Panel 01: Critical Issues for the Future of Education
Rodolfo A. Fiorini – What is Transdisciplinary Education?
« Le seul véritable voyage ce ne serait pas d'aller vers de nouveaux paysages, mais d'avoir d'autres yeux… »

Valentin Louis Georges Eugène Marcel Proust (1871-1922) from La Prisonnière (1923).
Presentation Outline

1. Introduction (09)
   • Transdisciplinary Cognition
   • Transdisciplinarity in Education

2. The Challenge of Evolutionary Learning (10)
   • Modern Paradigmatic Limitations
   • The Two Modelling Understandings

3. Conclusion (03)
   • WAAS New Paradigm for Human Development
   • IEEE ICCI*CC 2019
What is Transdisciplinary Education?

1. Introduction (09)
- Transdisciplinary Cognition
- Transdisciplinarity in Education
We were and are still currently educated to REDUCTIONIST learning which leads to ACTIONS based on (UNAWARE) APPROXIMATED approximations.

We MUST switch to
What is Transdisciplinary Education?

EVOLUTIONARY learning which can create the right INTERACTIONS with a complex world and universe, based on AWARE, EXACT approximations.
What is Transdisciplinary Education?

New Eyes (Is)

Transdisciplinary Cognition
(Cognitive Transdisciplinarity)

Transdisciplinarity in Education for Deep Learning, Creativity and Innovation

What is Transdisciplinary Education?

New Eyes (Is)

Cognitive Transdisciplinarity?

1. Humanity and Technology
2. Mind, Thinking, and Rationality
3. Creativity
4. Modeling Social Reality
5. Education in the 21st Century
IEEE ICCI*CC 2019
Polytechnic University of Milan, Italy, July 23-25, 2019
18th IEEE International Conference on Cognitive Informatics & Cognitive Computing

http://www.ucalgary.ca/icci_cc/icccicc-19
http://www.iccicc19.polimi.it (mirror site)

Paper submission:
https://easychair.org/conferences/?conf=ieeeicccicc19

2019 THEME
Cognitive Learning Systems, Brain-Inspired Systems, Cognitive Robotics, and Art & Science
What is Transdisciplinary Education?

World Academy of Art and Science (WAAS)

1- Humanity and Technology
- Evolving relationship between man and the machine
- Governing technology
- Managing systemic risk
- Social responsibility of science
- Governing privacy and trust
- Opportunities and challenges of networks
- Evolution of human-machines roles and relationships
- Man and machine consciousness
- Values in decision-making

2 - Mind, Thinking and Rationality
- Human and AI/machine learning
- Concepts of social cognition
- Mind and Brain
- Psychology and Neuroscience of consciousness
- Social Physics and cognitive computing
- Experience in judgment formation
- Information and value judgements
- Impact of digitization on the brain, mind and behavior
- Objective and subjective dimensions of decision-making
- Anticipation and determinism in decision-making
3 - Creativity
- Cognition and Mental development – stages and process
- Conceptual systems and deep thinking
- Scientific creativity
- Integral knowledge and holistic thinking
- Idioms in cognitive linguistics
- Sense perception, rationality and intuition
- Emotion, sympathy and affective computing
- Mathematical ambiguity and ambivalence
- Ambiguity in law and judicial proceedings
- Creativity and Individuality

4 - Modeling Social Reality
- Role of technology in social organization
- Theories and models of social organization
- Evolution of social organization
- New business models
- Cognitive learning and organizational effectiveness
- Blockchain as an emerging social organization
- Modeling global society
- Complexity and contextuality
- Cognitive transdisciplinarity
- Social informatics
- Modeling reality for decision-making

World Academy of Art and Science (WAAS)
What is Transdisciplinary Education?

World Academy of Art and Science (WAAS)

5 - Education in the 21st Century

- What should be taught in an age of infoglut and universal access?
- The process of learning
- Experiential learning
- Effective learning
- Contextual learning
- Machine-aided learning
- Peer-to-peer learning
- Information transmission losses
ICCI*CC at the Politecnico di Milano University 2019

2019 THEME

Cognitive Learning Systems, Brain-Inspired Systems, Cognitive Robotics, and Art & Science
2. The Challenge of Evolutionary Learning (10)

- Modern Paradigmatic Limitations
- The Two Modelling Understandings
What is Transdisciplinary Education?

