TRANSFORMATIONAL AI (TRAI): REVOLUTIONIZING THE MODERN BUSINESS WORLD

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Abstract: *Transformational Artificial Intelligence (TRAI), a subset of Transformative AI (TAI), empowers individuals to design and implement sophisticated data transformation workflows. TRAI systems enable new ways of working and learning by progressively manipulating data through a series of operations. This article explores TRAI's potential to revolutionise workflows, information consumption, and decision-making, offering practical guidance on leveraging existing tools to implement TRAI today. It also discusses the democratisation of workflows, the power of AI triggers, and the skills needed to excel in the TRAI landscape, emphasising that TRAI is not just for tech experts but anyone willing to learn and experiment. This article provides practical guidance on leveraging existing tools to implement TRAI today. It discusses the democratisation of workflows, the power of AI triggers, and the essential skills needed to excel in the TRAI landscape. Ultimately, TRAI is not just for tech experts but for anyone willing to learn and experiment, paving the way for more inclusive and effective AI solutions.*

Keywords: *artificial intelligence, transformational AI, workflows, automation, data transformation.*

JEL Classification: *O33, M15.*

INTRODUCTION

Artificial Intelligence (AI) has often been seen as the domain of experts, requiring specialised knowledge and complex coding. However, a new paradigm is emerging transformational artificial intelligence (TRAI). TRAI, a subset of Transformative AI (TAI), democratises the power of AI by enabling practically anyone with an open mind and some testing to design and implement sophisticated data transformation workflows, even without a technical background. In this article, we'll introduce you

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to the concept of TRAI, demonstrate its potential to revolutionise how we work and learn and provide practical guidance on how to get started with readily available tools.

DISTINGUISHING TAI AND TRAI

Transformational AI (TAI) is a broader concept encompassing any AI technology that has the potential to initiate significant, potentially irreversible change within society. This could manifest in several ways, from reshaping industries to altering societal norms. While terms like "human-level AI" and "artificial general intelligence" capture the potential for significant societal change from advanced AI, they lack clear definitions (Gruetzemacher & Whittlestone, 2022). In their place, Gruetzemacher and Whittlestone propose the concept of Transformative AI (TAI), emphasising the potential for AI to radically impact society, even without achieving human-level intelligence.

On the other hand, here we introduce the concept of Transformational Artificial Intelligence (TRAI) as a crucial technical underpinning for achieving TAI. TRAI focuses on the multi-step transformation of data structures. This model serves as the foundation for fundamentally changing workflows across diverse fields. By progressively manipulating data through a series of operations, TRAI systems enable entirely new ways of working, ultimately driving the broad societal changes envisioned by TAI.

Table 1. Comparison of TAI and TRAI

Term	Focus	Scope
TAI (Transformative AI)	Broad societal change	Potential to reshape industries, norms, etc.
TRAI (Transformational AI)	Technical processes	Multi-step data transformation workflows

Source: The authors' elaboration

APPLICATIONS OF TRAI
Learning from lengthy online resources can be time-consuming.

Imagine a world where you could quickly grasp the essence of a 2-hour video tutorial without fully watching it. TRAI promises to make this possible, transforming how we digest and learn from information.

Consider a common scenario: you find a potentially valuable 2-hour video tutorial on a topic you want to explore. Traditionally, you'd dedicate two hours, take notes, and hope the content is worth the time investment.

With TRAI, the approach is completely different:

- *Step 1:* Audio Extraction: The TRAI process starts with audio extraction for a seamless workflow.
- *Step 2:* Speech Transcription: An AI service accurately transcribes the audio into a text file. This step exemplifies the power of AI within TRAI. Without advanced AI for speech recognition, processing the audio into usable text would be a significant hurdle.
- *Step 3:* AI Summarization: A TRAI tool generates a concise summary and a list of key learning points based on your query (e.g., "Outline the core concepts and takeaways"). Here, AI shines again. Natural Language Processing allows the TRAI system to analyse the transcribed text, identify key points, and present them in a summarised format.

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- *Step 4* (Optional): Mind Map Generation: Upon further prompting ("Create a mind map connecting the key concepts"), the TRAI tool visually represents the knowledge structure outlined in the video. This step leverages AI's ability to process information and generate a visual representation based on the identified key points.

