus on diversity**	Learning about options
Create an institutional framework in which new experiences can be trialled in order to facilitate change.	**Context**	Contextual knowledge and flexible handling of contexts in personal commitment; courage to take risks. Create an institutional framework in which new experiences can be trialled in order to facilitate change.
System knowledge: Theoretical foundations: How can I abstract the processes that I perceive? What do I need for change? Systems theory and transformation theory; socio-ecological systems. Abstraction and repeatability.	**Explanation patterns**	System perspective
How can we find answers together / breaking down silos between disciplines	**Openness to results**	Promote openness to new ideas among all sectors/professional groups-
Multi-perspectivity	**Description of reality**	Understanding the system: Where can I take action in my role? Where can I go beyond the bureaucracy? Which experiments are welcome?
Getting to the heart of problems so that everyone is going in the same direction.	**Alignment**	Identifying the challenge of eco-social crises.

Creating a common language. Understanding people from different backgrounds and their environment - and connecting all people through statements.	**Social neutrality**	Knowledge: What does the region need? What is received/accepted? What is happening internationally? What can I implement in my region?
Building bridges between epistemic communities	**Content neutrality**	Act as a knowledge broker or networker between experiments and internal policy and planning processes and strategies.
Problem orientation & solution orientation (transdisciplinarity)	**Orientation**	Understanding that change is something other than a simple technology.
Stimulation of innovative solutions with subsequent scaling. Appreciation: Those who want it, do it well anyway!!!	**Reinforcement of the system**	Appreciation: Those who want it, do it well anyway!!! Empowering people/target groups who want change.
Know the initial situation so well that you know what to look for...	**Expertise**	Working across silos
Is on the side of change due to the research program objectives	**Neutrality towards "change" and "preservation**	Testing new rules in the practice test as opposed to formalised, step-by-step forms of control
You need an understanding of social structures (patterns) and how changes can take place here and what they depend on.	**Development logic**	Flexibility.
Maintain, preserve, expand. Learning methods of action research	**Development logic**	Being able to deal with the system - benefit - and go beyond it. Being able to navigate in context.
Utilise existing support measures to coordinate transformation.	**Overarching goal**	Utilise existing support measures to coordinate transformation. A lot comes from the top / EU policy
Creating an open, non-hierarchical space for discourse. Factors of inclusion and exclusion in knowledge processes:	**Governance Mode:** **Architecture for transformation**	Networking actors; translating problems and interests; exercising leadership; being able to translate EU discourse to the local level. Being able to build trust in political institutions
Combine projects so that they make sense in the long term.	**Long-term thinking and action**	Combine projects so that they make sense in the long term.
Composition of research consortia with transformation and transformative competences	**Complementary teams (process and content)**	Knowledge broker and networker

TABLE 14 **NEW ROLE REQUIREMENTS AND LEARNING OBJECTIVES FROM THE PERSPECTIVE OF THE RESEARCHERS INTERVIEWED**

Overall, however, the evaluation of the three research interviews, including some sporadic additions to the subjective experiences of the AIT-O expert and researcher, provides a good and easily understandable insight into the development history of transdisciplinary research over the last ten years, which fully

confirms the definition and description of the development history of transformative research based on the literature research in chapters 3.1 and 3.2.

5.5 Complex contexts require flexible solutions and governance approaches.

Complex situations require not only complex solutions, but also the awareness that their implementation requires a fundamental change in existing roles and routines that goes far beyond technological solutions and thus requires new forms of co-creative context management of transformation processes.

The Living Labs that have been successfully implemented in recent decades thanks to the EU's Horizon 2020 programmes have increasingly challenged researchers and civil servants to look for common forms of cooperation and governance in order to join forces to create appropriate innovation contexts for managing the design, testing, replication and implementation of sustainable solutions at local level.

The growing mutual understanding of each other's visions and constraints, with their room for manoeuvre and limitations, makes it possible for the first time to outline their complementary roles in the process of jointly managing complex transformation processes:

Civil servants today are faced with the task of realistically assessing the origin of their research vis-à-vis and the associated offers of cooperation. Are they dealing with a technological or scientific researcher who is offering them new basic knowledge for testing? Or does their counterpart come from the social sciences and represent a participatory, transdisciplinary and transformative research approach?

