

The HPTD-M Proposal for a TD Chair: A Paradigm Shift

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Abstract: *The Modern Age has promoted advances in technoscience and material quality of life. However, a cycle has been created in which the hypertrophy of logic and analysis does not solve the complexity of human phenomena. This author's HPTD-M theory (Holopraxis Transdisciplinary Management) emerged in this context. The objective of this article is to provoke a comprehensive discussion on the creation of a transdisciplinary chair (TD chair) in universities, including courses of short duration for public and private organizations, envisaging effective and dialectical problem solving for issues involving the complexity of human phenomena, when the mechanistic and the systemic-biological-environmental approach are not enough. Thirty-five-year transdisciplinary research and professional experience culminated in the HPTD-M theory and a 14-hour successful TD pilot course for mediating managers in March/2023. This author's proposal for a paradigm shift and TD Chair involves 1) A transdisciplinary course in the first semester of university graduation; 2) Simplification and flexibility to start (concepts of technoscience and complementarity); 3) The mediating professor for learning to learn and understanding, not only knowing; 4) Creation of a TD kind of Ph.D. and M.Sc. focused on the dialogue between*

theory praxis and generalist specialist. An MBA with more theory could be a starting point; 5) The three types of logic as tools for problem solving in dialogue with new ideas that make sense, considering the level of complexity in each concrete case; and 6) The abstract-concrete complementarity in problem solving and the concept of quaternary complementarities for troubleshooting in practice.

Keywords: *HPTD-M, transdisciplinary chair, paradigm shift, problem solving, dialectics.*

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1. Introduction

The Modern Age, since the 18th-century Enlightenment or *Age of Reason*, has promoted advances in technoscience and material quality of life. However, a spiral cycle has been created in which the hypertrophy of logic and analysis does not solve the complexity of human phenomena. A more comprehensive understanding of ancient philosophies and traditions has been lost. Understanding has been reduced to knowledge or binary logic, fractioned by narrow analytical and scientific views of reality. Many human sciences borrowed such rationalist models from the hard sciences in a reductionist approach of merely mechanistic or biological-environmental views, which can't be applied effectively to complex human phenomena.

In the 21st century, the Western mainstream paradigms can no longer deal with the level of uncertainties, conflicts, polarization, and ideologization in which the West finds itself, the result of a binary worldview that has its explanations in the Western culture itself, focused on causality, which does not consider the various interactions in dualities, like the subject-object and conscious-unconscious at intertwined levels, as is clear from the Jung Analytical Psychology and Modern Physics, considering the principle of complementarity.

In 2022 this author's HPTD-M theory emerged (*Holopraxis Transdisciplinary Management*), influenced by Carl Gustav Jung (1875–1961), a psychiatric scientist and physician who created Analytical Psychology, a complementary school to Freud's Psychoanalysis. The Jungian vision involves not only technoscience but also philosophy and traditions, besides the four archetypal elements – the analogy between states of matter, namely Solid, Liquid, Gas, and Plasma (from the most concentrated to the most expanded), with the psychological functions, respectively Sensation, Feeling, Thinking, and Intuition (from the most concrete or solid to the most abstract or expanded). Such functions, which Jung discovered empirically in his patients, interact in complementarities, and Jung himself already hinted in a 1957 interview that the psyche is a quality of matter, a different kind of matter. No wonder Jung coexisted and discussed his theory with modern physicists. Even the Nobel Prize winner Niels Bohr was aligned with the Jungian view of complementarity between subject-object and conscious-unconscious. This is the basis of TD and the HPTD-M view, as a way of dealing with the complexity of human phenomena for concrete and effective problem solving. The idea of complementarities is present in Hermetic Philosophy, Taoism, Greek Philosophy, European Alchemical Tradition, Modern Physics, and

Analytical Psychology.

Quaternary complementarities (quaternary because it involves four elements) is the HPTD-M main framework, coming from Greek Philosophy: Empedocles (Earth, Water, Air, and Fire) and Heraclitus (cycle of transformations in dualities, rise and fall in the four elements), considering especially the comprehensive framework of the European Alchemical tradition. Besides, an analogy between states of matter in modern physics (from the most solid to the most dispersed): Solid, Liquid, Gas, and Plasma. Furthermore, the concept is analogous to Jungian psychological functions (from the most concrete to the most abstract): Sensation, Feeling, Thinking, and Intuition.

The HPTD-M framework considers four epistemic ways or main disciplines, i.e. technoscience, philosophy, tradition, and art. Another way to see the same principle is the complementarity between culture and technoscience. Culture can be seen as the conjunction of philosophy + tradition + art, and science cannot be confused with technoscience, because technoscience is the complementarity feedback between technology and science: A newly discovered technology that works may not be explained scientifically, and a new scientific discovery may not have technological applications at once. Furthermore, religion cannot be confused with tradition, because tradition involves not only religions but also other cultural traditions, and spiritual traditions, like the Alchemical tradition which was also a protoscience until the 17th century.

This author's theory and praxis will be simply mentioned in this text as HPTD-M. Besides, the noun 'transdisciplinarity' or the adjective 'transdisciplinary' will be referred to as TD.

As far as TD principles are concerned, some quotes influenced this author's *Holopraxis Transdisciplinary Management* (HPTD-M) to construct the theory and praxis framework.

1) Albert Einstein (1879–1955), Relativistic Physics:

— *We cannot solve problems using the same kind of thinking we used when we created them*¹.

— *The intuitive mind is a sacred gift and the rational mind is a faithful servant. We have created a society that honors the servant and has forgotten the gift.*²

2) Carl Gustav Jung (1875–1961), Analytical Psychology:

— *Until the unconscious becomes conscious, it will guide your life and you will call it destiny*³.

¹ Costa, L. S. G. M. (2022). Applied transdisciplinarity through Plato's philosophy, Taoism, Alchemical tradition, and Jungian psychology. *Transdisciplinary Journal of Engineering & Science*, 13, p. 1-21 <https://www.atlas-tjes.org/index.php/tjes/article/view/261/214>

² Max-Neef, Manfred A. (2005). Foundations of transdisciplinarity. *Ecological Economics* 53 (2005) 5–16. Elsevier, p. 10. https://nova.org.za/assets/max_neef_2005_foundations_of_transdisciplinarity.pdf.

³ Costa, L. S. G. M., *op. cit.* (2022), p. 1-21.

— *Asking the right question is already half the solution to a problem*⁴.

3) Niels Bohr (1885–1962), Quantum Physics:

— *[...] dividing this reality into an objective and subjective side will not get us very far. [...] even when an individual tries to achieve the greatest degree of independence possible, he will still be influenced by existing spiritual structures – consciously or unconsciously.*⁵

4) Manfred Max-Neef (1932–2019), Economics and TD:

— *I was used to diagnosing and analyzing but not used to understanding [...] the idea [...] of demonstrating what economics looked like behind its mask of supposedly exact, mathematical, and judgment-free science*⁶.

5) Fritjof Capra (1939-), Modern Physics and Holistic Systems:

— *The physics of the 20th century has convincingly shown us that there is no absolute truth in science, that all concepts and theories are limited and approximate. The time has come for other sciences to broaden their underlying philosophies*⁷.

6) Basarab Nicolescu (1942-), Physics and TD:

— *Transdisciplinarity [...] is at the same time between the disciplines, across the different disciplines and beyond all disciplines*⁸.

7) Roberto Crema (1951 -), Anthropology, Psychology and Holistic TD:

— *Judgment is the failure of listening and understanding*⁹.

— *No one transforms anyone, and no one is self-transformed alone. We*

⁴ Ibid.

⁵ Popova, Maria (2018). Nobel-winning physicist Niels Bohr on subjective vs. objective reality and the uses of religion in a secular world. *The Marginalian*. Full text available at: <https://www.the-marginalian.org/2018/02/01/niels-bohr-science-religion/> [...] *splitting this reality into an objective and a subjective side won't get us very far. [...] even when an individual tries to attain the greatest possible degree of independence, he will still be swayed by the existing spiritual structures – consciously or unconsciously.*

⁶ Max-Neef, Manfred; Smith, Philip B. (2014). *La economía desenmascarada*. Icaria editorial, 1 ed., 2014. Free translation from Spanish to English of part of p. 13: *Todo mi discurso como académico económico convencional era completamente inadecuado para que pudiese decir algo significativo. Estaba acostumbrado a diagnosticar y analizar, pero no estaba acostumbrado a comprender.* <https://www.traficantes.net/sites/default/files/pdfs/9788498885576.pdf>.

⁷ Capra, Fritjof (1982). *The turning point: science, society, and the rising culture*. Bantam Books, p. 57, [http://pustaka.unp.ac.id/file/abstrak_kki/EBOOKS/CAPRA%20Fritjof_Capra-The_Turning_Point_Science,_Society,_and_the_Rising_Culture_-Bantam\(1988\).pdf](http://pustaka.unp.ac.id/file/abstrak_kki/EBOOKS/CAPRA%20Fritjof_Capra-The_Turning_Point_Science,_Society,_and_the_Rising_Culture_-Bantam(1988).pdf).

⁸ Nicolescu, Basarab (2005). Transdisciplinarity, past, present and future. Conference paper presented at the *II World Congress of Transdisciplinarity*, September 6 to 12, 2005, Vila Velha/Vitória – SC – Brazil. Available at: <https://www.tercercongresomundialtransdisciplina.riedad.mx/wp-content/uploads/2019/08/Transdisciplinarity-past-present-and-future.pdf>.

⁹ Crema, Roberto (2010). Conference paper in Portuguese: Understanding: convergence between knowledge and being. *Conferência Internacional Os Sete Conhecimentos para a Educação de Hoje*, de Edgar Morin. Fortaleza, Brasil, de 21 a 24 de setembro de 2010 (UNESCO, UEC, UCB). Available in Portuguese at: <https://robertocrema.com.br/compreensao-convergencia-entre-o-saber-e-o-ser/>.

*transform ourselves in the Encounter.*¹⁰

Finally, the objective of this article is to provoke a comprehensive discussion on the creation of a TD chair in universities, including courses of short duration for public and private organizations, envisaging an effective and dialectical problem solving for issues involving the complexity of human phenomena, when the mechanistic and the systemic-biological-environmental approach are not enough. In other words: When the binary and feedback types of logic are not sufficient to deal with the concrete problem to be solved. For that purpose, this text is divided in the following sections:

1. Introduction.
 2. TD Background and References
 3. TD Concepts through the HPTD-M
 4. Cultural Transformation and Paradigm Shift
 5. The HPTD-M Types of Logic and Mythology in Dialogue with Logic.
 6. The HPTD-M Analytical and Synthetic Models: Quaternary Complementarities for a TD Chair.
 7. Proposal for a TD Chair and Conclusions.
- Appendix 1: Questions for the Panel - March 2024 21–22 TD Chair Symposium.

Appendix 2: Background of TD Courses in Brazil Aiming at the International TD Chair.

Nowadays there are some formal approaches of TD worldwide. The Romanian Nicolescu is the most well known through the French NGO CIRET, an international organization for TD studies established in 1987. The holistic TD from Brazilian UNIPAZ, the ‘The University of Peace’, a private foundation also established in 1987, is a complementary view, besides ARKOS education institutions in Mexico, the scientific TD approach of the so-called Zurich approach, and HPTD-M as the integration of Brazilian TD with other approaches.

Dr. Sue L. T. McGregor, a senior member of CIRET from Canada, shared with this author her presentation slides of **Three Leading Approaches to Transdisciplinarity** (*The Future Is Not What It Used to Be: Thinking Differently Through Transdisciplinarity, Team Science, and Socio-Technical Controversies*. Cleveland State University: March 30, 2023, 11:00 –1:00 p.m. EST):

- **Nicolescu (new methodology).**
- **Zurich (science still reigns).**
- **HPTD-M (applied knowledge).**

To complete Dr. McGregor’s view, in our opinion as the creator of HPTD-M, it comes from the TD theory + engineering & management praxis,

¹⁰ Crema, Roberto (2017). *O poder do encontro: origem do cuidado [the power of encounter: origin of care]*. São Paulo: Tumiak Produções; Instituto Arapoty; UNIPAZ. Crema invited this author to the book release by e-mail on 28.02.2017, also mentioning in Portuguese: *Sempre afirmo que ninguém transforma ninguém e ninguém se transforma sozinho; nós nos transformamos no Encontro.* (free-translated into English).

based on 35 years of professional experience in Brazil, involving background in urban development, international trading, business, public finance, and public management, i.e. TD activities by nature.

In this framework coming from concrete TD experiences complemented by theoretical studies, this author understands the necessity of developing a TD chair to provoke a cultural transformation, a paradigm shift from a dominant scientist and dogmatic view focused on binary logic to a transdisciplinary approach focused on the dialogue between culture and technoscience for concrete problem solving in the complex issues of our civil society.

2. TD Background and References

This text involves not only research and TD theory, i.e. references directly or indirectly connected to TD in literature. **The HPTD-M promotes a TD dialogue between theory and praxis, considering this author's following background** in engineering, entrepreneurship, urban development, international trading, public finance, and public management:

1) More than 30-year professional experience connected and correlated to TD:

— **Engineering and Entrepreneurship – an urban development planning and execution in Brazil.** Besides this author's 16-year experience in international trading, there was a parallel activity with engineering: a Brazilian project that created the district *Vivendas Santa Mônica*, starting from a 170-hectare rural area to a cottage district of 1,100 lots, an economical-financial viability study, business plan, environmental impacts report, law assistance, project approval by the authorities, construction and selling agreements (from 1996 to 2002). This means a TD project, involving planning and execution, considering the various disciplines involved. This author was a business partner in the enterprise and also participated in the technical engineering solutions¹¹.

— **Public Finance – Brazilian federal funds.** A TD diagnosis and a proposal for a taxonomy of the Brazilian public and private funds as a way of administering public resources, in view of the financial law bill to replace the Federal Law 4,320/1964¹².

¹¹ Costa, L.S.G.M.C. (1996). *Vivendas Santa Mônica Project: Urban development applied project* which was part of the author's post-graduation degree in engineering economics at the 48th Class of Fundação Dom Cabral (FDC), 1996. <http://dx.doi.org/10.13140/RG.2.2.21666.71368>.

¹² Costa, L.S.G.M.C. (2011). *Fundos Federais: um diagnóstico* [Federal funds: A diagnosis: Monograph]. Honorable mention at a monograph contest from the Brazilian Federal Government: *IV Concurso de monografias da SOF (Secretaria de Orçamento Federal) com ESAF (Escola Nacional de Administração Fazendária)*. <https://repositorio.enap.gov.br/handle/1/4690>; Costa, L. S. G. M. C. (2012). *Uma visão sistêmica dos fundos federais* [A systemic vision of Brazilian federal funds]. *Série de textos para discussão do Tesouro TD n. 7/2012*. <https://repositorio.enap.gov.br/handle/1/4268>; Costa, L.S.G.M.C. (2017). *Fundos federais: Abordagem transdisciplinária*

— **Public Management – Quality of Public Expenditure.** A TD approach for the Brazilian federal administration, especially considering the complementarity (trade-off) corruption vs. mismanagement, besides its effects on the behavior of the good-will managers, through the equation model $0.17 \times + 0.83 y$, where $x > 0$ and $y < 0$; x is the positive effect in % of the bureaucratic combat to corruption and y is the negative effect (mismanagement) in % on the good-will managers¹³.

— **HPTD-M Theory and Praxis (e.g. Public Administration Disciplines).** The quaternary-complementarities framework of analytic and synthetic models for problem solving in the HPTD-M, including a model for mapping TD leadership through governance vs. governability, besides creating a definition of Public Administration Disciplines in a TD level, considering the interdisciplinarity of two by two and the TD as the mediating management in the center of the interaction of those four, i.e.:

- Politics – not to be confused with ideological partisanship.
- Technoscience – including economics and administration.
- Bureaucracy – law and legislation.
- Humanities – including psychology¹⁴.