On Paradigmatic Limitations

MODERN PARADIGMATIC LIMITATION EXAMPLES

Optimal Control Theory System Robustness &
System Risk Analysis.
To face the challenge of life as complex systems understanding and reliable arbitrary complex multiscale (ACM) system modeling, we need to be able to manage system uncertainty quantification from macroscale, through mesoscale, till nanoscale and beyond.

We need more robust, resilient and antifragile application to be ready for next generation systems. Attempts to optimize multi-scale systems in a top-down (TD) point-of-view (POV) will be less and less effective, and cannot be done in real time.

That is the main reason why, over the last few years, integration of stochastic methods into a multi-scale framework (from macro-scale to nano-scale) or development of multi-scale models in a stochastic setting for epistemic uncertainty quantification (UQ) is becoming an emerging research frontier for systems modelling, innovation and competitive development in Science and Technology.
What is Transdisciplinary Education?

The Root of the Current Problem for AMS System Modelling
What is Transdisciplinary Education?

The Root of the Current Problem for AMS System Modelling

Rodolfo A. Fiorini
Complexity is the impossibility of separating a system from its context. A living being from its environment. An object from its measuring instrument.
The Two Modelling Understandings

By default, systems are simple

Some of them are complicated

Occasionally systems are complex

Wicked systems are exceedingly rare

By default, systems are complex

Simple systems are limiting cases

Includes “complicated systems”

Complex systems treated as if they were simple tend to generate wicked problems
What is Transdisciplinary Education?

INNER vs. OUTER UNIVERSE (IOU) Mapping

DIRECT SPACE (DS)

CO-DIRECT SPACE (CS)

RECIPIROCAL SPACE (RS)

RECIPIROCAL CO-SPACE (RC)

R.A. Fiorini, 2014
What is Transdisciplinary Education?

CICT Solution to the Problem for AMS System Modelling

Resilience Conceptual Framework

Multi-Scale Model

TD POV

BU POV
### Half-Plane Space vs. OECS Space

#### Two Irreducible Complementary Operative Spaces

**Half-Plane Space**
- Inert matter best operational representation compromise.
- A Representation Space endowed with full Flexibility (mapping complexity to simplicity to give space to Imagination).
- Simplified system dynamics framework (Newtonian Approach).
- To model any geometrical space and monitor system dynamics behavior only.
- A Spectator can become a system innatural perturbation.

**OECS Space**
- Livig matter best representation operational compromise.
- An Outer Representation Space one-to-one linked to its Inner Representation Space.
- Natural system dynamics framework (Quantum Field Theory Approach).
- To model projective relativistic geometry and to anticipate emergent system dynamics.
- An Observer can become a system natural co-artifex.

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**What is Transdisciplinary Education?**

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Rodolfo A. Fiorini
Because we all share this small planet Earth, we have to learn to live in harmony and peace with each other and with Nature. That is not just a dream, but a necessity.

Learning according to Tenzin Gyatso, the 14th Dalai Lama (1935-)

What is Transdisciplinary Education?
What is Transdisciplinary Education?

3. Conclusion (03)
• WAAS New Paradigm for Human Development
• IEEE ICCI*CC 2019
WAAS New Paradigm for Human Development

The human being is the source of unlimited creative potential and the present, reductionist paradigm falls far short of fully developing the potential of its members. Solutions are available because unutilized human potential exists in abundance waiting to be developed and released.

For instance, Nikola Tesla was a remarkable man not only for his inventions, but also for his dedication and application. It is amazing to read of his "inner life" in a way rarely shared.

According to WAAS new paradigm for human development, as the creation of the new vision and new story for our shared future, an inspired cultural revival can be materialized in many different ways which, however, must share a common, solid, cultural background built on dedication and application.

WAAS, 2014
What is Transdisciplinary Education?
What is Transdisciplinary Education?
Thank You for Your Attention

What is Transdisciplinary Education?