This multi-step TRAI process transforms the raw video content into highly usable formats within minutes. You can quickly assess the video's relevance, obtain core takeaways, and visualise the information based on your preferred learning style, all without investing two hours into watching the entire video.
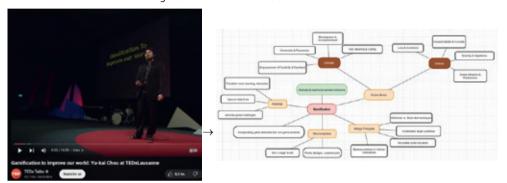
Table 2. Progressive transformation is a core of Transformational AI

Source: (TED, Gamification to improve our world | Yu-kai Chou at TEDx Lausanne, 2014)

This example illustrates the core of TRAI: progressively transforming data (video) through interconnected steps, utilising a range of TRAI tools. For the context of TRAI, a 'tool' refers to any resource, software, or service that facilitates the preparation and transformation of data from one form to another. These tools can be based on AI or conventional methods and may be locally available or accessed remotely through an online service (SaaS).

The presented example is only a glimpse of TRAI's potential to revolutionise our interactions with information. However, the implications extend far beyond individual tasks. By reshaping how we approach workflows, TRAI is democratising the ability to automate and optimise processes, previously the domain of technical specialists. This democratisation has the potential to rapidly transform entire industries, promising significant time and cost savings. For instance, the impact of AI on firm performance has been extensively studied, revealing that AI-based transformation projects across various industrial sectors can optimize existing processes, enhance automation, and improve decision-making. These improvements lead to significant performance enhancements at both organizational and process levels. Organizations can achieve better performance through AI capabilities by effectively reconfiguring their processes to leverage AI technologies (Wamba-Taguimdje, S.-L., Wamba, S. F., Kamdjoug, J. K., & Wanko, C., 2020).

The banking sector provides a striking example of this potential: analysts predict that AI technology alone could generate more than \$1 trillion worth of additional benefits for the banking industry by 2030 (Koyluoglu & Acar, 2023).This massive eco-

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nomic impact illustrates how TRAI can swiftly and dramatically alter the landscape of an entire industry. As organizations across various sectors adopt these technologies, we can expect similar transformative effects, with TRAI enabling faster, more efficient, and more innovative approaches to a wide range of business processes.

BUSINESS AND TRAI WORKFLOWS: A SHARED FOUNDATION, BUT A TRANSFORMATIVE LEAP

Business workflow methodology, a time-tested discipline, provides a structured approach to analysing, designing, and optimising organisational processes. Its value is undeniable, but its reliance on technical expertise often creates barriers to implementation (Reiner, B., Siegel, E., & Carrino, J., 2002). Now is the time to enter Transformational Artificial Intelligence (TRAI), a new-time concept that builds upon the familiar foundation of business workflows while offering distinct advantages powered by AI.

Shared Principles: A Bridge to Understanding

TRAI shares fundamental similarities with traditional business workflows, making it easier for business professionals to grasp its potential:

- Modular Design: Both rely on interconnected steps with a specific function. This might involve data entry, approvals, and reporting in business workflows. TRAI mirrors this structure with audio extraction, transcription, and summarisation steps.
- Sequential Progression: Both emphasise a logical sequence, where each step builds upon the previous one to achieve the desired outcome.
1. Transformation as the Goal: The core purpose of both is transformation. Business workflows transform raw data and inputs into desired outputs, like turning customer inquiries into resolved issues (Guru, Q., 2011). TRAI takes this further, using AI to transform data into more valuable forms, such as concise summaries or insightful visualisations.
- Triggers: Events, data changes, or user input initiates actions in both systems. In a business workflow, an incoming order triggers fulfilment. In TRAI, events like a customer's query or a change in market conditions can trigger a sophisticated AI-powered process.

The AI Advantage: Where TRAI Takes Flight

While the foundational principles are shared, TRAI distinguishes itself through its integration of AI, unlocking capabilities that traditional workflows can't match:

- Data Transformation Powered by AI: TRAI leverages AI to analyse vast amounts of data, extract meaningful insights, and make intelligent decisions. This goes far beyond simple rule-based transformations. For example, in supply chain management, AI can analyse real-time data to predict disruptions and optimise inventory levels, something traditional methods need help to achieve. If a key material is in low supply from one partner, AI can help companies identify other suppliers on short notice (Melton, J., & Evans, K, 2024).
- "Intelligent Triggers: TRAI's triggers are not reactive but proactive and intelligent. AI models can analyse data patterns and predict potential issues

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before they arise. In fraud detection, AI can analyse customer behaviour and flag suspicious transactions, saving time and resources (Vyas, 2023), (Halvaiee, N., & Akbari, M., 2014)."

From Siloed Tools to a Unified Platform: TRAI consolidates data and tasks from various disconnected tools into a single platform. This eliminates the need to juggle multiple applications, streamlines communication, and creates a single source of truth for informed decision-making.