2) TD publications throughout the USA, France, Canada, South Africa, and Brazil, in English and Portuguese, related to the framework of what would be the HPTD-M theory after April/2022. One book¹⁵, two monographs¹⁶,

diante do Projeto da Lei de Finanças Públicas [Federal funds: Transdisciplinary approach considering the Brazilian federal public finance bill]. *Série de textos para discussão do Tesouro TD n. 29/2017*. <https://repositorio.ena.gov.br/handle/1/4541>.

¹³ Costa, L. S. G. M. (2021). Qualidade do gasto público em abordagem transdisciplinar: levantamento com gestores, acadêmicos e controladores em 2020 e 2021 [Quality of public spending in a transdisciplinary approach: survey with managers, academics and controllers in 2020 and 2021: Monograph]. *ResearchGate*, 104 p. <http://dx.doi.org/10.13140/RG.2.2.19988.99201>; Costa, L. S. G. M. (2020). *Gasto público: Uma Perspectiva ampliada [Public expenditure: An amplified perspective]*. Clube de Autores. <https://www.amazon.com.br/Gasto-P%C3%BAblico-Leonardo-Martins-Costa-ebook/dp/B08H78N84H>; Costa, L. S. G. M. (2020). Presentation at the 29th GIRC Network Panel promoted by the Brazilian Ministry of Economy and the Comptroller General of the Union (CGU) on the theme of public spending: the bias of corrupt centrism and the search for efficiency. Abstract in English and slides presentation in Portuguese available at: <http://dx.doi.org/10.13140/RG.2.2.28140.03206>.

¹⁴ Costa, L.S.G.M. (2023). The Mediating Manager for Effective Troubleshooting in Organizations: A Transdisciplinary View from HPTD-M. *Transdisciplinary Journal of Engineering & Science*, 14. <https://doi.org/10.22545/2023/00228>.

¹⁵ Costa, L. S. G. M. (2020). *Public spending: an amplified perspective [Gasto público: uma perspectiva ampliada]*. Clube de Autores, 229 p. 1st Edition in Portuguese. <https://clubedeautores.com.br/livro/gasto-publico>.

¹⁶ Costa, L.S.G.M.C. (2011). Fundos Federais: um diagnóstico [Federal funds: A diagnosis: Monograph]. Honorable mention at a monograph contest from the Brazilian Federal Government: *IV Concurso de monografias da SOF (Secretaria de Orçamento Federal) com ESAF (Escola Nacional de Administração Fazendária)*. <https://repositorio.ena.gov.br/handle/1/4690>; Costa, L. S. G. M. (2021). Qualidade do gasto público em abordagem transdisciplinar: levantamento com

and three articles¹⁷ published in Portuguese (Brazil). Besides, nine articles published in English: the USA¹⁸, Canada¹⁹, France²⁰, and South Africa²¹.

3) 14-hour successful TD pilot course in 2023: The course was given in March/2023 for Brazilian public managers at the federal, state, and municipal levels²², which received very good feedback from 14 participants who evaluated

gestores, acadêmicos e controladores em 2020 e 2021 [Quality of public spending in a transdisciplinary approach: survey with managers, academics and controllers in 2020 and 2021: Monograph]. *ResearchGate*, 104 p. <http://dx.doi.org/10.13140/RG.2.2.19988.99201>.

¹⁷ Costa, L. S. G. M. (2023). Skills of the transdisciplinary mediator [Habilidades do mediador transdisciplinar]. *Centro de Educação Transdisciplinar (CETRANS)*. Parte do Boletim CETRANS INTER@TIVO 56, Ano XIV, Outono 2023. Abstract in English and article in Portuguese: <http://dx.doi.org/10.13140/RG.2.2.20330.29124>; Costa, L. S. G. M. C. (2012). Uma visão sistêmica dos fundos federais [A systemic vision of Brazilian federal funds]. *Série de textos para discussão do Tesouro TD n. 7/2012*. <https://repositorio.enap.gov.br/handle/1/4268>; Costa, L.S.G.M.C. (2017). Fundos federais: Abordagem transdisciplinária diante do Projeto da Lei de Finanças Públicas [Federal funds: Transdisciplinary approach considering the Brazilian federal public finance bill]. *Série de textos para discussão do Tesouro TD n. 29/2017*. <https://repositorio.enap.gov.br/handle/1/4541>.

¹⁸ Costa, L. S. G. M. (2022). Applied transdisciplinarity through Plato's philosophy, Taoism, Alchemical tradition, and Jungian psychology. *Transdisciplinary Journal of Engineering & Science*, 13. <https://www.atlas-tjes.org/index.php/tjes/article/view/261/214>; Costa, L. S. G. M. (2022). HPTD-M: The Holopraxis Transdisciplinary Management Theory. Communication and Mindsets as the main applied example. *Transdisciplinary Journal of Engineering & Science*, 13. <http://atlas-tjes.org/index.php/tjes/article/view/272/229>; Costa, L. S. G. M. (2022). HPTD-M for Public Management Sustainability: A Proposal for Brazil. *Transdisciplinary Journal of Engineering & Science*, SP-3. Special Issue on Complex Resilience and Sustainability. Transdisciplinary Perspectives, edited by G. del Cerro Santamaria. <https://www.atlas-tjes.org/index.php/tjes/article/view/347/272>; Costa, L.S.G.M. (2023). A stress tests for the HPTD-M transdisciplinarity through Alchemical Psychology. *Transdisciplinary Journal of Engineering & Science*, 14. <http://dx.doi.org/10.22545/2023/00222>; Costa, L.S.G.M. (2023). The Mediating Manager for Effective Troubleshooting in Organizations: A Transdisciplinary View from HPTD-M. *Transdisciplinary Journal of Engineering & Science*, 14. <https://doi.org/10.22545/2023/00228>; Costa, L.S.G.M. (2024). Artificial Intelligence and the Transdisciplinary Human Mediation of HPTD-M. *Transdisciplinary Journal of Engineering & Science*, 15. <https://doi.org/10.22545/2024/00243>.

¹⁹ Costa, L.S.G.M. (2022). Effectiveness and styles of leadership in Public Management: Quality in the context of transdisciplinary HPTD-M Theory. *Integral Leadership Review*, vol. 22, no. 1 Dec. 2022. <https://ilr.scholasticahq.com/article/57734-effectiveness-and-styles-of-leadership-in-public-management-quality-in-the-context-of-transdisciplinary-hptd-m-theory>.

²⁰ Costa, L. S. G. M. (2022). HPTD-M: A transdisciplinary integration of three paradigms – Mechanistic, Systemic, and Synchronistic. *Transdisciplinary Journal of Human Plasticity (PLASTIR)* 65, June/2022 (Quarterly Journal, bilingual/ISSN n° 2105–2794). <http://www.plasticitiesciencesarts.org/PLASTIR/daCosta%20P65.pdf>.

²¹ Costa, L. S. G. M. (2021). Transdisciplinarity of Physics, Philosophy, Economics, Law, Psychology, and Politics applied to Public Administration. *African Journal of Governance and Public Leadership (AJoGPL)* ISSN: 2789-2298 Vol. 1. Issue 2. pp. 53–66, Dec 2021. <https://ajogpl.kab.ac.ug/index.php/1/article/view/28>.

²² Costa, L. S. G. M. (2023). The mediating manager. A course of transdisciplinary tools applied to organizations, based on the HPTD-M theory and the new conception of mediation and leadership. *Brazilian National School of Public Administration (ENAP)*. <https://suap.enap.gov.br/portal/doaluno/curso/2136/?area=16>. The ENAP certificate is in the following link, which also explains

the course through a process called in Portuguese ‘reaction evaluation’. The average age of the participants was 44 and the evaluation average was 8.6 in 10, which was considered a very good grade for a pilot course.

4) International TD activities:

— Independent transdisciplinary theorist and practitioner (HPTD-M): publications in five countries.

— Since December 2023 member of CIRET, *Centre International de Recherches et Études Transdisciplinaires*, a French NGO in Paris, founded in 1987, promoter of international transdisciplinary research and studies. Site: <ciret.hypotheses.org>.

— Idealization and co-organization, as speaker and author, of the following international transdisciplinary symposiums:

- In June/2023, *The Transdisciplinary Mediator for Effective Problem Solving in Organizations and Civil Society*, promoted by CIRET²³.

- In November/2023, *Artificial Intelligence and Human Mediation*, promoted by CIRET Also, guest co-editor of the event book, released in February/2024 by ATLAS Publishing in the United States, through the same title *Artificial Intelligence and Human Mediation*²⁴. The ATLAS, *Academy of Transdisciplinary Learning & Advanced Studies*, founded in 2000, is a non-profit organization by the US Federal Government, providing services to students around the world: i) TD education and research; ii) support social, environmental, economic, and ethical sustainable development throughout the world; and iii) to promote global information exchange through innovative publishing. Site: <theatlas.org>.

- *For an International Transdisciplinary Chair*, promoted by CIRET in March 21–22/2024. See in Appendix 1 the questions presented in the Panel and this author’s answers to them.

5) International TD references with which HPTD-M dialogues: During the experience in public service, the HPTD-M theory emerged gradually, since 2012, also considering the following references (see **Table 1**).

the course main topics through translation from Portuguese to English, so that English-speaking researchers may understand the content: <http://dx.doi.org/10.13140/RG.2.2.28025.54884>.

²³ Costa, L.S.G.M.; Loisel, M. T. (2023). International Presentation: The Transdisciplinary Mediator for Effective Problem Solving in Organizations and Civil Society (in English and Portuguese), coordinated by Dr. Mariana Thieriot Loisel. *CIRET and CETTRANS*. Slides are available at: <http://dx.doi.org/10.13140/RG.2.2.20460.54401/1>. Video of the presentation available at: <https://www.youtube.com/watch?v=pSnHVXUEGSg>

²⁴ Costa, L.S.G.M., Loisel, M. T., Landier, H. et al. (2024). *Artificial Intelligence and Human Mediation* (Editors and co-authors among 12 authors: Leonardo da Silva Guimarães Martins da Costa & Mariana Thieriot Loisel). Postface and Appendix by Hubert Landier. ATLAS Publishing. ISBN: 978-0-9998733-8-0 (PDF). Full text available at https://theatlas.org/index.php/td-teaching-materials/td-books_

Table 1: Applied TD Main References for Each Background Discipline and Publication's Last Year – HPTD-M Design

Item	Type / Discipline	Author	Country	TD Main View
1	Holistic Systems: Modern Physics	Capra ²⁵	Netherlands	Systemic paradigm: not yet TD
2	TD Methodology: Physics	Nicolescu ²⁶	Romania	Included Third Logic
3	Holistic TD: Psychology & Math	Weil, Crema, & D'Ambrosio ²⁷	Brazil & France	Four Epistemic Ways
4	HPTD-M:	Costa ²⁸	Brazil	Holopraxis TD Management

²⁵ Capra, Fritjof (1982). *The turning point: science, society, and the rising culture*. Bantam Books. [http://pustaka.unp.ac.id/file/abstrak_kki/EBOOKS/CAPRA%20Fritjof_Capra-The_Turning_Point_Science,_Society,_and_the_Rising_Culture_-_Bantam\(1988\).pdf](http://pustaka.unp.ac.id/file/abstrak_kki/EBOOKS/CAPRA%20Fritjof_Capra-The_Turning_Point_Science,_Society,_and_the_Rising_Culture_-_Bantam(1988).pdf); Capra, Fritjof (1989). The Emerging New Culture: 27-minute interview in the *New Thinking Allowed* show with Jeffrey Mishlove. <https://youtu.be/e-UQ1QqcTYs>; Capra, Fritjof (1996). The Web of Life: 12-minute interview for the *Thinking Allowed* show with Jeffrey Mishlove. http://www.youtube.com/watch?v=TLiRXM2oZ_U&list=PL943946701C4718FB.

²⁶ Nicolescu, Basarab (2005). Transdisciplinarity, past, present and future. Conference paper presented at the *II World Congress of Transdisciplinarity*, September 6 to 12, 2005, Vila Velha/Vitória – SC – Brazil. Available at: <https://www.tercercongresomundialtransdisciplina.riedad.mx/wp-content/uploads/2019/08/Transdisciplinarity-past-present-and-future.pdf>; Basarab Nicolescu (2010). Methodology of Transdisciplinarity – levels of reality, the logic of the included middle, and complexity. *Transdisciplinary Journal of Engineering & Science*, 1. <https://www.atlas-tjes.org/index.php/tjes/article/view/9>; Nicolescu, Basarab (2012). Transdisciplinarity: the hidden third, between the subject and the object. *Human and Social Studies*, Vol. 1, No. 1 (2012), p. 24. Available at: http://www.basarab-nicolescu.ciret-transdisciplinarity.org/Docs_articles/ClujHiddenThird052009Proceedings.pdf.

²⁷ Crema, Roberto (2010). Conference paper in Portuguese: Understanding: convergence between knowledge and being. *Conferência Internacional Os Sete Conhecimentos para a Educação de Hoje*, de Edgar Morin. Fortaleza, Brasil, de 21 a 24 de setembro de 2010 (UNESCO, UEC, UCB). Available in Portuguese at: <https://robertocrema.com.br/compreensao-convergencia-entre-o-saber-e-o-ser/>; Crema, Roberto (2017). *O poder do encontro: origem do cuidado [the power of encounter: origin of care]*. São Paulo: Tumiak Produções; Instituto Arapoty; UNIPAZ. Crema invited this author to the book release by e-mail on 28.02.2017, also mentioning in Portuguese: *Sempre afirmo que ninguém transforma ninguém e ninguém se transforma sozinho; nós nos transformamos no Encontro* (free-translated into English); Weil, Pierre; Crema, Roberto; D'Ambrosio, Ubiratan (1993). *Toward the new transdisciplinarity: open systems of knowledge [Rumo à nova transdisciplinaridade: sistemas abertos de conhecimento]*. Summus Editorial. Edition in Portuguese. Weil, Pierre (2000). *A mudança do sentido e o sentido da mudança [The change of meaning and the meaning of change]*. Rosa dos Tempos. Edition in Portuguese.

²⁸ Costa, L. S. G. M. (2022). HPTD-M: The Holopraxis Transdisciplinary Management Theory. Communication and Mindsets as the main applied example. *Transdisciplinary Journal of Engineering & Science*, 13. <http://atlas-tjes.org/index.php/tjes/article/view/272/229>; Costa, L.S.G.M. (2023). A stress tests for the HPTD-M transdisciplinarity through Alchemical Psychology. *Transdisciplinary Journal of Engineering & Science*, 14. <http://dx.doi.org/10.22545/2023/00222>; Costa, L.S.G.M. (2023). The Mediating Manager for Effective Troubleshooting in Organizations: A Transdisciplinary View from HPTD-M. *Transdisciplinary Journal of Engineering & Science*, 14. <https://doi.org/10.22545/2023/00228>; Costa, L. S. G. M. (2022). HPTD-M: A transdisciplinary integration of three paradigms – Mechanistic, Systemic, and Synchronistic. *Transdisciplinary Journal of Human Plasticity (PLASTIR)* 65, June/2022 (Quarterly Journal, bilingual/ISSN n° 2105–2794). [http://www.plasticities-sciences-arts.org/PLASTIR/daCos ta%20P65.pdf](http://www.plasticities-sciences-arts.org/PLASTIR/daCos%20ta%20P65.pdf).