While in the first case the full responsibility for the decision and the way of implementation remains with the civil servant, in the second case he can expect the transformative researcher to support him by introducing new perspectives and co-creative intervention methods in the decision-making and implementation steps of technological or scientific solutions in the municipal system up to the successful acceptance of the new solutions by the local clients. If the civil servant has all the necessary options, he or she can draw on both the natural scientist/technology researcher as a specialist consultant and the transformative social scientist as a process consultant and transformative researcher. This requires civil servants to pay more attention to their research partners.

Conversely, transformative researchers are faced with the task of finding committed clients and coalition partners at the local level for the implementation of top-down goals set by research programmes, in order to initiate and support commitment and acceptance for change processes beyond pressure and resistance in the system itself. This requires a high degree of awareness of the level at which one can approach which people in the municipalities in order to find leaders with similar visions and goals who are prepared to courageously explore their scope for shaping the organisation by testing which changes are necessary for the municipality as an institution on the one hand, and which are tolerable and possible on the other. However, it also requires listening and support where the internal cooperation partner may have temporarily lost the overview in the thicket of complexity, in order to be able to maintain the basis for cooperation and thus joint control through mutual reflection and support.

The ability to maintain a stable and respectful basis for cooperation during turbulent transformation processes is one of the core competencies of civil servants and researchers who want to build and expand urban transformation capacity together.

5.6 Core competences as learning objectives for transformative researchers and civil servants

In contrast to analytical approaches, the systemic approach focusses on describing concrete (communicative) actions. In the systemic approach, attitudes and actions are not considered to be separate from one another. The attitude indicates what is being focussed on and how the transformation process should be designed, but it is only in the action that the attitude becomes visible and effective (Ebbecke-Nohlen 2009).

In the following table - analogous to the previous tables - the "attitudes" are used as substantive leading differences and thus as a classification system for operationalising the new (different/common) core competencies of transformative researchers and civil servants.

Seven of the twenty-four guiding differences, namely the "explanatory pattern", "dimension of evaluation", "content neutrality/non-knowledge as expertise", "governance/steering", "orientation", "temporality", "focus on diversity/choice", are based on the comparison of non-systemic and systemic supervision by Andrea Ebbecke-Nohlen (2009), a representative of the International Society for Systemic Therapy (IGST) in Heidelberg. The additional 17 key differences are derived from the nine key differences for complementary innovation counselling by Doris Wilhelmer (2009) and the key differences for transformation management by Alfred Janes, Karl Prammer and Michael Schulte Derne, three representatives of the Vienna School of systemic organisational development.

Since we understand the term "core competence" to mean the skills or actions that distinguish transformative from non-transformative (input-output orientated) researchers and civil servants, the description of the core competences in the following tables also represents a description of learning objectives for the two different professional groups.

5.6.1 Different core competences and learning objectives

The main difference between the two roles lies in their affiliation to the respective system: while the civil servant as a member of the municipal city system represents the local client system of the city for the transformative research consortium, in the case of a specific research project, the affiliation of the individual researchers relates primarily to the project consortium active in this case. Furthermore, the individual researchers represent the research discipline and culture of the research organisation from which they originally come and in which they were socialised in their current research role. For the city or the city's project manager, the project consortium therefore represents an external system environment.

If the aim is to implement a local ULL as a transformation space, the civil servant takes on the role of a systemically competent project manager during the implementation process (clarification of objectives, cooperation roles and rules, milestones, resources). If this implementation process ideally takes place in cooperation with the external, transformative research team, the researchers take on the role of external process counselling during the implementation process in the sense that they introduce new perspectives and governance options into the ULL as a transformative research project by asking systemic questions.

If the main task of systemic project management is to repeatedly introduce the rules of the context as well as the overarching goal and the reminder of the targeted results into the process and to compare them with the interim results that emerge, the main task of transformative researchers is to repeatedly scrutinise

all perspectives, interests, routines, specialist instructions, decision-making processes, etc. in order to enable alternative patterns of thought and action.

In a nutshell, the main difference between the task profiles of the two professional groups can be summarised as a) opening and expanding options on the part of the transformative researchers and b) steering and closing the process towards the desired outcome on the part of the transformative civil servants. This division of tasks ensures that the decisions are always made by the city's client system and never by the research team.

How this main difference is reflected in the role-specific core competences in dealing with specific situations and thus in role-specific learning objectives is briefly outlined in the following table.