Emphasis on transformation

TRAI workflows aren't just about adding AI to existing processes; they are designed from the ground up to leverage AI's transformative power. This term underscores the fundamental shift in how data is processed, decisions are made, and outcomes are achieved.

The shared foundation between TRAI and traditional workflows provides a crucial advantage. Business professionals can quickly understand and embrace TRAI's capabilities by leveraging their knowledge. This familiarity empowers them to become champions for change, advocating for AI adoption and leading the charge in transforming their organisations (Russell & Norvig, 2021).

THE DEMOCRATISATION OF WORKFLOWS

Despite sharing core similarities with traditional business workflows, TRAI introduces a revolutionary distinction: unparalleled accessibility. While classic workflows often demand coding or programming expertise, TRAI shatters those barriers.

TRAI is more than just a new tool; it signifies a fundamental shift in approaching problem-solving and process automation. It's about recognising that AI isn't just for tech specialists; it's a resource that anyone with a curious and open mindset can harness.

TRAI opens its doors to everyone within an organisation by leveraging human-like conversation and intuitive interfaces. This means that existing skills still need to be updated. Instead, TRAI demands new skills, primarily process thinking and a willingness to learn and adapt (Goodfellow, Ian ; Bengio,Yoshua, 2016).

Anyone Can Learn: Developing the Necessary Skills

To fully embrace TRAI, individuals must be willing to:
- Cultivate Process Thinking: Understanding how to break down complex tasks into smaller, manageable steps is crucial for designing effective TRAI workflows.
- Learn New Tools: While TRAI eliminates the need for coding, familiarity with various TRAI tools and platforms is essential.
- Embrace Experimentation: TRAI is a rapidly evolving field. Be bold, try new approaches, test different tools, and continuously iterate on your workflows.

The Key Takeaway: TRAI's In-House Potential

With TRAI, the power to design and implement workflows shifts from IT departments to the broader workforce. This democratisation empowers organisations to:

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- Utilise All Available Resources: TRAI enables everyone to contribute their unique expertise and perspectives to workflow design, fostering collaboration and innovation.
- Embrace Agility: Traditional workflow changes can be cumbersome. TRAI allows for rapid adaptation, enabling organisations to respond quickly to evolving needs and seize new opportunities.

In essence, TRAI isn't about making everyone an instant expert. It's about fostering a mindset of continuous learning and recognising that AI is a tool everyone can learn to leverage for greater efficiency and innovation. By embracing this new paradigm, organisations can unlock the full potential of their human capital and drive transformative change.

THE POWER OF AI TRIGGERS: DYNAMIC WORKFLOWS AND ENHANCED DECISION-MAKING

In traditional business workflows, triggers act as the starting point or catalyst for a series of actions. These triggers are often based on predetermined rules or conditions. For instance, an incoming customer order might trigger a fulfilment process, or a low inventory level could trigger a reordering process. These rule-based triggers provide a basic level of automation, ensuring that specific actions are taken when certain conditions are met.

One of TRAI's standout features is its ability to incorporate AI triggers, significantly enhancing workflow adaptability and intelligence. Unlike traditional triggers based on fixed rules or simple conditions, AI triggers leverage machine learning models to make more nuanced and context-aware decisions. This enables workflows to respond dynamically to complex situations and diverse data inputs, leading to more effective and efficient processes.

Defining AI Triggers

An AI trigger is a decision point within a TRAI workflow that activates based on the output of an AI mode, such as sentiment analysis in text or image recognition in visual content. When the AI model detects a predefined pattern or threshold, it triggers a specific action or path within the workflow.

Example: Intelligent Technical Support Routing

Let's consider your example of a technical support workflow. In this scenario, an AI trigger can route incoming emails dynamically based on customer sentiment.

- Email Analysis: An AI model with sentiment analysis capabilities scans incoming support emails.
- AI Trigger Activation: If the model detects a strong negative sentiment (e.g., anger, frustration, or threats), it activates a trigger.
- Workflow Branching: The triggered workflow branches off, escalating the issue to a technical support leader or manager.
- Standard Processing: Emails with neutral or positive sentiments follow the standard support process.

This example highlights the value of AI triggers. Without this capability, all support tickets would be processed uniformly, potentially delaying responses to urgent or

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sensitive issues. AI triggers enable a more responsive and tailored approach, ensuring that the most critical concerns receive prompt attention from the appropriate personnel.

AI triggers represent a significant leap forward in TRAI's capabilities. By incorporating machine learning into decision points, workflows can dynamically adapt to complex situations, streamline processes, and improve outcomes across various domains.