	Eng. & Management			
5	TD in Economics	Max-Neef ²⁹	Chile	Understanding vs. Knowing
6	TD in Psychology	Crema ³⁰	Brazil	Understanding vs. Knowing
7	TD in Law	Wiviurka ³¹	Brazil	'Transdisciplinarization' of Law
8	TD in Intl. Law	Popa Tache & Sararu ³²	Romania	New TD Directions in Intl. Law
9	TD in Politics	Viparelli ³³	Italy	Transpolitics
10	TD in Public Adm.	Uwizeyimana ³⁴	South Africa	Disciplines in Public Adm.
11	TD in Public Adm.	Nita ³⁵	Romania	New Type of Education
12	TD in Human Mediation	Costa, Landier & Thieriot ³⁶	Brazil & France	AI & Human Mediation
13	TD in Education & Philosophy	Thieriot & D'Ambrosio ³⁷	Brazil	Philosophy & Technoscience

²⁹ Max-Neef, Manfred A. (2005). Foundations of transdisciplinarity. *Ecological Economics* 53 (2005) 5–16. Elsevier, p. 10. https://nova.org.za/assets/max_neef_2005_foundations_of_transdisciplinarity.pdf; Max-Neef, Manfred; Smith, Philip B. (2014). *La economia desenmascarada*. Icaria editorial, 1 ed., 2014. Free translation from Spanish to English of part of p. 13: *Todo mi discurso como académico económico convencional era completamente inadecuado para que pudiese decir algo significativo. Estaba acostumbrado a diagnosticar y analizar, pero no estaba acostumbrado a comprender*. <https://www.traficantes.net/sites/default/files/pdfs/9788498885576.pdf>.

³⁰ Crema, Roberto (2010). Conference paper in Portuguese: Understanding: convergence between knowledge and being. *Conferência Internacional Os Sete Conhecimentos para a Educação de Hoje*, de Edgar Morin. Fortaleza, Brasil, de 21 a 24 de setembro de 2010 (UNESCO, UEC, UCB). Available in Portuguese at: <https://robertocrema.com.br/compreensao-convergencia-entre-o-saber-e-o-ser/>; Crema, Roberto (2017). *O poder do encontro: origem do cuidado [the power of encounter: origin of care]*. São Paulo: Tumiak Produções; Instituto Arapoty; UNIPAZ. Crema invited this author to the book release by e-mail on 28.02.2017, also mentioning in Portuguese: *Sempre afirmo que ninguém transforma ninguém e ninguém se transforma sozinho; nós nos transformamos no Encontro*. (free-translated into English).

³¹ Wiviurka, Eduardo Seino (2010). The transdisciplinarization of Law [A transdisciplinarização do Direito]. *XIX Encontro Nacional Conpedi realizado em Fortaleza, Brasil*, nos dias 09, 10, 11 e 12 de junho. <http://www.publicadireito.com.br/conpedi/manaus/arquivos/anais/fortaleza/3278.pdf>.

³² Popa Tache, C. E. & Sararu, C.-S. (2023). New Transdisciplinary Directions in International Law? *Lex Humana (ISSN 2175-0947)*, 15(4), 86–109. Retrieved from <https://seer.ucp.br/seer/index.php/LexHumana/article/view/2705>.

³³ Viparelli, Irene (2019). Transdisciplinarity and politics. A possible encounter? [Transdisciplinaridade e política. Um encontro possível?]. *Perspectivas – Journal of Political Science*, vol. 21. 2019. <https://www.perspectivasjournal.com/index.php/perspectivas/article/view/2507>.

³⁴ Uwizeyimana, D. E. & Basheka, B. C. (2017). The multidisciplinary, interdisciplinary, and transdisciplinary nature of public administration. *African Journal of Public Affairs*, Vol. 9, No. 9 December 2017. <https://journals.co.za/doi/pdf/10.10520/EJC-c13a0c9c0>.

³⁵ Nita, Mircea Aurel (2013). Types of truth, transdisciplinarity and a new type of education in public administration. *Curentul Juridic*, 16, pp. 157–170. Available at: http://revcurentjur.ro/old/arhiva/attachments_201304/recjurid134_17F.pdf.

³⁶ Costa, L.S.G.M., Loisel, M. T., Landier, H. et al. (2024). *Artificial Intelligence and Human Mediation* (Editors and co-authors among 12 authors: Leonardo da Silva Guimarães Martins da Costa & Mariana Thieriot Loisel). Postface and Appendix by Hubert Landier. ATLAS Publishing. ISBN: 978-0-9998733-8-0 (PDF). Full text available at <https://theatlas.org/index.php/td-teaching-materials/td-books>.

³⁷ Loisel, Mariana Thieriot (2024) *Les mutations humaines: dialogue entre la philosophie et les technosciences*. Editions Amalthée. <https://www.plasticites-sciences-arts.org/editions-plasticites/>; Thieriot Loisel, M. & D'Ambrosio, U. (2006) TD Chair ministered in the São Bento Monastery Faculty of Philosophy, São Paulo, Brazil, from 2005 to 2006.

14	TD in Education & Spirituality	Pasquier ³⁸	France	Education & Spirituality
15	TD Academic	McGregor ³⁹	Canada	TD trends and Transpraxis

3. TD Concepts through the HPTD-M

As HPTD-M understands, there are six essential aspects for the TD Chair:

1) Disciplinarity: disciplines studied separately by specialists (isolated disciplines).

2) Multidisciplinarity: specialists in a meeting, working group, or research, with no interaction between disciplines (multi = several).

3) Interdisciplinarity: interaction and interchange among or between disciplines in a meeting, working group, or research, which may even create new disciplines (inter = among or between).

4) TD: the unity of understanding beyond the disciplines (trans = beyond + through), complementary and synergic interactions between specialists and generalists through various ways.

5) Complementarities, such as between disciplinarity and TD, i.e. one-discipline specialists in dialogue with generalists who work with many specialists to promote the comprehensive and holistic TD view. The holistic view, in turn, is made of the *holological* and *holopractical* complementarity ('holos' comes from the Greek and means 'whole'). Complementarity, as a principle, involves the logic of the Included Third. Modern physics rediscovered at the beginning of the 20th century this simple principle. De Broglie demonstrated the wave-particle duality and Einstein the convertibility between mass and energy ($E=mc^2$). All of this was intuitively already known by the Alchemical Tradition, as seen in the Ouroboros symbol and the Taoist Philosophy, through the circular Tai Chi symbol of Ying-Yang. The Tao means the way, i.e. the true way is not the true way (like in a Zen koan to provoke meditation through paradoxes). So, complementarity can be seen clearly through technoscience, philosophy, tradition, and art to demonstrate that binary logic can be applied only to certain contexts in practical terms. Complementarity also involves the balance of opposites.

³⁸ Pasquier, F. (2022). From Spirituality to Technontology in Education. *Journal of Systemics, Cybernetics and Informatics*, 20(6), 49–52. <https://doi.org/10.54808/JSCI.20.06.49>

³⁹ McGregor, S. L. T. (2023). Transdisciplinarity and public policy. *Transdisciplinary Journal of Engineering & Science*, 14. https://doi.org/10.22545/2023/00219_McGregor; McGregor, S. L. T. (2020). Transdisciplinarity and Transpraxis. *Transdisciplinary Journal of Engineering & Science*, 11. <https://doi.org/10.22545/2020/00134>; McGregor, S. L. T. (2023). Shifting paradigms: Bringing transdisciplinarity into the light. *Transdisciplinary Journal of Engineering & Science*, 14. <https://doi.org/10.22545/2023/00235>; McGregor, S. L. T. (2024). Russian school of transdisciplinarity as a metadiscipline. *Universum: Social Sciences*, 3 (106), 53–65. <https://universum.com/ru/social/archive/item/17087>.

6) Quaternary Complementarities, as seen in the HPTD-M through archetypal relations for effective and dialectical organizational problem solving. Roughly, this principle can be seen by the complementarity between soft skills (human abilities) and hard skills (technical abilities), considering the quaternary types of intelligence, i.e. empirical, emotional, rational, and intuitive. This means soft skills are emotional and intuitive, and hard skills are empirical and rational. In Analytical Psychology, the four HPTD-M types of intelligence can be seen through the four Jungian functions, respectively: sensation, feeling, thinking, and intuition. In Physics, quaternary complementarities can be shown through the four states of matter (solid, liquid, gas, and plasma), besides the astronomical cycle of solstices and equinoxes, which marks the changing of seasons, involving Earth's orbit around the Sun, i.e. two solstices (summer and winter) and two equinoxes (spring and autumn) occurring each year. Those also involve archetypal symbols, not only physical concepts. The symbolic and mythological counterpart can be understood through cultural traditions, e.g. the Christian cross (four vertices interacting through horizontal and vertical axis), the Celtic cross (with a circle in the center), and the swastika (an ancient symbol that reflects the quaternary cycle, present in many ancient cultures).

Some of the HPTD-M perspectives were influenced by **Nicolescu's** TD methodology, for which there is a fertile complementarity between disciplinarity and TD, comprising the logic of Included Third and the idea of Hidden Third [9]. Others come from Weil, D'Ambrosio, and Crema⁴⁰, especially the concept of holistic view and four epistemic ways, besides Capra's holistic systems⁴¹.

There is a connection to the HPTD-M view of the **complementarity principle** as a balance of opposites, since the Niculescu's Included Third element of harmonization may also emerge in **Plato's dialectics** (427 - 347 BC), as the fourth level of knowledge in Plato's Divided Lines, another HPTD-M reference. This view differs from the logic of Aristotle (384 - 322 BC), which separates the opposites, comprising the linear logic, which is still our Western society's dominant view, the causality paradigm⁴².

Therefore, the HPTD-M understands that TD is a new cultural, philosophical, technoscientific, and creative approach that goes beyond and through disciplines (TRANS), in search of UNDERSTANDING reality to solve problems, more than simply KNOWING rationally. Here are two authors who corrob-

⁴⁰ Weil, Pierre; Crema, Roberto; D'Ambrosio, Ubiratan (1993). *Toward the new transdisciplinarity: open systems of knowledge [Rumo à nova transdisciplinaridade: sistemas abertos de conhecimento]*. Summus Editorial. Edition in Portuguese.

⁴¹ Capra, Fritjof (1982). *The turning point: science, society, and the rising culture*. Bantam Books. [http://pustaka.unp.ac.id/file/abstrak_kki/EBOOKS/CAPRA%20Fritjof_Capra-The_Turning_Point_Science_Society_and_the_Rising_Culture__Bantam_\(1988\).pdf](http://pustaka.unp.ac.id/file/abstrak_kki/EBOOKS/CAPRA%20Fritjof_Capra-The_Turning_Point_Science_Society_and_the_Rising_Culture__Bantam_(1988).pdf).

⁴² Costa, L. S. G. M. (2022). HPTD-M: The Holopraxis Transdisciplinary Management Theory. Communication and Mindsets as the main applied example. *Transdisciplinary Journal of Engineering & Science*, 13. <http://atlas-tjes.org/index.php/tjes/article/view/272/229>.

orate this vision, as per the difference between UNDERSTANDING and KNOWING:

— **Max-Neef:** economist and academic, Alternative Nobel for his *Barefoot Economics* theory. As per Max-Neef, formal knowledge, linked to reason, is constructed according to the rules of method and causality, while understanding, more linked to intuition, regulates method and causality: *Einstein [...] declared that 'the intuitive mind is a sacred gift, and the rational mind is a faithful servant. We have created a society in which we honor the servant and have forgotten the gift.'*⁴³

— **Crema:** anthropologist, psychologist, therapist, and TD theorist, creator of the 5th Force in Therapy. In the scholar's view (free translated from Portuguese): *There is the hypertrophy of information and knowledge, of broad, unrestricted, and immediate access, concomitant to the atrophy of the process of discernment and understanding. [...] There is a mega-factor impeding understanding, which consists in what Pierre Weil, Jean-Yves Leloup, and this author have called normosis, a pathology of normality. Pierre Weil conceptualizes normosis as abnormalities of normality conformed by norms, concepts, values, stereotypes, habits of thinking and acting, which are approved by consensus or by the majority in a given society and which cause suffering, illness, and death*⁴⁴.

In this connection of Holistic TD, Weil, D'Ambrosio, and Crema are not physicists like Nicolescu, but psychologists (Weil and Crema) and math professor (D'Ambrosio). So, their perspective is complementary to Nicolescu's TD framework when showing two new ideas for the TD theory⁴⁵;

— **Holistic view** as the complementarity between the hology (study of the whole) and holopraxis (the praxis of the whole). However, a similar view is presented Capra's holistic systems, developed from Modern physics⁴⁶.

— **The four main disciplines or epistemic ways** – the idea of four epistemic forms (disciplines) as science, philosophy, religion, and art, which HPTD-M adapted in 2022 aiming at a more concrete problem-solving approach, to technoscience, philosophy, tradition, and art.

⁴³ Max-Neef, Manfred A. (2005). Foundations of transdisciplinarity. *Ecological Economics* 53 (2005) 5–16. Elsevier, p. 10. https://nova.org.za/assets/max_neef_2005_foundations_of_transdisciplinarity.pdf.

⁴⁴ Crema, Roberto (2010). Conference paper in Portuguese: Understanding: convergence between knowledge and being. *Conferência Internacional Os Sete Conhecimentos para a Educação de Hoje*, de Edgar Morin. Fortaleza, Brasil, de 21 a 24 de setembro de 2010 (UNESCO, UEC, UCB). Available in Portuguese at: <https://robertocrema.com.br/compreensao-convergencia-entre-o-saber-e-o-ser/>.

⁴⁵ Weil, Pierre; Crema, Roberto; D'Ambrosio, Ubiratan (1993). *Toward the new transdisciplinarity: open systems of knowledge [Rumo à nova transdisciplinaridade: sistemas abertos de conhecimento]*. Summus Editorial. Edition in Portuguese. <https://www.amazon.com.br/Rumo-Nova-Transdisciplinaridade-Pierre-Weil/dp/8532304427>.

⁴⁶ Capra, Fritjof (1982). *The turning point: science, society, and the rising culture*. Bantam Books. [http://pustaka.unp.ac.id/file/abstrak_kki/EBOOKS/CAPRA%20Fritjof_Capra-The_Turning_Point_Science,_Society,_and_the_Rising_Culture_-_Bantam_\(1988\).pdf](http://pustaka.unp.ac.id/file/abstrak_kki/EBOOKS/CAPRA%20Fritjof_Capra-The_Turning_Point_Science,_Society,_and_the_Rising_Culture_-_Bantam_(1988).pdf).

The French Weil was a Ph.D. in psychology and university professor in Brazil, a prolific writer, also a human resources consultant for Brazilian banks. D'Ambrosio, in turn, was a Ph.D. in math, a university professor in Brazil, and one of the 1986 UNESCO Venice Charter signatories. Both deceased. Crema, in turn, is an ex-psychoanalytical therapist, the current dean of UNIPAZ in Brazil, a TD organization <unipazdf.org.br>.

Other sources that may establish a bridge for TD for applied disciplines:

- Corporate Feedback – Missel⁴⁷.
- Transpolitics (TD in politics) – Viparelli⁴⁸.
- Transdisciplinary Law (TD applied to Law) – Wiviurka⁴⁹.
- TD in International Law – Popa Tache & Sararu⁵⁰.
- Systemic Law – Brazilian Bar OAB⁵¹.
- ‘Hammer-Nail’ allegory – replicated by the website of a technology company⁵²: ‘There is an old saying: *If the only tool you have is a hammer, you will start treating all your problems like a nail.* Abraham Maslow modified it in 1966 to: *If all you have is a hammer, everything looks like a nail.*

As per Dr. Loisel TD view – free translated from Portuguese⁵³: *Competition and hierarchies among the various disciplines are fed, stimulating a hiatus between Human and Exact Sciences, with contempt for all knowledge that comes from tradition. (p. 9) A pathos emerges, a disease that corrodes the relations between the disciplines, as each one calls true to its territory, to its cage, resisting the fact that truth emanates from a whole superior to the parts. (pp 9–10) [...] when new meanings emerge, the relationship transgresses the position of the marked places, of the disciplinary cages, as Ubiratan D'Ambrosio would say, to occupy a new place, in which we are all learners. It is the moment when a single*

⁴⁷ Missel, Simoni (2016). *Corporate Feedback: How to know if it's going well [Feedback corporativo: como saber se está indo bem]*. São Paulo: Saraiva. Edition in Portuguese.

⁴⁸ Viparelli, Irene (2019). Transdisciplinarity and politics. A possible encounter? [Transdisciplinaridade e política. Um encontro possível?]. *Perspectivas – Journal of Political Science*, vol. 21. 2019. <https://www.perspectivasjournal.com/index.php/perspectivas/article/view/2507>.