Transformative researchers as process consultants	**Leading differences**	**Transformative civil servants as systemic project managers**
Being able to assess the functioning of small, medium-sized and large cities in their respective cultural context; recognising important actors and decision-making patterns; building relationships of trust and acceptance in the system; being able to assess the role of the PM in the overall system	**Context**	Having relationships of trust and acceptance in the system; being able to assess the necessity, possibilities and limits for change in the city; recognising typical decision-making patterns and power constellations. Independence and the courage to utilise their own creative scope for innovative processes beyond the hierarchy.
Be able to translate and link key messages from EU strategies, research programme objectives, national strategies and municipal strategies in a comprehensible manner. Have a personal vision of sustainability. Be able to carry out circular order clarification processes.	**Alignment**	Know municipal (sub-) strategies and objectives and be able to link them to research objectives. Have an interest in the interests and goals of important stakeholder groups. Know and be able to utilise the potential for achieving objectives in the city and its surroundings. Ensure careful clarification of the assignment with decision-makers, including clarification of the necessary resources.
Ensure that all partners in the research consortium identify with the overarching objective. Establish a basic understanding and acceptance of transformative research, including in technologically and scientifically driven research organisations.	**Overarching goal**	Be able to communicate the project objective as part of the implementation of the municipal strategy. Ensure that departments, experts & stakeholders involved identify with the objective. Use the overarching goal to create meaning across the board and as mediator in the event of escalating departmental egos.
Asking questions instead of contributing knowledge or defining yourself as a knowledgeable person.	**Openness to results**	Ongoing reminder of project goals and success criteria for the expected results.
Be able to explain the benefits of EU change objectives for everyday municipal life. Understand and utilise resistance as	**Neutrality towards "change" and "preservation**	Clearly perceive your own task of maintaining structures and processes - and be able to scrutinise them on a project-specific basis.

an indication of a lack of information. Know the effects of the "change mandate" on the system and be able to relativise them beyond devaluations.		Be able to introduce the side of necessary change in the system and communicate its benefits. Be able to create scope for change processes in the system.
Perceive the project objective as part of the EU programme's objectives and be able to see and shape the project as an intermediate step in the framework of a possible long-term municipal development process.	**Long-term thinking and action**	Clear orientation towards the mandate of the mayor or municipal council. Orientation towards short and medium-term implementation goals of the municipality and striving for quick wins in the achievement of goals. Being able to think long-term.
Dissolving truth assumptions and positions and expanding the possibilities for thought, choice and action in the system.	**Focus on diversity Options**	Clearly marking areas where decisions and rules of the system must not be questioned and opening up opportunities for freedom of choice as part of the transformation process.
Ensure a needs-based composition of the project consortium - consisting of e.g. TECH experts and transformative researchers with a good combination of technical and process expertise.	**Complementary teams (process and content)**	When putting together the internal project team as well as internal advisory boards and external response groups, ensure that there is sufficient a) decision-making power, b) procedural knowledge, c) sectoral expertise from the administration, d) profound knowledge of the key interests and motives of external stakeholders.

TABLE 15 DIFFERENT LEARNING OBJECTIVES RESULTING FROM THE INTERVIEWS

5.6.2 Common core competences and learning objectives

Joint governance of complex transformation projects requires joint access to a systemic view of the world. This differs fundamentally from the paradigm of a mechanistic "input-output" approach to social- living systems.

The most striking difference lies in the type of cognition: based on the different positions of the observers "civil servants" and "transformative researchers", the mechanistic view focuses on WHAT is recognised, whereas the systemic view focuses on HOW something is recognised. While in the first case it is assumed that reality can be recognised independently of the observer and that different observers should therefore arrive at the same results in their scientific investigations, in the second case the observers are part of the observation and the diversity of the observation is a desirable effect for the further knowledge process.

This corresponds to the fact that in the mechanistic view, objectivity is achieved, and one truth can be recognised, whereas in the systemic view, the subjectivity of cognition recognises many "truths", i.e., enables many complementary perspectives. Instead of testing just one hypothesis, the aim is to generate many hypotheses, which in turn are not subjected to attempts to disprove them but are evaluated in terms of how useful they are for the cognitive process and the solutions.

While the mechanistic world view focusses on hard, measurable data, the systemic approach takes subjective and emotional data into account, and therefore soft data as well as hard data. In the systemic ap-

proach, context is of great importance, indeed: context makes all the difference. Finally, the systemic paradigm assumes interactions between the observed and the process of observation. Linear causality is replaced by the idea of circular causality. Development processes are also understood as non-linear. (Ebbeke-Nohlen 2009, p. 29-31).

As the table below shows, systemic action is always committed to self-regulation and impartiality or neutrality. The principles of "respect for target groups and people" and "disrespect for ideas" apply. Context and gender sensitivity are further central, guiding systemic attitudes that can also be understood as ethical principles of systemic action (Ebbecke-Nohlen 2009).