BREAKING LANGUAGE BARRIERS: AI-POWERED INTERFACES

With AI agents' ability to communicate in multiple languages, changing the language of interaction within TRAI processes becomes effortless. This opens many possibilities, particularly in today's increasingly multicultural world.

Consider multilingual surveys designed with open-ended questions to gather insights from diverse respondents.

Traditionally, this would involve translating the survey into every anticipated language, a costly and time-consuming process. With TRAI, language selection becomes as simple as choosing from a dropdown menu. AI seamlessly translates survey questions in real time, adapting them linguistically and culturally. This ensures that questions are not just translated word-for-word but resonate with the specific nuances and sensitivities of the target group.

The result is a rich database of responses in various languages, which would have been incredibly challenging to analyse. With TRAI, you can build workflows to perform complex tasks like topic or sentiment analysis across this multilingual dataset. The AI can filter out irrelevant or low-quality responses and normalise the data to facilitate meaningful comparisons.

Ultimately, TRAI eliminates the need for manual translation and extensive adaptation of surveys, freeing up resources to focus on extracting valuable insights and driving more informed decision-making from diverse linguistic data.A question for you - does a video transformation from the beginning of this article pose any challenge in TRAI methodology if this video is, for example, in language you don't understand?

PACKAGING TRAI FLOWS: BUILDING BLOCKS FOR INTELLIGENT AUTOMATION

A key advantage of TRAI methodology is the ability to encapsulate individual workflows into reusable packages, much like LEGO bricks. Each package represents a self-contained unit of functionality, such as "transform video takeaways into mind map". These packages can then be easily combined and interconnected to create larger, more complex TRAI flows.

The Benefits of Packaged TRAI Flows

- Modularity: Packaged TRAI flows promote a modular approach to automation. This allows for greater flexibility and customisation, as users can select and assemble the specific components they need for a given task.
- Reusability: By packaging flows, users can reuse pre-built components across different workflows, saving time and effort in development.
- Collaboration: Packaged flows can be shared and reused within teams or organisations, fostering collaboration and knowledge exchange.
- Scalability: Packaged flows can be scaled up or down as needed, allowing users to adapt their automation to changing requirements.

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According to Cull and Eldabi (Cull, R., & Eldabi, T, 2010), a hybrid approach to workflow modelling supports this modularity, enhancing adaptability and efficiency in complex systems.

Interconnected Information Systems and AI Flows

"TRAI leverages interconnected information systems and AI flows to deliver its transformative power. Data can seamlessly flow between tools and services, regardless of location. For example, a TRAI flow might start on your local computer, utilise cloud-based AI services for processing, and then return the results to your machine (Josifoski, M., Klein, L., Peyrard, M., Li, Y., Geng, S., Schnitzler, J., Yao, Y., Wei, J., Paul, D., & West, R, 2023).

This distributed architecture allows TRAI to leverage the best available tools and resources for each process step. It also enables seamless integration with existing systems, enhancing the value of your current infrastructure.

Building a Learning Organization with TRAI

The LEGO-like nature of TRAI opens up exciting possibilities for learning organizations. Imagine a scenario where employees create AI-powered workflows tailored to their specific needs. These flows can then be shared and reused by others within the organization, creating a more complex workflow. This bottom-up approach to automation empowers users to take ownership of their workflows and continuously improve them. By leveraging the organization's collective intelligence, TRAI can drive innovation, streamline processes, and free up valuable time for more strategic tasks (Amershi, S., Begel, A., Bird, C., Deline, R., Gall, H., Kamar, E., Nagappan, N., Nushi, B., & Zimmermann, T., 2019).

LEARNING THE POWER OF TRAI: 5 SURPRISING SKILLS YOU NEED

Have you ever seen a Rube Goldberg machine[1]? It's a delightfully complex contraption that uses chain reactions and everyday objects to achieve a simple task. This humourous approach to problem-solving, popularised by the American cartoonist Rube Goldberg, shares a surprising connection with the world of Transformational AI (TRAI). Just like those intricate machines, TRAI involves orchestrating a sequence of steps to transform data ingeniously. According to Acharya and Sirinterlikci (Acharya, S., & Sirinterlikci, A. , 2010), introducing engineering design through intelligent Rube Goldberg implementations can provide a unique educational experience that fosters creativity and problem-solving skills.