⁴⁹ Wiviurka, Eduardo Seino (2010). The transdisciplinary Law [A transdisciplinarização do Direito]. *XIX Encontro Nacional Conpedi realizado em Fortaleza, Brasil*, nos dias 09, 10, 11 e 12 de junho. <http://www.publicadireito.com.br/conpedi/manaus/arquivos/anais/fortaleza/3278.pdf>

⁵⁰ Popa Tache, C. E. & Sararu, C.-S. (2023). New Transdisciplinary Directions in International Law? *Lex Humana (ISSN 2175-0947)*, 15(4), 86–109. Retrieved from <https://seer.ucp.br/seer/index.php/LexHumana/article/view/2705>.

⁵¹ Brazilian Bar – OAB (2020). Systemic Law Booklet [Cartilha de Direito Sistêmico]. *OAB Santa Catarina*. Booklet available in Portuguese at: <https://oabms.org.br/wp-content/uploads/2020/02/cartilha-ebook-1.pdf>. Release note of the booklet available in Portuguese at: <https://www.oab-sc.org.br/noticias/cartilha-comissao-direito-sistemico-ja-esta-disponivel-para-download/17300>.

⁵² Sorrells, Philip (2017). If your only tool is a hammer. *COMMSCOPE*. <https://www.commscope.com/blog/2015/if-your-only-tool-is-a-hammer/>.

⁵³ Loisel, Mariana Thieriot (2013). Perlaborar ou a consciência do não intencional: primeiros elementos para uma escuta transdisciplinar [Perlaboring or the awareness of the unintentional: first elements for a transdisciplinary listening]. *CETRANS – Centro de Educação Transdisciplinar*. <https://1drv.ms/b/s!AqLPNeNwvK2zgp5LSWsgdm2mCWxeMg>.

sunflower appears on the canvas and resists time, or when a new conceptualization shakes the established order. The itinerary that leads to discovery is not an exact path, which does not exclude the precision and rigor. The path is that of labour, not of building a bridge or adjusting a machine. (pp 12–13) It is the consciousness of the fact that will establish the relationship between knowledge and the meaning of human norms. (p. 15)

Considering two academic TD colleagues:

— Ph.D. Canadian public policy consultant and retired professor (e-mail to this author on April 16, 2023): *The KEY feature of transdisciplinarity is that it is BEYOND disciplines. It is disciplinary and sectoral. Trans means beyond to a new space. To count as TD, the work must include more than just academics.*

— Ph.D. American professor – The Pennsylvania State University (e-mail does this author on June 22, 2023): *The core impulse of TD is action, practical changes, enacted solutions – practitioners, change agents are doing TD without calling it that, because they are organizationally mandated and responsible for results. To me, practitioners are central to advancing TD (emphasis on ‘trans’) while academic TD (emphasis on Disciplines) is still struggling to disciplinary interspaces.*

By the 1994 Charter of the First World Congress on TD in Portugal⁵⁴, TD is complementary to the disciplinary approach, considering Article 3: *Transdisciplinarity complements disciplinary approaches. It occasions the emergence of new data and new interactions from out of the encounter between disciplines. It offers us a new vision of nature and reality. Transdisciplinarity does not strive for mastery of several disciplines but aims to open all disciplines to that which they share and to that which lies beyond them.*

Also, by the Charter, three topics interest HPTD-M:

— **Complexity:** Preamble, second paragraph: *Whereas only a form of intelligence capable of grasping the cosmic dimension of the present conflicts is able to confront the complexity of our world and the present challenge of the spiritual and material self-destruction of the human species;*

— **Levels of Reality governed by different logics** – Article 2: *The recognition of the existence of different levels of reality governed by different types of logic is inherent in the transdisciplinary attitude. Any attempt to reduce reality to a single level governed by a single form of logic does not lie within the scope of transdisciplinarity.*

— **Ethics** – Article 13: *The transdisciplinary ethic rejects any attitude that refuses dialog and discussion, regardless of whether the origin of this attitude is ideological, scientific, religious, economic, political or philosophical. Shared knowledge should lead to a shared understanding based on an absolute respect for the collective and individual Otherness united by our common life on*

⁵⁴ First World Congress on Transdisciplinarity (Convento da Arrábida, Portugal, November 2–7, 1994). Participants’ letter which contains a set of fundamental principles of the 2 community of transdisciplinary spirits. <https://ciret-transdisciplinarity.org/chart.php#en>.

one and the same Earth.

In this connection, HPTD-M considers the following basic concepts and principles:

— **Complexity:** The complexity of human phenomena needs to be treated in an adequate and non-reductionist way, by means of mechanistic, systemic, and TD paradigms, each one with its scope of action and level of adequacy according to the variables to be treated, without excluding beforehand, in a prejudiced way, any of these three ways of approaching reality.

— **Levels of Reality governed by different types of logic:** The Binary Logic must dialogue with the logic of the third party included (Included Third Logic), depending on the concrete case to be dealt with, whichever is simpler and more adequate for the approximation of reality. In this context emerges the quaternary-complementarities concept of the HPTD-M, the archetypal four elements interacting through complementarities. Those principles of earth, water, air, and fire can also be seen as levels of reality, not only symbolically, but in terms of consciousness functions, according to Analytical Psychology: sensation, feeling, thought, and intuition, as characterized in the MBTI⁵⁵, i.e. concrete, subjective, objective, and abstract levels. In this connection, MBTI is the *Myers-Briggs Type Indicator*, also known as the MBTI System, used for the classification of psychological types, based on the Jungian typology, however with sixteen types instead of eight in the Jungian perspective.

— **Ethics in the HPTD-M view.** The four epistemic paths need dialogue: technoscience, philosophy, tradition, and art. As a heritage of the Modern Age and the Enlightenment, the lack of dialogue in our Western rationalist culture tends to cause **dogmatic scientism feedbacked by partisanship**, which tends to undermine technoscience, as if only science matters and there is no possibility of technologies or techniques not originated or explained by science. Cultural traditions go in this direction of dogmatism and partisanship as if there could be no diversity of views of reality, only the ‘true’ one, considering the others as ‘false’ by the ideology corroborated by the ‘science’ of the moment. In other words, science can be approached ideologically, when scientific results are used selectively to substantiate or justify a particular ideology or belief system, ignoring or distorting scientific information that does not fit that perspective. This can occur in both political and religious ideologies. As Jung said in *AION: [...] the spirit became non-spiritual and [...] the vitalizing archetype gradually degenerated*

⁵⁵ First World Congress on Transdisciplinarity (Convento da Arrábida, Portugal, November 2–7, 1994). Participants’ letter which contains a set of fundamental principles of the 2 community of transdisciplinary spirits. <https://ciret-transdisciplinarity.org/chart.php#en>; Nicolescu, Basarab (2012). Transdisciplinarity: the hidden third, between the subject and the object. *Human and Social Studies, Vol. 1, No. 1 (2012)*, p. 24. Available at: http://www.basarab-nicolescu.ciret-transdisciplinarity.org/Docs_articles/ClujHiddenThird052009Proceedings.pdf; English, Trevor (2020), Louis Broglie and the Idea of Wave-Particle Duality: Broglie devised that all matter had properties of both waves and particles. *Interesting Engineering*. <https://interestingengineering.com/louis-broglie-and-the-idea-of-wave-particle-duality>.

into rationalism, intellectualism, and doctrinairism, all of which leads straight to the tragedy of modern times now hanging over our heads like a sword of Damocles⁵⁶.

4. Cultural Transformation and Paradigm Shift

In the HPTD-M view, TD involves cultural transformation and paradigm shift. The Modern era is dominantly guided by the Binary Logic and sciences, the Newtonian paradigm, and the Cartesian mechanism. The subject has been reduced to object. In the early 20th century, Modern Physics (quantum/micro and relativistic/macro), in parallel with Analytical Psychology, highlighted the inconsistency of the Western tendency to reduce human phenomena to the mechanical. Modern physics discovered inseparability and complementarity as a **concentration expansion**, evidenced by:

- 1) **Particle-Wave:** De Broglie's duality in Physics⁵⁷.
- 2) **Mass-Energy:** Einstein's convertibility in Physics⁵⁸.
- 3) **Subject-Object:** Bohr in Physics⁵⁹ and Jung in Analytical Psychology⁶⁰.
- 4) **Conscious-Unconscious:** Bohr in Physics⁶¹ and Jung in Analytical Psychology⁶².

So, the historical cycles involving oscillation of such opposites are natural, as per:

— The cycles of nature, such as day and night, or the alternating hot and cold seasons throughout the year.

⁵⁶ Jung, Carl Gustav (1959). *AION. Researches into the phenomenology of Self*. Princeton University Press, p. 86.

⁵⁷ English, Trevor (2020), Louis Broglie and the Idea of Wave-Particle Duality: Broglie devised that all matter had properties of both waves and particles. *Interesting Engineering*. <https://interestingengineering.com/louis-broglie-and-the-idea-of-wave-particle-duality>.

⁵⁸ Einstein, Albert (2021). Albert Einstein explains the theory of relativity. 1m48s video. *YouTube*. <https://www.youtube.com/watch?v=aNuuYKieHRY>.

⁵⁹ Franz, Marie-Louise von (1980). *Projection and recollection in Jungian psychology: reflections of the soul*. Open Court Publishing; Jung, Carl Gustav (1959). *AION. Researches into the phenomenology of Self*. Princeton University Press, p. 86, <https://ia800606.us.archive.org/11/items/collectedworksof92cgju/collectedworksof92cgju.pdf>.

⁶⁰ Franz, Marie-Louise von (1980). *Projection and recollection in Jungian psychology: reflections of the soul*. Open Court Publishing.

⁶¹ Popova, Maria (2018). Nobel-winning physicist Niels Bohr on subjective vs. objective reality and the uses of religion in a secular world. *The Marginalian*. Full text available at: <https://www.themarginalian.org/2018/02/01/niels-bohr-science-religion/> [...] *splitting this reality into an objective and a subjective side won't get us very far. [...] even when an individual tries to attain the greatest possible degree of independence, he will still be swayed by the existing spiritual structures – consciously or unconsciously.*

⁶² Jung, C. G. (1966) *Two Essays in Analytical Psychology*. Princeton University Press. <https://vdoc.pub/documents/two-essays-on-analytical-psychology-5m8ujeeupn00>.

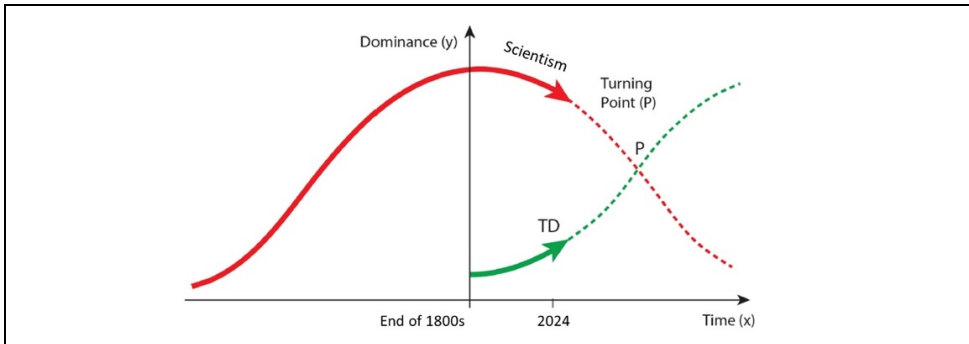
— The Apollonian (more rational) and Dionysian (more sentimental) cycles in history and literature; the ways of thinking throughout history; in the Middle Ages, more religious; in the Renaissance, more rational; in the Baroque, more religious and sentimental; in the Enlightenment, very rational; in 19th century Romanticism, more sentimental and religious; and in the 20th century, totally rational.

— The political business cycle theory, in which rulers are prescribed to apply all unpopular measures at the beginning of their government, to receive the fruits at election time, close to the end of their mandate.

— The energy flow in the human body, represented by a rhythm, a vibration, or a constant pulse shown in the electroencephalogram, for example.

Finally, as per **Figure 1**, HPTD-M sees a transition process between an old modern concentrated scientism, to be replaced gradually by an expanded TD view through cultural transformation. Cultural transformation means considering not only science for problem solving but also the interaction between technology and science (technoscience): Besides, the technoscience interaction with culture. In turn, culture can be understood as philosophy, tradition, and art. So, technoscience provides the rational, empirical, and material means to solve problems concretely, and culture completes with the ethical, anthropological, and philosophical views of the problems to be solved, in organizations and civil society.

Figure 1: Emergence and Decline of Dominant Paradigms. Process of Cultural Transformation: From scientism to TD⁶³



5. The HPTD-M Types of Logic and Mythology in Dialogue with Logic

As far as the dialogue between of logic and mythology is concerned,

⁶³ Costa, L. S. G. M. (2022). HPTD-M for Public Management Sustainability: A Proposal for Brazil. *Transdisciplinary Journal of Engineering & Science*, SP-3. Special Issue on Complex Resilience and Sustainability. Transdisciplinary Perspectives, edited by G. del Cerro Santamaría. <https://www.atlas-tjes.org/index.php/tjes/article/view/347/272>.

HPTD-M can see three levels of complexity do deal with problem solving, presented in **Figure 2**, which also shows mythology as complementary to the types of logic through feedback arrows.

1) Types of Logic:

— **Binary Logic:** involving ‘True’ or ‘False’, ‘Right’ or ‘Wrong’, in terms of a mechanistic view when the variables of the problem function like a machine. Cause and effect are direct. Also shown through 0 or 1 computer binary language. This type of logic is correlated to the **MECHANISTIC paradigm** according to HPTD-M.

— **Feedback Logic:** in self-regulating living systems, the cause-and-effect work in feedback, like in homeostasis, and that is the reference for this type of logic. If the variables function like living systems and ecosystems, Feedback Logic can be applied. This type of logic still keeps the binary cause-effect perspective of the mechanistic view, but through a more sophisticated way, correlated to the **SYSTEMIC paradigm** according to HPTD-M.

— **Included Third Logic:** in view of the complexity of human phenomena, like in questions involving organizational, sociological, and psychological behavior, the Binary and the Feedback Logic is not enough to solve problems. The idea of dialectics emerges as a possible solution, through the TD paradigm. The Logic of the Included Third (T) involves preference bias, e.g. considering the universe U is represented by the larger circle, by personal preference there are the ‘A’ who defend an ideology, a dogma, or are part of factions inside organizations. In contrast, there are the ‘Non-A’ opponents. For ‘A’ and ‘Non-A’, who have a personal taste as a reference, it will be difficult to understand the ‘T’ perspective, not for, nor against. The T paradigm is at another level of reality. For example, the pursuit of excellence in problem solving. This has nothing to do with ideologies, dogmatism, or personal preferences. Therefore, ‘A’ and ‘non-A’ tend to have a mistaken view of the nature of ‘T’, as if ‘T’ was their ideological opponent, but ‘T’ only may be on the opposite side by chance. After all, the ‘T’ can be seen as those initiated in TD. Besides, the Included Third Logic can be seen through two types of schemas, i.e. HPTD-M and Nicolescu, as presented in **Figure 2**. An alternative view of this type of logic, in the same sense, can be considered through the binary ‘True’ vs. ‘False’, ‘Right’ vs. ‘Wrong’, expressing the ‘0’ or ‘1’ in the computer’s language: It is inappropriate or ineffective to describe the reality of complex human phenomena. Also, the Feedback Logic is for systemic, biological, and environmental issues, not enough in this context, simply because there is no simple relation of cause and effect, even in the feedback process, through the Included Third perspective. This type of logic is correlated to the **TD paradigm** according to HPTD-M.