The key differences (see table below) focus on central, systemic attitudes and thus offer perspectives for observing and understanding social systems. In essence, they represent the central, necessary attitudes for transformative action from the two different roles (civil servants/transformative researchers).

Accordingly, all systemic methods of questioning and instruments of context governance are always based on these central attitudes. Joint governing of transformation processes by civil servants and transformative researchers can therefore only succeed if they can build on the systemic world view as a common basis when realising their different tasks.

Transformative researchers as process consultants	**Leading differences**	**Transformative civil servants as systemic project managers**
Define yourself as a non-knower and learner; reflect on the supportive and obstructive effects of your own interventions in the communal system. Follow the motto: "The change process always starts with myself".	**To see yourself as See part of what is observed**	Distance yourself from the demand that "others should change". Recognising yourself as part of the system to be changed and "leading by example" by changing your own attitude and actions.
Putting your own expertise in the background: Concentration on communication patterns and integration of contradictions from the municipal system.	**Communication patterns Relational thinking as a communication pattern**	Understand statements and demonstrated behaviour on the basis of communal relationships between functions/departments and not attribute them to individuals. Recognising and promoting contradictions as an expression of different competencies.
When forming hypotheses about the system, always include developments in the environment.	**presuppose dynamics: Interactions between the city and its environment**	Integrate current and upcoming development processes from the regulatory, legislative and geographical environment into description and development processes.
Welcome relapses into old patterns as an important part of change processes. Use the unexpected as important additional information.	**Assumption of non-linear developments beyond progress thinking**	Allow for the temporality of development processes. Utilise the unexpected as important additional information. Expect surprises.
Recognising dysfunctional routines as formerly good solutions and learning from them in an appreciative way. Recognising circular processes	**Explanation pattern**.	Shifting the focus away from individuals towards concrete patterns of action. Be able to identify possible winners and losers in the transfor-

and being able to simulate them hypothetically.		mation processes of subgroups in the system.
Take your own subjectivity into account when forming hypotheses. Obtain as many perspectives as possible from the system to broaden the view of the overall system. Do not strive for unique, correct solutions.	**Focus on diversity: Appreciation of observer-dependent perspectives**	Relativising the assumption of "knowing how the hare runs". Putting your own assumptions up for discussion as one element among many others. Thinking in alternatives. Thinking in alternatives instead of pushing for unique solutions
Introduce a "suitable for the current problem" as a decision criterion and represent it in the research team.	**Dimension of the valuation**	Accept a "suitable for the current problem" and represent it in the system.
Appreciate and support analogue forms of representation of social and emotional processes.	**Expertise Integration of hard and soft data**	Enable metaphorical descriptions of social processes alongside key figures.
Introduction of methods of vision and scenario development to support thinking from the future.	**Temporality** **Metaphors, visions**	Allow visions and metaphors instead of exact definitions as a space of possibility for futures.
Identify resources (instead of deficits) in the system. Recognising problems as formerly successful solutions. Adopt a clear solution-orientation in the process.	**Orientation**	Recognising potential and resources in the system and being able to see problems as former solutions. Be able to take on the role of creating meaning. Aim for win-win solutions for the system as a whole.
Support the self-motivation, self-responsibility and self-control of the municipal project partners. Consider ignorance, uncertainty and turbulence as normality. Experiment with new modes of governance.	**Control system**	Be able to deal well with the communal hierarchy and use it as a context for establishing and protecting communicative freedom for self-organised change processes.
Be able to maintain the same distance/proximity to all actors in the system: Understanding and building trusting relationships with all actors at all levels in the system. Translating and linking the different goals/ interests.	**Social neutrality**	Be able to maintain the same distance/proximity to all players in the system: Keep away from subgroups and coalitions. Approach knowledgeable players from all departments and win their co-operation. Coordinate cross-departmental development and decision-making processes; build an overarching transformation alliance of entrepreneurs in the city.
Experience in dealing with context governance via the implementation of transformation architectures. Experience in combining different actors at different levels to	**Transformation architecture**	Ensure acceptance of the transformation architecture on the part of the hierarchy. Committees/ communication Set-ups of the architecture can be used for working with stakeholders at eye level. Support transparent development and decision-

support the achievement of the overall objective.		making processes beyond traditional power circles.
Making competences and resources in the system visible and explicitly valuing them instead of pointing out deficits in a diagnostic way	**Reinforcement of the system**	Making competences and resources in the system visible to all beyond power constellations.