If you're intrigued by the idea of building your own "digital Rube Goldberg machines," here are five fascinating skills you'll need to master to become a TRAI expert:
1. The Data Detective: As Rube Goldberg meticulously planned each step of his contraptions, TRAI developers must have a keen eye for data. You'll

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[1]   Reuben Lucius Goldberg (1883-1970), was an American cartoonist renowned for his humorous depictions of complex contraptions designed to perform simple tasks convolutedly. These "Rube Goldberg machines," often involving chain reactions, reflected a fascination with interconnectedness and playful ingenuity—qualities that resonate with the design of TRAI workflows. (See examples here: https://bit.ly/RUBE-TRAI)

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need to uncover hidden patterns, inconsistencies, and opportunities for transformation within datasets. It's like being Sherlock Holmes, piecing together clues to unravel the mysteries hidden within data, its structures, representations, and different standards.

2. The Workflow Architect: Rube Goldberg's machines were a symphony of interconnected parts, each triggering the next in a delightful chain reaction. Similarly, designing effective TRAI flows requires a vision of how different AI models and tools can work together seamlessly. You'll be the architect, crafting intricate workflows that transform raw data into valuable insights.

3. The Language Whisperer: Many TRAI applications involve working with natural language, whether analysing text, understanding voice commands, or generating summaries. Your secret weapon will be a deep understanding of language nuances and the ability to communicate effectively with AI models.

4. The Tech-Savvy Tinkerer: While you don't need to be a coding wizard, you'll need to get comfortable with a diverse toolkit of TRAI technologies. Think of yourself as a modern-day Rube Goldberg, experimenting with various software and AI services to create innovative solutions.

5. The Ethical Navigator: TRAI's impact can be profound, so it's crucial to consider the ethical implications of your work. Are your algorithms fair and unbiased? Could they be misused? Just as Rube Goldberg's creations were meant to inspire and amuse, TRAI should be developed responsibly, focusing on positive societal impact. Ethical considerations in AI also involve transparency, accountability, and societal impact, emphasizing the responsible development and deployment of these technologies (Jaiswal, R., Sharma, S., & Kaushik, R. , 2023).

Bonus Skill: The Lifelong Learner: The world of TRAI is constantly evolving, so the most successful practitioners embrace a growth mindset. Never stop learning, experimenting, and pushing the boundaries of what's possible with this transformative technology.

Building real-life TRAI applications is an exhilarating journey that blends creativity, technical skill, and ethical responsibility. By drawing inspiration from the playful genius of Rube Goldberg and embracing these essential skills, you'll be well on your way to becoming a TRAI trailblazer.

KEY TAKEAWAYS: PUTTING TRAI INTO PRACTICE TODAY

Transformational AI (TRAI) isn't just a futuristic concept; it's a practical tool you can use today to reshape how you work, learn, and interact with information. Here are some key takeaways from this article that you can apply right now:

1. Embrace the Lego-like Approach: Think of TRAI as a set of building blocks. Take your time with the idea of complex workflows. Experiment with individual tools and services to understand how they can be combined to achieve specific goals.

2. Explore Existing Tools: You don't need to be a developer to leverage TRAI. A wealth of user-friendly tools is readily available. Experiment with audio extraction, speech-to-text transcription, AI summarisation, and even mind map generation. Many of these tools offer free trials or basic versions to get

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you started.
3. Think in Workflows: Break down tasks into smaller steps and identify how AI tools can automate or enhance each step. This could be as simple as using a text summariser to quickly grasp the key points of a long article or automating repetitive data entry tasks.
4. Ask for Help: Be bold and leverage the power of AI. Ask chatbots or AI assistants to help you brainstorm ideas, generate summaries, or even create simple workflows. The technology is rapidly advancing, and you might be surprised by what it can do.
5. Keep Learning: TRAI is a dynamic field with new tools and techniques emerging constantly. Stay curious and explore online resources, tutorials, and communities to expand your knowledge and stay ahead of the curve.

CONCLUSION

The beauty of TRAI is that it's wider than tech experts. Anyone willing to learn and experiment can harness its power to transform their daily tasks and streamline their workflows. By embracing TRAI today, you're not just preparing for the future but actively shaping it.

Transformational Artificial Intelligence (TRAI) represents a paradigm shift in how we approach data manipulation and workflow management. TRAI empowers individuals and organisations to automate tasks, optimise processes, and extract greater value from information by offering user-friendly tools and a modular workflow design. Business professionals can leverage their knowledge of process design and goal-oriented thinking to become champions of TRAI adoption. TRAI's democratisation of AI removes the need for specialised technical expertise, allowing businesses to harness the power of AI to streamline operations, enhance decision-making, and foster a more collaborative and innovative work environment.

Whether analysing complex data sets, automating repetitive tasks, or optimising supply chains, TRAI offers many applications to drive efficiency, productivity, and business growth. By embracing TRAI's processes and AI-driven insights, businesses can start a future where dynamic workflows, agility, and collaboration are the norm, not the exception.

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