2) Mythology and Logic in Feedback. Nicolescu understands that pre-Modern man had no will of his own, but a magical-vitalist vision of the world, in which everything would be an expression of God’s will. Thus, the man of this

period would have the subject immersed in the object. Nicolescu divides the relationship between subject and object into three periods of history. In Pre-Modernity the subject was immersed in the object. Everything was a trace or signature of a higher meaning. The world of pre-modern man was magical. In Modernity, subject and object became totally separated by a radical epistemological cut, thus allowing the development of Modern science. The object was there, to be known, deciphered, dominated, and transformed. In Post-Modernity the role of subject and object are changed in comparison to Modernity and reversed in comparison to Pre-Modernity: the object, then considered as outside the subject, however, is a social construction. It is not really ‘there’. It seems more like an emanation of the subject. In this context, **the idea of TD leads to a new understanding of the relationship between subject and object. As in Modernity, subject and object remain separate but are united by immersion in a third element**, which Nicolescu calls the ‘Hidden Third,’ whose radius of action is infinite⁶⁴, in the same sense as the **Included Third Logic** as presented by HPTD-M.

The Greeks were an exception in Pre-Modernity. As per psychiatrist Bernardo Gregório, **the Greeks became rational, they invented logic from mythology**, and they brought myths into logic, something that gave birth to philosophy and then science. In addition, they were the forerunners of the theater, recognized today as one of the forms of therapy. Tragedy is a way of dealing with the suffering of life, as in a process of catharsis, recognizing it. Satire is the way to laugh at this suffering, using humor to make it lighter. In the Greek theater, satire was performed in the morning and tragedy in the afternoon. These are rituals that made up the current idea of theater, whose current symbol is the image of the two masks together, the comic and the tragic⁶⁵.

The understanding of myths, parables, legends, and fairy tales is important to map the language of dreams, which in most cases is symbolic, subjective, and rarely objective or premonitory. In many traditions, there is the myth of the great hero, the one who wins the confrontation with monsters, a theme that sometimes also appears in the oneiric world. Also, to understand myths it is necessary to understand **the Greek idea of the ‘symbolic’ (to bring together) as opposed to the ‘diabolic’ (to separate)**. The two concepts form a duality and must dialogue, so it is another type of complementarity in the HTPD-M view. The unconscious works in a symbolic way, much older than reason, it is a simpler way of structuring than written language. Symbolic communication in dialogue

⁶⁴ Nicolescu, Basarab (2010). Methodology of Transdisciplinarity – levels of reality, the logic of the included middle, and complexity. *Transdisciplinary Journal of Engineering & Science*, 1. https://www.atlas-tjes.org/index.php/tjes/article/view/9_Nicolescu_Basarab_2012. Transdisciplinarity: the hidden third, between the subject and the object. *Human and Social Studies*, Vol. 1, No. 1 (2012), p. 24. Available at: http://www.basarab-nicolescu.ciret-transdisciplinarity.org/Docs_articles/ClujHiddenThird052009Proceedings.pdf.

⁶⁵ Gregório, Bernardo de. (2014). Entre o céu e a terra [Between Earth and heaven]. One hour 30 minutes *interview to TV Brazil* on December 15, 2014. Available in Portuguese at: <https://www.youtube.com/watch?v=2uDYSwitcCY&t=1506s>.

with logic is important because the unconscious is like a background to manifests itself in dreams, visions, insights, and subliminal communications. Symbols can be recognized in dreams, mythology, and legends, also having to do with the TD idea (the interaction and integration of opposites). The symbol acts on each one even if one does not recognize it, as in the case of advertisements where subliminal messages are used. **A symbol influences us unless we become aware of it.** In this connection, an **archetype is a primordial form from which all human ideas emerge**, a term that has existed since Plato and was adopted by Jung. Independent of culture, the deepest unconscious is formed by these archetypes.

According to Jung, archetypes would also be the image of God – *Imago Dei*. A Jungian psychological concept, the Self, in mythological terms would be the seed of God that each person carries within⁶⁶.

In the view of the already mentioned psychiatrist Gregório, who is also a philosopher, theater director, and Jungian therapist, in an interview about studies comparing types of archetypes reported by civilizations, communities, tribes, and peoples who have never met, **archetypes can be summarized in three dualities: i) masculine and feminine, ii) light and shadow, and iii) human and divine.** The shadow is often related to evil in these cultures, and Jung is said to have developed the psychological idea of *animus* and *anima*, which reflects the duality of masculine and feminine in the sense of soul and soul, respectively. In parallel Chinese Taoism comes with the duality of Yin and Yang, reflecting respectively the polarities of a) high, masculine, luminous, and divine, as opposed to b) low, feminine, dark, and material⁶⁷.

One simple example in the context of concrete problem solving can be shown in this context: German scientist Kekulé discovered the formula for Benzene in 1865 after hard work on the matter and a subsequent dream of a snake eating its tail⁶⁸, a variation of an ancient alchemical symbol: the *Ouroboros*. According to Kekulé: *Gentlemen, let us learn to dream, and perhaps then we shall find the truth [...] but let us also be careful not to publish our dreams until they have been examined by the waking mind*⁶⁹.

The scientist woke up and worked out at that moment the formula for the molecule, as a closed chain of six carbon atoms bonded to six hydrogen atoms. This example shows that symbols can be a way to describe complex ideas with

⁶⁶ Jung, Carl Gustav *et al* (1964). *The man and his symbols*. Anchor Press. <https://antilogicalism.com/wp-content/uploads/2017/07/man-and-his-symbols.pdf>.

⁶⁷ Gregório, Bernardo (2015). Five-minute interview on archetypes in Portuguese. <https://youtu.be/x6gqBR6GLW4>.

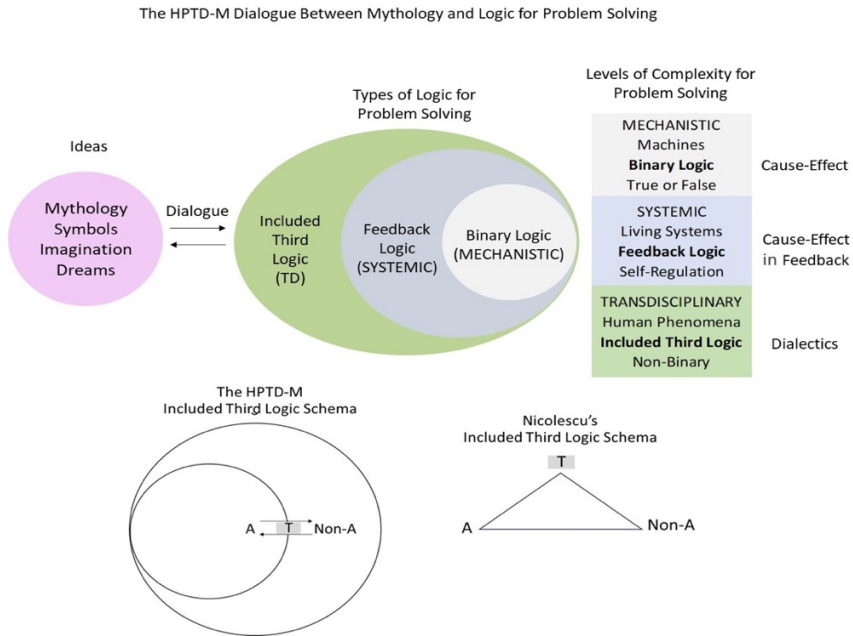
⁶⁸ Massachusetts Institute of Technology – MIT (2015). Kekulé's dreams. <https://web.mit.edu/redingtn/www/netadv/SP20151130.html>.

⁶⁹ Oliveira, Jane Raquel Silva de (n.a.). The intriguing of Kekulé's dream: considerations on the history and nature of science [O intrigante do sonho de Kekulé: considerações sobre a história e a natureza da Ciência]. *Fundação Cecierj / UFSCar*. Free translation from Portuguese. http://projetooseduc.cecierj.edu.br/eja/recurso-multimedia-professor/quimica/novaeja/m4u1/12_O%20Sonho%20de%20Kekule.pdf.

simplicity, through images, like mythology. The images that come from the personal and collective unconscious can be important instruments for concrete solutions if well translated into the reality experienced.

To establish finally the connection between Mythology and Logic seen through the HPTD-M perspective, the lower part of **Figure 2** is a schema reflecting the dialogue between Mythology and Types of Logic. From an objective and concrete perspective, Mythology is also in connection to abstract ideas coming from symbols, images, and dreams, e.g. Kekulé’s Benzene formula discovery.

Figure 2: Mythology in dialogue with Logic (a new HPTD-M schema in this text), including the HPTD-M Types of Logic⁷⁰ and the Included Third Logic Schemas: HPTD-M⁷¹ vs. Nicolescu⁷²



⁷⁰ Costa, L.S.G.M. (2024). Artificial Intelligence and the Transdisciplinary Human Mediation of HPTD-M. *Transdisciplinary Journal of Engineering & Science*, 15. <https://doi.org/10.22545/2024/00243>.

⁷¹ Costa, L. S. G. M. (2022). HPTD-M: The Holopraxis Transdisciplinary Management Theory. Communication and Mindsets as the main applied example. *Transdisciplinary Journal of Engineering & Science*, 13. <http://atlas-tjes.org/index.php/tjes/article/view/272/229>.

⁷² Nicolescu, Basarab (2012). Transdisciplinarity: the hidden third, between the subject and the object. *Human and Social Studies*, Vol. 1, No. 1 (2012), p. 24. Available at: http://www.basarab-nicolescu.ciret-transdisciplinarity.org/Docs_articles/ClujHiddenThird052009Proceedings.pdf.

6. The HPTD-M Analytical and Synthetic Models: Quaternary Complementarities for a TD Chair

Reflecting the TD basic principle of complementarity, the synthetic schemas tend to show symbols, images, geometric forms, theory of sets, involving dominantly a gestalt perception, i.e. an intuitive perception of the whole, not segregated in parts. As complementary tools for troubleshooting (requirements) and problem solving (attributes), the analytic schemas tend to use tables, charts, math, interdependence relations through arrows, and so on, involving dominantly rational judgement. Naturally, this type of classification is a mere reference to give a direction, like a compass is, it is not an absolute idea, since there can be simultaneously both types of attributes in a schema, analytic and synthetic. The same happens with the four archetypal elements that lead to the four types of intelligence and the four epistemic ways (**technoscience, art, philosophy, and tradition**). The question here is the predominance of one or another to understand the complementarity principle of HPTD-M in praxis through the four elements.

In the context of HPTD-M applied for a TD chair, psychology emerges as an important issue. There are four Jungian functions of the psyche, which imply, as per HPTD-M, four types of intelligence, namely **empirical, emotional, rational, and intuitive**. In the literature, as Prof. Dr. Mircea Nita informed this author in November/2021 from Bucharest, Romania, at the *8th Annual International Conference on Law and Administrative Justice from an Interdisciplinary Perspective*⁷³, it had been very common to consider three types of intelligence in Romania, i.e. **rational, emotional, and spiritual**. These can be translated to the HPTD-M paradigm as follows:

- Rational (Rational in the strict sense plus Empirical in HPTD-M).
- Emotional (Emotional in HPTD-M).
- Spiritual (Intuitive in HPTD-M).

On the other hand, according to Figure 3, Prof. Nita himself corroborates the quaternary view of reality, by proposing a new type of Public Administration education, in the sense of learning to:

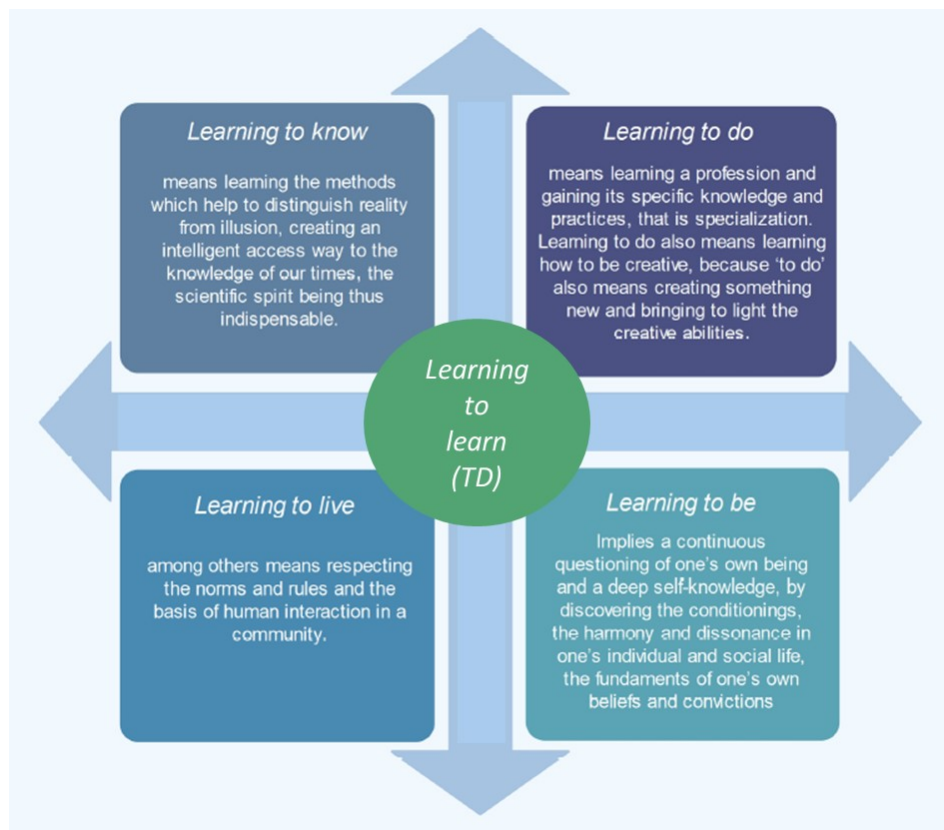
- KNOW the methods that help distinguish reality from illusion (Rational intelligence in HPTD-M).
- DO something in specialized professional practice (Empirical intelligence in HPTD-M).
- LIFE respecting the norms and bases of human community interaction (Emotional intelligence in HPTD-M).
- BE questioning oneself continuously in a process of self-knowledge (Intuitive intelligence in HPTD-M).

In the view of Dr. Mariana Thieriot Loisel, Secretary-General of CIRET

⁷³ Costa, L. S. G. M. (2021). Quality of Public Expenditure and Transdisciplinarity. *8th Annual International Conference on Law and Administrative Justice from an Interdisciplinary Perspective*. Bucharest, Romania. *ResearchGate*. <http://dx.doi.org/10.13140/RG.2.2.23501.72169>

<iret.hypotheses.org>: Those four perspectives of Prof. Dr. Nita are originally from UNESCO. However, this author's HPTD-M theory and praxis were not based on the UNESCO framework. As per the HPTD-M view, there is a fifth element that balances those four, i.e. **learning to learn** (see **Figure 3**).

Figure 3: New Type of Education: HPTD-M model adapted from Nita⁷⁴ except for the arrows and the 'Learning to learn' green circle, which is a new HPTD-M idea



As demonstrated in **Figure 4** and establishing a dialogue with adapted Nita's **Figure 3**, besides the dialogue between TECHNOSCIENCE and CULTURE, HPTD-M understands four types of intelligence, i.e. 1) Intuitive – learning to BE, 2) Rational – learning to KNOW, 3) Emotional – learning to LIVE, and 4) Empirical – learning to DO, in connection to the four epistemic ways: A) Philosophy, B) Tradition, C) Art, and 4) Technoscience (technology in feedback with

⁷⁴ Nita, Mircea Aurel (2013). Types of truth, transdisciplinarity and a new type of education in public administration. *Curentul Juridic*, 16, pp. 157–170. Available at: http://revcurentjur.ro/old/arhiva/attachments_201304/recjurid134_17F.pdf.

science).