TABLE 16 JOINT LEARNING OBJECTIVES RESULTING FROM THE INTERVIEWS

6 Conclusions: learning objectives and learning content for transformative professional groups

With a view to the further expansion and professionalisation of transformative researchers and civil servants, the question arises at this point as to which overarching goals and content could help both professional groups to further develop their skills and abilities to support transformation processes.

The systemic world view with its assumption of observer-based subjectivity of all knowledge as well as relational generation and acceptance of knowledge and the fundamental disrespect for content in favour of a multitude of time-limited solutions essentially contradicts the traditional view of science based on objectivity, hard data and replication. Depending on socialisation in different scientific disciplines, it can be that access to the systemic paradigm and world view is more or less easy. Access to and handling of the systemic world view is based on the integration of previously acquired methods and knowledge, which can be understood as context-independent solution impulses and made available as innovation impulses within the framework of transformation processes, without restricting or even anticipating the respective context-specific useful and possible solutions.

Conversely, the systemic world view also contradicts the traditional top-down management habits of public administration and public organisations in Central Europe (in contrast to the Scandinavian countries). The task of providing equal access to public goods for all citizens derives its legitimisation from quasi person- and context-independent, objective procedural steps. Context dependency and subjectivity, as well as diversity and ambiguity, contradict attempts at unambiguous definitions and procedures. Furthermore, the politics of cities and regions are legitimised less by their prudent view of the system as a whole than by their affiliation and loyalty to a particular party and its definition of priority interest groups and issues. In this sense, relational thinking in the sense of thinking and municipal action in relation to the overall system of the city runs counter to the political mandate accepted through the election. This phenomenon of invisibly effective loyalties as steering mechanisms in concrete decision-making processes influences both the type of proximity/distance design (social neutrality) to people, as well as to ideas and dimensions of the evaluation of decisions in cities, which at the end of the day are not supported by the experts of the administration, but by the politicians and for which they are responsible. Anyone who develops a need for security in this non-transparent situation in the administration withdraws into the sectoral silos of the individual departments, which further complicates overarching target-orientated processes for the overall system. However, experience shows that, due to their direct proximity to the electorate, many local authorities still manage to come up with suitable solutions for specific situations and citizens that go beyond party calculations. Such abilities are attributed not least to an eye for the overall system and social and substantive neutrality in the search for a suitable solution for the situation.

The initial situations described above, and the learning objectives described in the previous tables at the respective role-specific action level - with a view to a curriculum to be developed in the final year of the project - can be summarised as the following meta-objectives and content:

1. Both professional groups know and understand the systemic world view in contrast to the mechanistic "input-output" and "top-down" driven world view
2. The basic attitudes of the systemic paradigm (e.g., "self-reflexivity", "relational thinking", "system dynamics", "non-linear thinking", "subjectivity of knowledge", "social and construct neutrality" etc.) and their translation into the daily actions of the respective professional groups are known.
3. Both professional groups have different levels of detailed knowledge of systemic governance tools such as
    a. to the systemic loop
    b. for circular order clarification
    c. systemic questioning methods (circular questions, scaling questions, questions about exceptions, paradoxical questions, miracle questions, etc.) and
    d. systemic instruments of context governance such as social and temporal architectures for transformation processes
4. Both professional groups have sufficient, function-specific expertise to fulfil their non-transformative tasks within their organisations of origin.

7 OUTLOOK to the TANGO-W curriculum

The present deliverable 2.4 "new Skills & role requirements" provides a valuable basis for the development of a TANGO-W curriculum for transformative researchers and civil servants planned for 2025 by describing new role requirements and skills as well as the resulting occupational group-specific learning objectives.

Discussions on this already began in the 2023/24 reporting year with representatives of C-KiC and the project managers from NR and SIN. It is planned that all relevant results will be brought together in Deliverable 5.2 "curriculum and skills trainings for widening transformative capacity" and made available to interested representatives of transformative research and administration as part of a pilot run. In addition, support is planned for interested training organisations in their implementation of the TANGO-W curriculum.

8 References

Austin, F.C. (2008). High-Risk High-Reward Research Demonstration Project, presentation given to the NIH Council of Councils.

Baecker, D. (2005a): Form und Formen der Kommunikation. Frankfurt am Main, Suhrkamp.

Bartels, K.P.R., Wittmayer, J.M. (Eds.) (2018). Action Research in Policy Analysis. Critical and Relational Approaches to Sustainability Transitions. Routledge Taylor & Francis Group, London/New York.