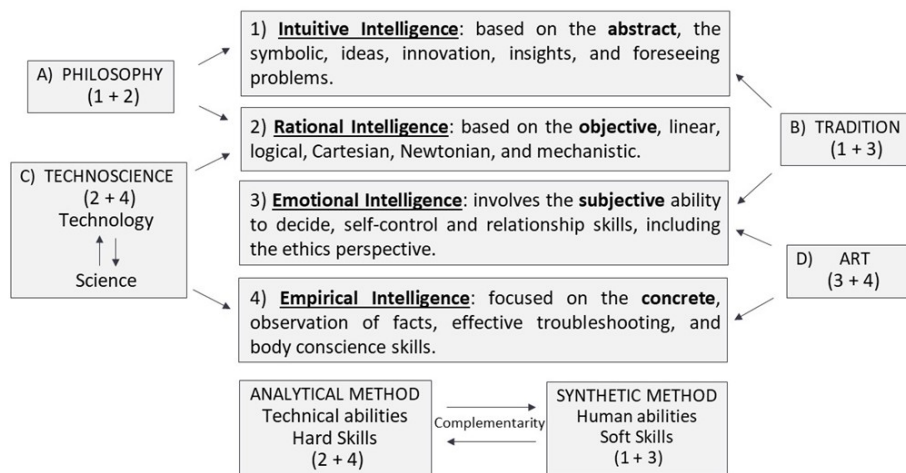
Examples of hard skills and analytical method – Empirical and Rational Intelligence⁷⁵:

1) Empirical Intelligence – by discretionary need when it fits, without science or bureaucracy to support it (inductive method):

— An engineer, by experience, uses his empirical formula for project sizing, which is not possible to be deduced mathematically.

— A physician prescribes to his patient an off-label medication, given the few calculated side effects and his professional experience in similar/analogous concrete cases.

Figure 4: TECHNOSCIENCE vs. CULTURE in HPTD-M: Levels of Abstraction and Epistemic Ways⁷⁶



Conclusion: In TD, TECHNOSCIENCE dialogues with CULTURE (PHILOSOPHY + TRADITION + ART)

2) Rational Intelligence – through published scientific models or deduced modeling, mathematically or otherwise (deductive method):

⁷⁵ Costa, L. S. G. M. (2023). The mediating manager. A course of transdisciplinary tools applied to organizations, based on the HPTD-M theory and the new conception of mediation and leadership. *Brazilian National School of Public Administration (ENAP)*. <https://suap.enap.gov.br/portaoaluno/curso/2136/?area=16>. The ENAP certificate is in the following link, which also explains the course main topics through translation from Portuguese to English, so that English-speaking researchers may understand the content: <http://dx.doi.org/10.13140/RG.2.2.28025.54884>.

⁷⁶ Costa, L.S.G.M.; Loisel, M. T. (2023). International Presentation: The Transdisciplinary Mediator for Effective Problem Solving in Organizations and Civil Society (in English and Portuguese), coordinated by Dr. Mariana Thieriot Loisel. *CIRET and CETRANS*. Slides are available at: <http://dx.doi.org/10.13140/RG.2.2.20460.54401/1>. Video of the presentation available at: <https://www.youtube.com/watch?v=pSnHVXUEGsg>

— Modeling in economics: econometric models deduced with mathematical equations.

— Drug research by laboratories with published results scientifically proven through statistics.

Examples of soft skills and synthetic method – Emotional and Intuitive Intelligence⁷⁷:

3) Emotional Intelligence – the ability to deal with oneself and others:

— The manager learns to control himself psychologically (consciousness development by various forms of therapies helps).

— Understands how their colleagues behave psychologically (the MBTI⁷⁸ is an interesting learning reference as a self-leadership and management system).

— Knows how to decide based on what he diagnoses and on the feedback from his colleagues.

— Understands what may be rational, but not reasonable, as to sensibleness, acceptability, and proportionality.

4) Intuitive Intelligence – searches for decision-making elements when data/diagnosis are insufficient:

— A police investigator follows his ‘guts’ and searches for clues to solve a case.

— Politicians follow their ‘feeling’ to take a certain course of action in uncertain situations.

— A businessman follows his instinct and goes against the results of an economic-financial viability study with an attractive internal rate of return, deciding not to invest.

— Insights can give the manager ideas for innovation.

— An idea that does not make sense should not go on, because making sense is the starting point.

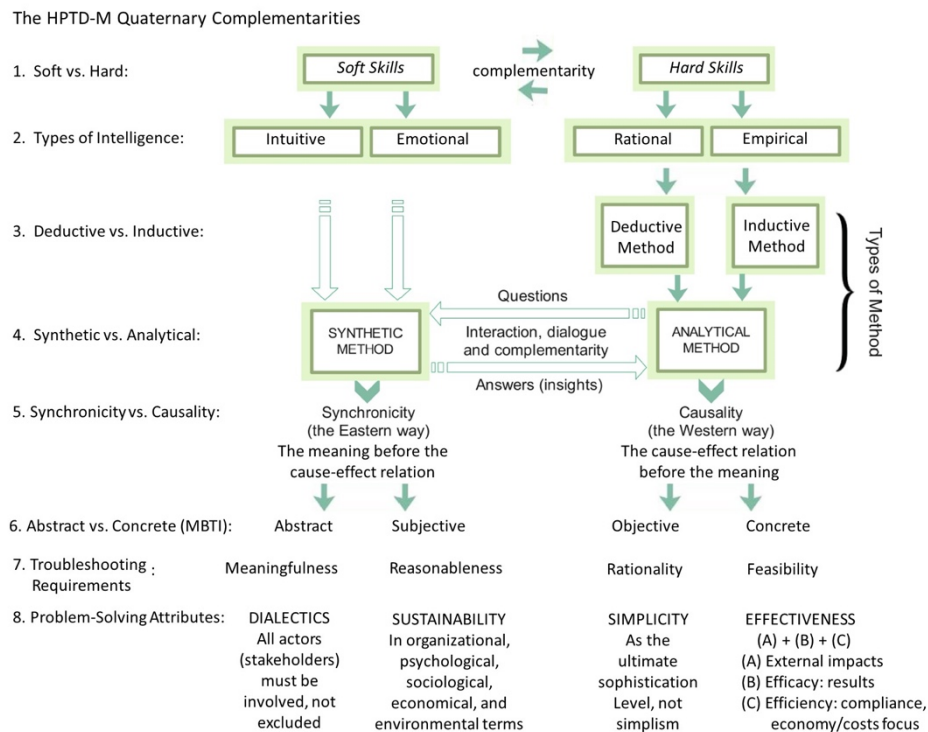
Figure 5 shows the HPTD-M analytical model built from the four archetypal elements. These elements interact in complementarities. That is the meaning

⁷⁷ Costa, L. S. G. M. (2023). The mediating manager. A course of transdisciplinary tools applied to organizations, based on the HPTD-M theory and the new conception of mediation and leadership. *Brazilian National School of Public Administration (ENAP)*. <https://suap.enap.gov.br/portal/doaluno/curso/2136/?area=16>. The ENAP certificate is in the following link, which also explains the course main topics through translation from Portuguese to English, so that English-speaking researchers may understand the content: <http://dx.doi.org/10.13140/RG.2.2.28025.54884>.

⁷⁸ First World Congress on Transdisciplinarity (Convento da Arrábida, Portugal, November 2–7, 1994). Participants’ letter which contains a set of fundamental principles of the 2 community of transdisciplinary spirits. <https://ciret-transdisciplinarity.org/chart.php#en>; Nicolescu, Basarab (2012). Transdisciplinarity: the hidden third, between the subject and the object. *Human and Social Studies*, Vol. 1, No. 1 (2012), p. 24. Available at: http://www.basarab-nicolescu.ciret-transdisciplinarity.org/Docs_articles/ClujHiddenThird052009Proceedings.pdf; English, Trevor (2020), Louis Broglie and the Idea of Wave-Particle Duality: Broglie devised that all matter had properties of both waves and particles. *Interesting Engineering*. <https://interestingengineering.com/louis-broglie-and-the-idea-of-wave-particle-duality>.

of ‘quaternary complementarities’, as already mentioned. As the HPTD-M approach demonstrates, these elements are reflected in various scientific views, philosophies, and traditions, not only in Jung’s Analytical Psychology and Nita’s framework for a new type of education in Public Administration.

Figure 5: The HPTD-M Analytical Model of Four Elements Interacting in Dualities⁷⁹



In this perspective:

— **Troubleshooting is the process of finding a solution** (the requirements in **Figure 5**).

— **Problem solving involves the solution itself** (the attributes in **Figure 5**).

— **Remark about the concept of inductive method:** ‘inductive’ in the HPTD-M framework is related to the process of transforming something mapped empirically, such as a mechanism or process, into a rational model. However, some philosophers may also use ‘inductive’ as the process of turning an intuition, insight, or idea, into something rational, like Kekulé’s discovery of the Benzene formula through an oneiric image of the Ouroboros.

⁷⁹ Costa, L.S.G.M. (2023). The Mediating Manager for Effective Troubleshooting in Organizations: A Transdisciplinary View from HPTD-M. *Transdisciplinary Journal of Engineering & Science*, 14. <https://doi.org/10.22545/2023/00228>.

As per the attributes in correlation with the types of intelligence⁸⁰:

1) Effectiveness (concrete, empirical, inductive): More than the mere Efficacy of internal results of an organization or the Efficiency of the economy (costs) and conformity of processes (compliance and bureaucracy). Effectiveness means the result of management in the perception of civil society: The external environment impacts. However, the concepts of Efficacy and Efficiency, as described, are comprised in Effectiveness. This perspective of Effectiveness containing Efficacy and Efficiency is in the Brazilian Public Administration mainstream. Another way of seeing it considering the complementarity principle of HPTD-M is Effectiveness ('doing the right thing') vs. efficiency ('doing things right'). In this conception effectiveness involves the external impacts or 'outer effectiveness', while efficacy can be considered the 'inner effectiveness' in terms of results in the perspective of the organization, and efficiency keeps the same conception of compliance and economy.

2) Sustainability (subjective, emotional, synthetic): The final balance of economic and environmental resources, considering the sociological realm, and especially human psychological well-being at collective and personal levels (human resources at the personal and organizational levels).

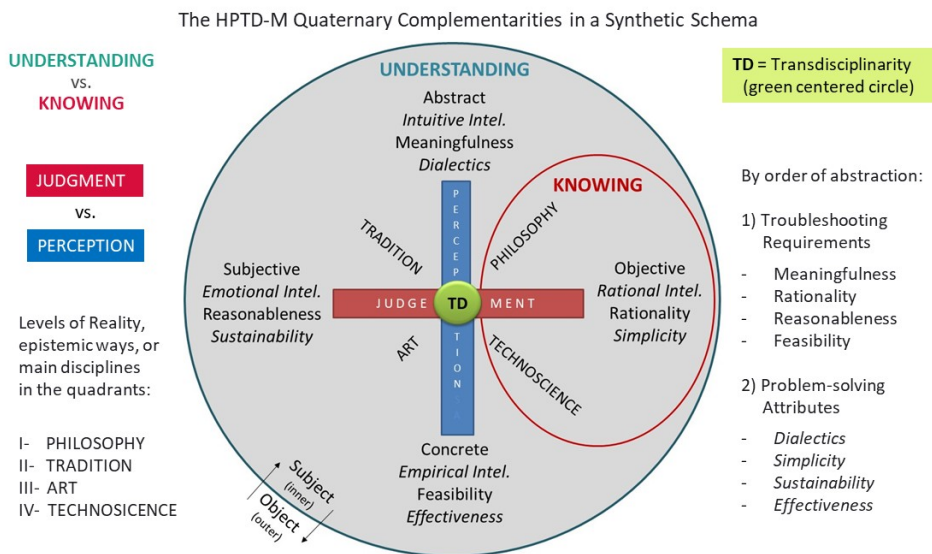
3) Simplicity (objective, rational, deductive): A consequence of discussions with all stakeholders and studies to transform the complexity of human phenomena into simplicity as the ultimate sophistication, which should not be confused with a reduction to the mechanical phenomena of hard science or simplism.

4) Dialectics (abstract, intuitive, synthetic): Through the friction of opposites in a discussion (complementarities), the abstract idea is polished until it reaches its mature point of realization, considering that all actors (stakeholders) must be involved, heard, and not excluded for this to occur.

Finally, in Figure 6 the whole HPTD-M model can be seen in a synthetic format, not analytical and complementary to **Figure 4** and **Figure 5**, also evidencing the difference between UNDERSTANDING and KNOWING:

⁸⁰ Crema, Roberto (2017). *O poder do encontro: origem do cuidado [the power of encounter: origin of care]*. São Paulo: Tumiak Produções; Instituto Arapoty; UNIPAZ. Crema invited this author to the book release by e-mail on 28.02.2017, also mentioning in Portuguese: *Sempre afirmo que ninguém transforma ninguém e ninguém se transforma sozinho; nós nos transformamos no Encontro.* (free-translated into English); Loisel, Mariana Thieriot (2013). *Perlaborar ou a consciência do não intencional: primeiros elementos para uma escuta transdisciplinar [Perlaboring or the awareness of the unintentional: first elements for a transdisciplinary listening]*. *CETRANS – Centro de Educação Transdisciplinar*. <https://1drv.ms/b/s!AqLPNeNwvK2zgp5LSWsgdm2mCWxeMg>.

Figure 6: The HPTD-M Synthetic Model of Quaternary Complementarities⁸¹



There are various forms of complementarities in the context of the four elements of **Figure 6**, i.e. in the context of quaternary complementarities, such as:

- **Technology-Science** (the most important for our Western scientist bias).
- **Technoscience-Culture** (Culture = Philosophy + Tradition + Art).
- **Technoscience-Philosophy** (the OBJECTIVE complementarity side – right side of **Figure 6**).
- **Technoscience-Art** (the CONCRETE complementarity side – lower

⁸¹ Costa, L. S. G. M. (2022). HPTD-M: The Holopraxis Transdisciplinary Management Theory. Communication and Mindsets as the main applied example. *Transdisciplinary Journal of Engineering & Science*, 13. <http://atlas-tjes.org/index.php/tjes/article/view/272/229>; Costa, L.S.G.M. (2023). The Mediating Manager for Effective Troubleshooting in Organizations: A Transdisciplinary View from HPTD-M. *Transdisciplinary Journal of Engineering & Science*, 14. <https://doi.org/10.22545/2023/00228>; Costa, L.S.G.M. (2022). Effectiveness and styles of leadership in Public Management: Quality in the context of transdisciplinary HPTD-M Theory. *Integral Leadership Review*, vol. 22, no. 1 Dec. 2022. <https://ilr.scholasticahq.com/article/57734-effectiveness-and-styles-of-leadership-in-public-management-quality-in-the-context-of-tr> ansdisciplinary-hptd-m-theory; Costa, L.S.G.M.; Loisel, M. T. (2023). International Presentation: The Transdisciplinary Mediator for Effective Problem Solving in Organizations and Civil Society (in English and Portuguese), coordinated by Dr. Mariana Theriot Loisel. *CIRET and CETRANS*. Slides are available at: <http://dx.doi.org/10.13140/RG.2.2.20460.54401/1>. Video of the presentation available at: <https://www.youtube.com/watch?v=pSnHVXUEGsg>; Costa, L.S.G.M. (2024). Artificial Intelligence and the Transdisciplinary Human Mediation of HPTD-M. *Transdisciplinary Journal of Engineering & Science*, 15. <https://doi.org/10.22545/2024/00243>.

side of **Figure 6**).

— **Philosophy-Tradition** (the ABSTRACT complementarity side – upper side of **Figure 6**).

— **Tradition-Art** (the SUBJECTIVE complementarity side – left side of **Figure 6**).

— **UNDERSTANDING-KNOWING** (the outer circle in green and the inner circle in red of **Figure 6**).

— **JUDGMENT-PERCEPTION** (the horizontal red axis and the vertical blue axis of **Figure 6**).

— **Subject-Object** (the inner environment of an organization like the green circle vs. the outer).

So, the HPTD-M theory and praxis are about flexibility, new ideas, and content, not the excessive form of bureaucracy, ideology, or dogmatism.

Bureaucracy can be seen in **Figure 6** as part of the quadrant of technoscience, and dogmatism as a deviation of tradition and science in many forms, such as religious fanaticism, scientism, political partisanship, and so on. So, dogmatism tends to be seen through the quadrant of tradition and the quadrant of technoscience, configuring a pernicious ideological complementarity between tradition and science (as part of technoscience).

The antidote to this Western dogmatic bias is the idea of **learning to learn**, as already seen in the center of **Figure 3**: It looks like the archetypal quintessential or fifth element of the European Alchemical tradition⁸² that could also be placed in the TD green center of **Figure 6**. This is essential both for teachers and students: In the HPTD-M perspective teachers act as working-group coordinators, as a mediating manager focused on UNDERSTANDING more than KNOWING for effective and dialectical problem solving, considering the quaternary complementarities.

Of course, it is necessary to establish mechanisms of **transmitting knowledge for students to understand and learn: Through the same quaternary principle of HPTD-M**, which is simple but not simplistic, not only in view of technoscience but also through its quaternary complementarities with culture as the example of the stress test this author demonstrated in the comparison between HPTD-M and the Alchemical Psychology⁸³, considering also the Figure 6 relation between UNDERSTANDING and KNOWING.

In that sense, as an example, **Figure 7** reflects the levels of awareness through the concept of levels of shadows and unconscious.

Some previous concepts to understand the model: according to Jung's Analytical Psychology, the levels of the psyche can be classified as⁸⁴:

⁸² Costa, L.S.G.M. (2023). A stress tests for the HPTD-M transdisciplinarity through Alchemical Psychology. *Transdisciplinary Journal of Engineering & Science*, 14. <http://dx.doi.org/10.22545/2023/00222>.

⁸³ Ibid.

⁸⁴ Costa, L.S.G.M. (2023). The Mediating Manager for Effective Troubleshooting in Organizations:

— **Personal Conscious:** whose content is the **EGO**, a personal center of consciousness.

— **Personal Unconscious:** related to the **SHADOW**, the rejected or unknown part, the shadow of the unconscious, the ‘alter ego’. The shadow may contain qualities that need to be integrated in favor of a more comprehensive ego structure.

— **Collective Unconscious:** also called the objective or transpersonal unconscious, whose contents are archetypal images on level 8 of the HPTD-M model: archetypes are images and patterns of emotional and intellectual behavior, models, or universal scripts, independent of culture.

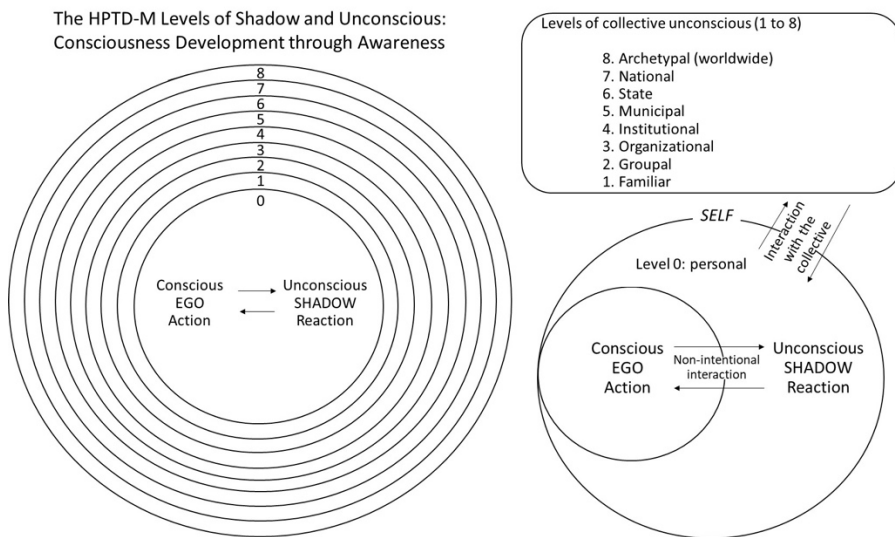
— **Collective Conscious:** the cultural world of shared values and forms.

— **SELF:** the regulatory center of the psyche, a fifth unifying function, which transcends sensation, feeling, thought, and intuition (the four Jungian functions of the psyche).

In other words, as per the HPTD-M view: Consciousness development or awareness is the light that can guide us through our personal and collective shadows, which are the repressed or oblivious parts uncomfortable to deal with in our journey.

Besides, **Table 2** demonstrates this didactic perspective in technoscientific in cultural aspects (philosophical, traditional, and artistic) through the idea of consciousness in the HPTD-M approach.

Figure 7: Awareness Levels of the Collective Unconscious⁸⁵



⁸⁵ Ibid.

Table 2: Consciousness seen in the context of HPTD-M Quaternary Complementarities

Type of Approach	Vehicles or Instruments of Consciousness Manifestation			Observer/Consciousness
1. Symbolic Alchemical Elements ⁸⁶	Earth	Water	Air	Fire
2. Physical States of Matter ⁸⁷	Solid	Liquid	Gas	Plasma
3. Psychological Functions ⁸⁸	Sensation	Feeling	Thinking	Intuition
4. Greek Philosophy ⁸⁹	Soma	Psyche		Nous
5. HPTD-M Types of Intelligence ⁹⁰	Empirical	Emotional	Rational	Intuitive
6. HPTD-M Psychosomatics ⁹¹	Physiological-Energetic	Emotional	Intellectual	Consciousness
7. Galvão's Philosophical view ⁹²	Physical-Energetic	Emotional	Mental	Consciousness
8. Thieriot Loisel's TD view ⁹³	----	----	Cognition	Awareness

Source: Author's Conception adapted from⁹⁴

7. The HPTD-M Proposal for a TD Chair and Conclusions

The TD Chair can be an instrument for transforming a culture fragmented by specialists and isolated disciplines, aiming at concrete, effective, and dialectical solutions to organizational problems through the transdisciplinary mediation of generalists. That is the opinion of this author after more than 30-year research and professional experience which culminated in the 2022 HPTD-M theory. The idea of a 14-hour successful TD pilot course by the author was turned into reality

⁸⁶ Costa, L.S.G.M. (2023). A stress tests for the HPTD-M transdisciplinarity through Alchemical Psychology. *Transdisciplinary Journal of Engineering & Science*, 14. <http://dx.doi.org/10.22545/2023/00222>.

⁸⁷ Ibid.

⁸⁸ Ibid.

⁸⁹ Costa, L. S. G. M. (2022). HPTD-M: A transdisciplinary integration of three paradigms – Mechanistic, Systemic, and Synchronistic. *Transdisciplinary Journal of Human Plasticity (PLASTIR)* 65, June/2022 (Quarterly Journal, bilingual/ISSN n° 2105–2794). <http://www.plasticites-sciences-arts.org/PLASTIR/daCosta%20P65.pdf>.

⁹⁰ Ibid.

⁹¹ Ibid.

⁹² Galvão, Lúcia Helena (2016). BHAGAVAD GITA - Comentários filosóficos sobre o livro sagrado indiano. [BHAGAVAD GITA – Philosophical commentary on the Indian holy book]. *New Acropolis Brazil*. <https://youtu.be/FYqJ5fwR4Ps?si=OQcp3AZONdJlrs1r>.

⁹³ Loisel, Mariana Thieriot (2024) Les mutations humaines: dialogue entre la philosophie et les technosciences. Editions Amalthée, <https://www.plasticites-sciences-arts.org/editions-plasticites/>.

⁹⁴ Costa, L.S.G.M. (2024). Artificial Intelligence and the Transdisciplinary Human Mediation of HPTD-M. *Transdisciplinary Journal of Engineering & Science*, 15. <https://doi.org/10.22545/2024/00243>.

in 2023, aiming at developing and training a TD mediating public manager, for participants in the Brazilian federal, state, and municipal levels, some of them with a Ph.D., M.Sc., or MBA titles.

As a background theoretical support to our proposal, here are some basic TD principles, considering what has been shown so far:

— TD is beyond and through disciplines, i.e. more than multidisciplinary (many disciplines not interacting) and interdisciplinarity (disciplines in interaction).

— TD is the dialogue between technoscience (the feedback process between technology and science) and culture (philosophy, tradition, and art).

— TD is the dialectical process between opposites, which includes the complementarity of disciplinarity vs. TD, i.e. specialists in dialogue with generalists to promote the TD view.

— The TD approach can be used for concrete problem solving, in public and private organizations, including civil society. If there is no complementarity between theory and praxis, it is not TD, i.e. discussions about the epistemology of TD or the science of TD are only part of TD but not TD itself.

Besides, there are Brazilian initiatives that influenced this author's HPTD-M theory and praxis: i) UNIPAZ, ii) Dr. Ambrosio & Dr. Thieriot, and iii) Dr., Hyssa, M.D., MBA, besides HPTD-M itself (see **Appendix 2**).

So, this author understands that some steps are necessary for a paradigm shift, to develop a TD Chair in universities and courses of short duration for public and private organizations:

1) A TD course in the first semester of university graduation: In this author's perspective it would be interesting to start the first semester of each graduation with a TD chair, considering:

— In the US, the first two years of a four-year undergraduate program are often referred to as the 'general education' or 'core curriculum' years. During this time, students are exposed to a broad range of disciplines and subjects, allowing them to acquire a well-rounded education before specializing in a particular field.

— In this author's concrete case in the Brazilian five-year civil engineering graduation from 1987 to 1991, two years of hard sciences, i.e. calculus, physics, mechanics, analytical geometry, statistics, chemistry, geology, and ecology, before going to technoscience and engineering itself in the last three years of graduation, including one semester of administration, economics, architecture, law, geology applied to engineering, environmental sanitation, sanitary chemistry, and sanitary biology, as applied disciplines connected to civil engineering. By the way, civil engineering can be an example of TD, if well-studied, since it is everything that is not military engineering.

— As a Federal Auditor of Finance and Control from the Brazilian career, after being approved in a difficult text for the economic-financial area for becoming a civil servant: This author is professionally involved in economics,

finance, public finance, public management, and law. So, the experience with economists, other engineers, lawyers, and public administrators corroborates the above-mentioned view, considering the TD complexity of problem solving in public management.

— Especially for any course involved in technoscience, i.e. theory and praxis with concrete problem solving like medicine, engineering, law, economics, and psychology, it would be essential to start the graduation first semester with the conception of TD, including the epistemic ways and disciplines, to make clear the difference between technology and science, besides the interaction between art and technoscience as the concrete way of solving problems. Considering technoscience, as per Weil, Crema, and D'Ambrosio: *The roots of technology are lost in the night of time. The first agricultural techniques, the production of fire, cooking, the manufacture of tools of all kinds, such as axes, bows and arrows, are all part of an archaic phase of technology. This archaic technology has been replaced by scientific technology or technoscience, which can be understood in two ways: one consists of using scientific discoveries to create or perfect methods of action; the other puts technology at the disposal of science itself. This establishes a feedback relationship that makes it often difficult to separate science from technology*⁹⁵.

2) Simplification and flexibility to start (concepts of technoscience and complementarity): A TD chair could start rationally, in the Western way, by simplifying processes, such as the bureaucracy of presenting articles, reports, and texts, following flexible rules, such as references by numbers between brackets, e.g., to make the content cleaner. A TD chair base involves the essence before the form of standards; otherwise, the ideas may be lost to excessive bureaucracy feedbacked by dogmatism. The Western culture has been creating this kind of Cartesian, mechanistic, and positivist trap since the end of the 18th century: The scientism feedbacked by dogmatism, which in the end tends to focus on the form rather than the essential content itself. In simple terms: technology is the empirical, practical, and inductive way to solve problems concretely, and science is a rational, theoretical, and deductive way to find abstract principles with possible future applications. So, to be guided merely by science does not seem to be a wise thing to do concretely, since it may lead to the so-called dogmatic scientism, which is disconnected from the problem-solving reality. **Even some TD academics don't understand concretely the idea of technoscience as the interaction and complementarity between technology and science.** Those tend to think about the interaction between science and culture as the essence of TD, which is an important point of view, but not complete in terms of TD epistemic forms. So, HPTD-M understands essential for TD to evidence clearly and concretely the

⁹⁵ Weil, Pierre; Crema, Roberto; D'Ambrosio, Ubiratan (1993). *Toward the new transdisciplinarity: open systems of knowledge [Rumo à nova transdisciplinaridade: sistemas abertos de conhecimento]*. Summus Editorial, p. 18, free translation from Portuguese to English. <https://www.amazon.com.br/Rumo-Nova-Transdisciplinaridade-Pierre-Weil/dp/8532304427>.

concepts of technoscience and complementarity, considering that some technic or technologies cannot be demonstrated by science and may have connections to culture through a complementarity technic vs. culture, i.e. some technic may come from tradition (part of the culture), e.g. Ayurvedic medicine and Traditional Chinese Medicine, both coincidentally also based on the complementarity and balance, including the concept of opposites.

3) The mediating professor for learning to learn and understanding, not only knowing: In a TD view the professor tends to be closer to a working group coordinator, a mediating manager of the participants as students, who need to be stimulated to think and create new ideas, learning to learn in the realm of UNDERSTANDING, not simply absorbing information through KNOWING, since computers can provide information faster and more efficiently than humans, especially, considering Artificial Intelligence.

4) Creation of a TD kind of Ph.D. and M.Sc.: Nowadays those post-graduations are specialized and focused on disciplinarity. Traditionally Ph.D. stands for ‘Philosophy Doctor’ and M.Sc. stands for ‘Master of Science.’ However, in a TD context where integration beyond traditional academic boundaries is valued, these titles may be seen as limited in capturing what is understanding (not only knowing) and the required skills in practice. For example, the US MBA (Master of Business Administration), created in the late 1950s, reflects a specific focus on practical business skills and management expertise that may be perceived as more directly applicable to real-world praxis compared to some Ph.D. and M.Sc. programs. In this context, it sounds reasonable to create a complementarity dialogue through a generalist TD approach. A new conception of Ph.D.s and M.Sc. coexisting with the traditional one could be interesting, i.e. the creation of a transdisciplinary Ph.D. and M.Sc. with the same status as the usual Ph.D. and M.Sc. but focused on theory and praxis. An MBA with more theory could be a starting point.

5) The three types of logic as tools for problem solving in dialogue with new ideas that make sense, considering the level of complexity in each concrete case: Binary, Feedback, and Included Third, as per the HPTD-M framework. TD is an answer to complexity, as Dr. Marco Fioravanti from the University of Florence, Italy, mentioned in the Panel of CIRET TD Chair Symposium of March 21–22, 2024. In this perspective, HPTD-M understands problem solving using tools depending on how complex the problem is. Binary Logic is for mechanistic problems (clear relations of cause and effect – 0 or 1, right and wrong, true and false, and so on), Feedback Logic for environmental and biological issues (cause and effect in feedback – self-regulation) and Included Third Logic for the complexity of human phenomena, which involves cultural, sociological, and psychological issues (dialectic process, a solution between opposite arguments).

6) The abstract-concrete complementarity in problem solving and the concept of quaternary complementarities for troubleshooting in practice.

This item envisages the concreteness of a TD chair that is practical, not only theoretical, involving the quaternary complementarities principle of HPTD-M with the following troubleshooting requirements (the process of finding solutions) and problem-solving attributes (of the solutions themselves), through the complementarity of the analytic and synthetic methods:

— Troubleshooting requirements: viability, rationality, reasonableness, meaningfulness.

— Problem-solving attributes: effectiveness (not only efficiency), simplicity, sustainability (especially psychological, not only biological-environmental), and dialectics.

An effective and dialectical TD chair means achieving simultaneously the concrete and the abstract attributes in HPTD-M (see **Figure 5** and **Figure 6** that complete each other), so evidencing the complementarity principle of TD.

Finally, this HPTD-M perspective may be an interesting approach to balance the Western rational hypertrophy, aiming at a feasible troubleshooting process through many aspects of human phenomena, considering disciplines such as Psychology, Medicine, Engineering, Economics, Administration, and Law. This TD Chair proposal is a possible way to promote a Western cultural transformation since The West still has a dominant mechanistic, scientific, and dogmatic view of reality. So, the TD Chair may lead to effective problem solving in organizations and civil society, including universities' transdisciplinary courses envisaging a paradigm shift: From the mere disciplinary, multidisciplinary, or interdisciplinary approach to a fruitful dialogue between disciplinarity and transdisciplinarity.