Beers, P.J., Van Mierlo, B., (2017). Reflexivität, Reflexion und Lernen im Kontext der Systeminnovation: Prying loose entangled concepts, in: Elzen, B., Augustyn, A.M., Barbier, M., van Mierlo, B. (Eds.), AgroEcological Transitions: Changes and Breakthroughs in the Making. Wageningen University & Research, pp. 243-256.

Bileišis, M., Kovač, P., Gajduschek, G., Horváth, T., Sienkiewicz, M., Pukis, M., Leontjeva, O., Voronču ka, I., Smalskys, V., Stasiukynas, A., Domeikienė, J., Nemec, J., Merickova, B., Calin, E., Hintea, Jugovits, Károly, Kopric, I., Michalowski, S, Svidroňová, M., Petrov, S., Țiclău, T. (2017). Public Administration Reforms in Eastern European Union Member States. Post-Accession Convergence and Divergence.

Blahodarnyi, A.M., Barabash, O., Honcharov, A.V., Honcharov, M.V., Shatilo, V. (2022). The experience of European countries regarding the effective functioning of local governance Informatol. 55.

Bouckaert, G., Kuhlmann, S., Schwab, C. (2017). Autonomy, Performance, Participation: Lessons from the Comparative Study of Local Public Sector Reforms: Lessons from Research and Practice in 31 Countries.

Braams, R. B., Wesseling, J.H., Meijer, A.J., Hekkert, M.P. (2021). Legitimizing transformative government: Aligning essential government tasks from transition literature with normative arguments about legitimacy from Public Administration traditions, Environmental Innovation and Societal Transitions, Vol. 39, pp. 191-205.

Ebbeke-Nohlen, A. (2009): Einführung in die systemische Supervision. Carl-Auer Compact Verlag 2009.

Fjelland, R. (2016): When laypeople are right and experts are wrong: Lessons from love canal, in: HYLE – International Journal for Philosophy of Chemistry 22(1), pp. 105-125.

Foerster, H. v. (1985): Entdecken oder Erfinden? In: A.Mohler, H.Gumin (Hg). Einführung in den Konstruktivismus. München.

Foerster, H. v. (1999a): Sicht und Einsicht. Versuche zu einer operativen Erkenntnistheorie. Reihe: Konstruktivismus und systemisches Denken. Hrsg. V. Hans Rudi Fischer. Carl Auer Systeme Verlag 1999.

Foerster, H. v. (1999b): Wie wir uns erfinden: Eine Autobiographie des radikalen Konstruktivismus. Foerster H. v. und Glasersfeld E. v., Carl Auer Systeme Verlag, 1. Aufl. 1999.

Foerster, H. v. ; Pörksen, B. (1998): Wahrheit ist die Erfindung eines Lügners. Gespräche für Skeptiker. Carl Auer Verlag.

Funtowicz, S., Ravetz, J. (1993): Science for the post-normal age, in: Futures 31(7), pp. 735-755.

Greenwood, D.J., Levin, M., (2007). Einführung in die Aktionsforschung. Social Research for Social Change, 2nd Editio. ed. Sage, Thousand Oaks.

Grundmann, R. (2007): Knowledge Politics, in: The Blackwell Encyclopedia of Sociology, DOI: 10.1002/9781405165518.wbeosk018.pub2.

Grundmann, R. (2016): Climate change as a wicked social problem, in: Nature Geoscience 9, pp. 562-563.

Hammerschmid, G., Palaric, E., Rackwitz, M., Wegrich, K. (2023). "A shift in paradigm? Collaborative public administration in the context of national digitalization strategies."

Hedegaard Sørensen C. (2018). A typology of inter-organisational coordination in public transport: The case of timetable planning in Denmark,Research in Transportation Economics,Volume 69, pp. 411-419

Hulme, M. (2009): Why We Disagree about Climate Change: Understanding Controversy, Inaction and Opportunity, Cambridge.

Janes, A., Prammer, K., Schulte-Derne, M. (2000): Transformations-Management. Organisationen von Innen verändern. Springer Wien New York 2000.

Jasanoff, S. (2010): A new climate for society, in: Theory, Culture & Society 27 (2-3), pp. 233-253.