Appendix 1: Questions for the Panel - March 2024 21–22 TD Chair Symposium

For the Panel of the March 2024 21–22 TD Chair Symposium, there were four questions made for discussion:

- 1) What is the TD CULTURE?
- 2) Is TECHNOSCIENCE a necessary dialogue between technology and science?
- 3) How can we mediate conflicts with TD?
- 4) What should the TD Chair explore basically?

A few days before the event, this author shared with the speakers' group his view, for reflections and discussions of the participants. After that, in the Panel of the event, some content was added. This is the consolidation of everything.

1) What is the TD CULTURE? Reference: this article

Culture involves the three epistemic ways of **tradition** (religion included), **philosophy**, and **art**. Considering the tradition's perspective, a symbol influences us unless we become aware of it. In this connection, an archetype is a primordial form from which all human ideas emerge, a term that has existed since

Plato and was adopted by Jung. Independent of culture, the deepest unconscious is formed by these archetypes. TD will take time to be absorbed by a critical mass of academics and practitioners, and considers the following basic concepts and principles:

— **Complexity:** The complexity of human phenomena needs to be treated in an adequate and non-reductionist way, by means of mechanistic, systemic, and TD paradigms, each one with its scope of action and level of adequacy according to the variables to be treated, without excluding beforehand, in a prejudiced way, any of these three ways of approaching reality.

— **Levels of Reality governed by different types of logic:** The Binary Logic must dialogue with the logic of the third party included (Included Third Logic), depending on the concrete case to be dealt with, whichever is simpler and more adequate for the approximation of reality. In this context emerges the concept of quaternary complementarities, the archetypal four elements interacting through complementarities. Those principles of earth, water, air, and fire can also be seen as levels of reality, not only symbolically, but in terms of consciousness functions, according to Analytical Psychology: sensation, feeling, thought, and intuition, as characterized in the MBTI, i.e. concrete, subjective, objective, and abstract levels. In this connection, MBTI is the *Myers-Briggs Type Indicator*, also known as the MBTI System, used for the classification of psychological types, based on the Jungian functions, the evolution of Jungian typology.

— **Ethics.** The four epistemic paths need dialogue: technoscience, philosophy, tradition, and art. As a heritage of the Modern Age and the Enlightenment, the lack of dialogue in our Western rationalist culture tends to cause **dogmatic scientism feedbacked by partisanship**, which tends to undermine technoscience, as if only science matters and there is no possibility of technologies or techniques not originated or explained by science. Cultural traditions go in this direction of dogmatism and partisanship as if there could be no diversity of views of reality, only the ‘true’ one, considering the others as ‘false’ by the ideology corroborated by the ‘science’ of the moment. In other words, science can be approached ideologically, when scientific results are used selectively to substantiate or justify a particular ideology or belief system, ignoring or distorting scientific information that does not fit that perspective. This can occur in both political and religious ideologies. As Jung said in *AION*: [...] *the spirit became non-spiritual and [...] the vitalizing archetype gradually degenerated into rationalism, intellectualism, and doctrinairism, all of which leads straight to the tragedy of modern times now hanging over our heads like a sword of Damocles.*

There is a transition process between the Modern scientism, to be replaced gradually by an expanded TD view through cultural transformation. Cultural transformation means considering not only science for problem solving but also the interaction between technology and science (technoscience): Besides, the technoscience interaction with culture. In turn, culture can be understood as philosophy, tradition, and art. So, technoscience provides the rational, empirical, and

material means to solve problems concretely, and culture completes with the ethical, anthropological, and philosophical views of the problems to be solved, in organizations and civil society.

2) Is TECHNOSCIENCE a necessary dialogue between technology and science, in a feedback process, i.e. a new technology can emerge without scientific proof at first, and a scientific discovery may not be technologically applied at first? **Reference: this article.**

As per Weil, Crema, and D'Ambrosio: *The roots of technology are lost in the night of time. The first agricultural techniques, the production of fire, cooking, the manufacture of tools of all kinds, such as axes, bows and arrows, are all part of an archaic phase of technology. This archaic technology has been replaced by scientific technology or technoscience, which can be understood in two ways: one consists of using scientific discoveries to create or perfect methods of action; the other puts technology at the disposal of science itself. This establishes a feedback relationship that makes it often difficult to separate science from technology.*

Technology or technique often interacts with science, but frequently technology tends to be confused with science. Technology is applied, coming from concreteness and the inductive method. Science is theoretical, coming from abstraction and the deductive method. Both complement each other in a feedback process.

Eng. Leonardo Costa, a TD author with professional experience in urban development and public management in Brazil, has already seen some engineers that use empirical formulas for dimensioning: They have already discovered that technologies or techniques can be independent of science. For the effect of problem solving, engineers tend to feel no need to demonstrate that a solution is 'scientific' according to this or that codification, methodology, or standards, especially if it doesn't make sense in the concrete case, i.e. solving problems with technics developed with professional experience that works and give concrete results tend to be enough for engineers. Another example comes from the health area. Once, this same author watched an interview with Dr. Zerbini, a surgeon who performed the first heart transplant in Brazil (1968). The doctor reported seeing personally how the health system worked in China, impressed with a lung surgery in which the patient was anesthetized only with acupuncture. In this context, some physicians and scientists, not being able to explain acupuncture scientifically, simply deny its existence, in this same isolated rationalist paradigm that may be seen also in Artificial Intelligence (AI). As demonstrated by this author, tools like the ChatGPT do not admit that a technique such as acupuncture exists independently of science. Obviously, it is very risky to deny the existence of something simply because it cannot be explained rationally or scientifically, even if empirically it is evident, like the 'off-label' prescriptions of medicines by physicians: They understand that it works but don't know the mechanism.

Finally, **simplification and flexibility to start (concepts of technoscience and complementarity)**: A TD chair could start rationally, in the Western way, by simplifying processes, such as the bureaucracy of presenting articles, reports, and texts, following flexible rules, such as references by numbers between brackets, e.g. '[1]', to make the content cleaner. A TD chair base involves the essence before the form of standards; otherwise, the ideas may be lost to excessive bureaucracy feedbacked by dogmatism. The Western culture has been creating this kind of Cartesian, mechanistic, and positivist trap since the end of the 18th century: scientism is feedbacked by dogmatism, tending to focus on the form rather than the essential content itself. In simple terms: technology is the empirical, practical, and inductive way to solve problems concretely, and science is a rational, theoretical, and deductive way to find abstract principles with possible future applications. So, to be guided merely by science does not seem to be a wise thing to do concretely, since it may lead to the so-called dogmatic scientism, which is disconnected from the problem-solving reality.

Even some TD academics don't understand concretely the idea of technoscience as the interaction and complementarity between technology and science.

Those tend to think about the interaction between science and culture as the essence of TD, which is an important point of view, but not complete in terms of TD epistemic forms, i.e. **technoscience, tradition, philosophy, and art**. TD needs to evidence clearly and concretely the concepts of technoscience and complementarity, considering that some technics or technologies cannot be demonstrated by science and may have connections to culture through a complementarity technic vs. culture, i.e. some technics may come from tradition (part of the culture), e.g. Ayurvedic medicine and Traditional Chinese Medicine, both coincidentally also based on the complementarity and balance, including the concept of opposites.

3) How can we mediate conflicts with TD? See Reference⁹⁶

Through Dr. Thieriot Loisel Gray Zone⁹⁷, in connection with the perspective of social audit of the French economist, mediator, and social auditor Dr. Hubert Landier, considering Eng. Leonardo Costa's HPTD-M, the idea of the transdisciplinary mediating manager emerges as an alternative for problem solving in organizations.

The rationalist models borrowed from the hard sciences configure a reductionist approach of merely mechanistic AI or biological-environmental views, which can't be applied to complex human phenomena, for which the proposal of

⁹⁶ Costa, L.S.G.M. (2024). Artificial Intelligence and the Transdisciplinary Human Mediation of HPTD-M. *Transdisciplinary Journal of Engineering & Science*, 15. <https://doi.org/10.22545/2024/00243>.

⁹⁷ Thieriot Loisel, M. (2024). Artificial Intelligence and Our Secret Mind: Human Mediation in Grey Zones. *Transdisciplinary Journal of Engineering & Science*, 15. <https://doi.org/10.22545/2024/00247>.

the mediating manager emerges as a possible alternative. An article evolved from this perspective together with a training course given by Eng. Leonardo Costa to public managers in Brazil.

The idea of the mediating manager involves various disciplines to create integration by understanding beyond and through disciplines, which may lead the mediator to four dimensions:

— **Generalist:** Manager as an articulating leader, a generalist articulating many specialists.

— **Peacemaker:** A mediator promotes agreement between the parties to resolve conflicts before judicializing an issue, including by using techniques along the lines of the Systemic Law discipline of the Brazilian Bar OAB. In the case of public management, the manager is in the role of a facilitator, articulator, and conflict harmonizer.

— **Ghostbusters:** With the ability to put the right people in the right place. Two mediators in a social audit (different from an accounting audit) looking for the ‘ghosts in the organizations’ environments’, according to Dr. Landier: The ever-present, yet unspoken memory of an event or a person that destabilized the community and contributes to keeping this collectivity divided, for no apparent reason. In the specific case of the public manager, the development of the expertise to put the right people in the right place so that ‘ghosts’ are prevented through organizational synergy.

— **Welcoming in a broad sense:** The capacity to listen, to hear, and to welcome all the actors. A therapist is a mediator for the conscience development of his clients, on a personal, family, or organizational level. As for the manager, the ability to listen and welcome (accept and integrate) all stakeholders or actors involved in work groups and organizations, so that the best solutions are developed. Regarding the levels of listening within working groups:

— **Level 1 – Distracted listening,** not paying attention completely to what is said.

— **Level 2 – Bureaucratic or pro forma** listening, just taking notes of what is said.

— **Level 3 – Listening rationally:** according to personal/organizational mindset or mental models. Those may swear that they listen to everyone, but they do it only pro forma or bureaucratically, not accepting different opinions.

— **Level 4 – Welcoming in a strict sense: i) acceptance:** the leader must emotionally accept to discuss new ways or ideas, even if considered weird or unusual, through the skill of emotional intelligence; **ii) integration** of all stakeholders into the workgroup, making everybody feel included, which is difficult, but it is what solves the problem dialectically and effectively, as per the HPTD-M analytical model attributes from the most abstract to the more concrete: dialectics, sustainability, simplicity, and effectiveness.

This expertise can avoid costs for organizations and civil society be-

cause the problem is solved before it happens, or in the beginning. Transdisciplinary mediators act like *fire extinguishers* before the fire spreads. Also, those mediators promote the consciousness development to listen more than bureaucratically and rationally, with acceptance and integration of all the stakeholders or actors involved in work groups and organizations.

4) What should the TD Chair explore basically? Reference: this article.

— A transdisciplinary course in the first semester of university graduation.

— Simplification and flexibility to start (concepts of technoscience and complementarity).

— The mediating professor for learning to learn and understanding, not only knowing.

— Creation of a TD kind of Ph.D. and M.Sc. focused on the dialogue between theory praxis and generalist specialist. An MBA with more theory could be a starting point.

— The three types of logic as tools for problem solving in dialogue with new ideas that make sense, considering the level of complexity in each concrete case.

— The abstract-concrete complementarity in problem solving and the concept of quaternary complementarities for troubleshooting in practice.

Appendix 2: Background of TD Courses in Brazil Aiming at the International TD Chair

1) UNIPAZ (established in 1987): A 481-hour course on Holistic TD called FHB, i.e. *Holistic Basic Training* with 25 instructors. For any student or professional over 18 years old, those seeking a new way of being in the world, or those interested in the holistic transdisciplinary approach as a tool for improving personal and professional dimensions. The deans: Pierre Weil (deceased in 2008) and then Roberto Crema, Brasília-DF, Brazil. Regarding the FHB course: Roberto Crema was responsible for implementing and coordinating its Pilot Group at UNIPAZ in Brasilia from 1989 onwards. So, the FHB has already a 35-year tradition⁹⁸.

2) From 2005 to 2006: A TD Philosophy Chair was ministered by Dr. Ubiratan D'Ambrosio (one of the 1986 UNESCO Venice Charter signatories) and Dr. Mariana Thieriot Loisel, for the Monastery of São Bento Faculty of Philosophy, São Paulo, Brazil. This information was given by Dr. Thieriot Loisel in a conversation with this author.

3) Marco Ernani Hyssa, M. D., MBA. TD practitioner ex-mayor of Altinópolis in São Paulo State. A pediatrician who took the FHB course of UNIPAZ

⁹⁸ <https://unipazdf.org.br/produto/formacao-holistica-de-base/>.

(see item 1). Considering Hyssa's public management as mayor, the French media defined Altinópolis as a 'Brazilian Utopia', e.g. in 2004 the first page of the *Le Monde*⁹⁹ and in the 2014 *Positive Economy Forum Le Havre*¹⁰⁰. In 2006, The Mato Grosso State Government School, Brazil, hired Hyssa to give a TD course for public managers¹⁰¹.

4) Eng. Leonardo da Silva Guimarães Martins da Costa, MBA, civil-servant auditor and independent TD theorist/practitioner. The author has a concrete experience based on his international HPTD-M theory: *The mediating manager and quality of public expenditure*. A 14-hour course of transdisciplinary tools applied to organizations focused on TD and concepts of mediation and leadership. A 1st Edition was given as a pilot course at the Brazilian Government National School of Public Administration (ENAP) in March/2023. The ENAP site description in Portuguese of the objective, methodology. The course was very well evaluated by the participants, i.e. municipal, state, and federal public managers of the 44-year-old average¹⁰².

Unfortunately, those Brazilian TD courses that promote a concrete dialogue between theory and praxis are ministered only in Portuguese. However, **this author's HPTD-M theory was designed and codified originally in English, as an effort to integrate TD researchers worldwide**. As per the February-2024 Berlitz's list of the 10 most spoken languages in the world and the major Western languages¹⁰³:

1. English: 1.45 billion.
4. Spanish: 548 million.
5. French: 280 million.
8. Russian: 258 million.
9. Portuguese: 257 million.

In this context, to complete the 10 most spoken languages with those not considered part of the Western culture, for obvious reasons.: 2. Mandarin (1.12 billion), 3. Indi (602 million), 6. Modern Standard Arabic (274 million), 7. Bengali (272 million), and 10. Urdu (231 million).

All that said, in this author's opinion through the HPTD-M, **the most**

⁹⁹ https://www.lemonde.fr/archives/article/2004/10/01/altinopolis-une-utopie-bresilienne_381363_1819218.html

¹⁰⁰ <https://www.youtube.com/watch?v=VUt4wORb5y8&t=62s>.

¹⁰¹ Hyssa, Marco Hernani (2006). Transdisciplinary course for public managers in the Brazilian State of Mato Grosso. *The Mato Grosso State Government School*, Brazil. <https://www5.sefaz.mt.gov.br/-/escola-de-governo-realiza-estudos-sobre-transdisciplinariadade>.

¹⁰² Costa, L. S. G. M. (2023). The mediating manager. A course of transdisciplinary tools applied to organizations, based on the HPTD-M theory and the new conception of mediation and leadership. *Brazilian National School of Public Administration (ENAP)*. <https://suap.enap.gov.br/portal-doaluno/curso/2136/?area=16>. The ENAP certificate is in the following link, which also explains the course main topics through translation from Portuguese to English, so that English-speaking researchers may understand the content: <http://dx.doi.org/10.13140/RG.2.2.28025.54.884>.

¹⁰³ www.berlitz.com/blog/most-spoken-languages-world.

effective way to promote an international TD Chair that provokes cultural transformation in the Western dominant dogmatic scientism feedback by ideologies (not ideas) seems to be through English, a language that can achieve as many readers as possible worldwide. This could provoke a critical mass to introject new paradigms in the Western collective unconscious, by using the personal conscious of influencers in a constructive sense. The theory basis for this finding can be demonstrated by the HPTD-M perspective of complementarity, like in Modern Physics and Analytical Psychology, especially because English is an international language spread worldwide.

Acknowledgments and Conflicts of Interest

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