Jost, G. (2021): Rezension von Walther A., Stauber B. Rieger-Ladich M. Wanka A. 2021 (Hrsg): Reflexive Übergangsforschung. Theoretische Grundlagen und methodologische Herausforderungen. Verlag Barbara Budrich GmbH (Opladen, Berlin, Toronto) 2020. (Beiträge von Barbara Friebertshäuser / Anthropologie), Birgit Becker/Lebensverlaufsforschung, Frank Oswald & Anna Wanka / Ökologische Psychologie, Christiane Hof/mixed-Methods, Anna Wanka/ Theoretisch-konzeptionelle Perspektiven; Markus Rieger-Ladich / Subjektivierungspraktiken, Barbara Stauber/ Differenzierungstheoretische Grundüberlegungen, Petra Bauer/ Auswirkungen auf Beratungsverständnis).

Kemmis, S., McTaggart, R. (2005): Participatory action research: Communicative action and the public sphere. In: N. Denzin, Y. Lincoln (Eds.): Handbook of qualitative research. 3rd ed. Sage, Thousand Oaks, CA, pp. 559–603.

Kiurienė, V. (2020). Administrative supervision of local self-government in the baltic states: a comparative view. Journal of Education Culture and Society, 6(2), pp. 394-410.

Kronsell A., Mukhtar-Landgren D. (2018) Experimental governance: the role of municipalities in urban living labs, European Planning Studies, 26:5, pp. 988-1007.

Kuhlmann, S., Wollmann, H. (2019). Introduction to Comparative Public Administration. Administrative Systems and Reforms in Europe. Second Edition. Cheltenham, UK; Northampton, MA, USA.

Leixnering, S., Meyer, R., & Polzer, T. (2021). Hybrid coordination of city organizations: The rule of people and culture in the shadow of structures. Urban Studies, 58 (14), pp. 2933 - 2951.

Lewin, K. (1948): Aktionsforschung und Minderheitenprobleme. In: K. Lewin (Ed.): Die Lösung sozialer Konflikte. Christian-Verlag, Bad-Neuheim, pp.278–298.

Lewin, K. (1948): Aktionsforschung und Minderheitenprobleme. In: K. Lewin (Ed.): Die Lösung sozialer Konflikte. Christian-Verlag, Bad-Neuheim, pp. 278–298.

Lewin, K. (1952): Group Decision and Social Change. In: T. M. Newcomb & E.E. Hartley (Eds.): Readings in social psychology. Holt, New York, pp. 459–473 (english).

Loorbach, D. (2010). Übergangsmanagement für nachhaltige Entwicklung: A präskriptive, komplexitätsbasierte Steuerung Rahmenwerk. Steuerung 23, pp. 161-183.

Loorbach, D., (2007). Transition Management. New Mode of Governance for Sustainable Development. PhD-Thesis. Erasmus Universität Rotterdam, Rotterdam.

Luft J. (1963): Einführung in die Gruppendynamik. Fischer Tb. Verlag, Frankfurt am Main.

Maturana, H. (1994): Was ist erkennen? Piper Verlag GmbH, München 1994.

Maturana, H.; Varela, F. J. (1984): Der Baum der Erkenntnis. Die biologischen Wurzeln des menschlichen Erkennens. Goldmann Vlg, genehmigte Tb Ausgabe, 3. Auflage 1991.

Meadows, D.H., Randers, J., Meadows, D.L. (197)2. Die Grenzen für growth.

Meisch, S. (2020): Transformative Research: The IASS Approach. IASS Discussion Paper: Institute for Advanced Sustainability Studies (IASS), August 2020; Translation and Edition: Damian Harrison.

Mocca, E.(2021): The municipal gaze on the EU: European municipalism as ideology, Journal of Political Ideologies.

Mäenpää, O.I., Fenger, N. (2019). Public Administration and Good Governance. in P Letto-Vanamo , D Tamm & B O Gram Mortensen (eds), Nordic Law in European Context . Ius Gentium: Comparative Perspectives on Law and Justice , vol. 73 , Springer , Cham , pp. 163-178.

Pivoras, S. (2013). Post-Communist Public Administration in Lithuania.

Ravetz, J. (2006): Post-Normal Science and the complexity of transitions towards sustainability, in: Ecological Complexity 3, pp. 275-283.

Rittel, H.W.J., Webber, M.M. (1973). Dilemmas in a General Theory of Planning. Policy Sci. 4, pp. 155-169.

Rotmans, J. (2005). Maatschappelijke innovatie: tussen droom en werkelijkheid staat complexiteit. Erasmus

Rudiak-Gould, P. (2013): "We Have Seen It with Our Own Eyes": Why We Disagree about Cli-mate Change Visibility, in: Weather, Climate and Society 5, pp. 120-132.

Sandberg, S. (2023). The role of administrative tradition in government responses to crises: A comparative overview of five Nordic countries. In Communicating a Pandemic: Crisis management and Covid-19 in the Nordic countries, pp. 31–50.

Schein, E.H. (2010). Organizational Culture and Leadership. 4th Edition. Published by Jossey-Bass, San Francisco 2010; Copyright by John Wiley & Sons, Inc.

Schneidewind, U., Singer-Brodowski, M. (2014). Transformative Wissenschaft. Klimawandel im deutschen Wissenschafts- und Hochschulsystem, Marburg.

Schuitmaker, T.J. (2012). Identifizierung und Enträtselung hartnäckiger Probleme. Technol. Forecast. Soc. Change 79, 1021- 1031.

Schwab, C., Bouckaert, G., & Kuhlmann, S. (Eds.). (2017). The Future of Local Government in Europe: Lessons from Research and Practice in 31 Countries (1st ed.). Nomos Verlagsgesellschaft mbH.

Schäpke, N. et al (2017): Reallabore im Kontext transformativer Forschung: Ansatzpunkte und Konzeption und Einbettung in den internationalen Forschungsstand. IETSR Discussion papers in Transdisciplinary Sustainability Research Leuphana Universität, Lüneburg.

Skoog, L., Svensson, P. (2023). Hidden policy conflicts? Administrative strategies to manage depoliticisation. Acta Polit 58, pp. 819–836.

Stangl, W. (1997): Handlungsforschung. 1997, abgerufen am 28. November 2023.

Strand, R. (2018): Post-Normal Science, in: Spash, Clive (eds): Routledge Handbook of Ecologi-cal Economics: Nature and Society, London, pp. 288-297.

Strohschneider, P. (2014). Zur Politik der Transformativen Wissenschaft. In: Brodocz, André, et al. (eds): Die Verfassung des Politischen. Festschrift für Hans Vorländer. Wiesbaden, pp. 175-192.

Tasan-Kok, Tuna & Vranken, Jan. (2011). Handbook for Multilevel Urban Governance in Europe.

Thomas, P. (2020). Building transformative capability through civil service reform Administration, vol. 68, no. 4 (2020), pp. 73–96.

Walther A., Stauber B. Rieger-Ladich M. Wanka A. 2021 (Hrsg): Reflexive Übergangsforschung. Theoretische Grundlagen und methodologische Herausforderungen. Verlag Barbara Budrich GmbH (Opladen, Berlin, Toronto).

Watzlawick, P. (1976): Wie wirklich ist die Wirklichkeit? R. Piper & Co. Verlag, München.

WBGU (= German Advisory Council on Global Change) (2011). World in Transition. A Social Contract for Sustainability, Berlin, https://www.wbgu.de/fileadmin/user_upload/ wbgu/publikationen/hauptgutachten/hg2011/pdf/wbgu_jg2011_en.pdf

Wendell L. French, Cecil H. Bell: Organisationsentwicklung, Sozialwissenschaftliche Strategien zur Organisationsveränderung. Paul Haupt Verlag, Bern/Stuttgart 1973/1994.

Wilhelmer, D. (2009): Erinnerung an eine bessere Zukunft. Syntax für eine komplementäre Innovationsberatung. Carl-Auer Verlag Heidelberg. 1. Auflage 2009. ISBN 978-3-89670-913-4.

Willke, H. (1995): Systemtheorie III: Steuerungstheorie: Grundzüge einer Theorie der Steuerung komplexer Sozialsysteme. Stuttgart, Jena.

Willke, H. (1998): Systemisches Wissensmanagement. Mit Fallstudien von D. Gnewekow, T. Hermsen, J. Köhler, C. Krück, S. Mingers, K. Piel, T. Strulik und O.Vopel. Stuttgart: Lucius und Lucius.

Wittmayer, J.M., Loorbach, D., Bogner, K., Hölscher, K., Hendlin, Y., Lavanga, M., Vasques, A., von Wirth, T., und de Wal, M. (2021). Transformative Forschung: Wissen und Handeln für gerechte Nachhaltigkeitstransitionen. DIT-Arbeitspapier zur Positionierung transformativer Forschung. Rotterdam, Design Impact Transition Platform, Erasmus Universität Rotterdam.

Wolfram, M., & Frantzeskaki, N. (2016). Cities and Systemic Change for Sustainability: Prevailing Epistemologiesand an Emerging Research Agenda. Sustainability, 8(2), 144.