3rd International Conference on Future Education

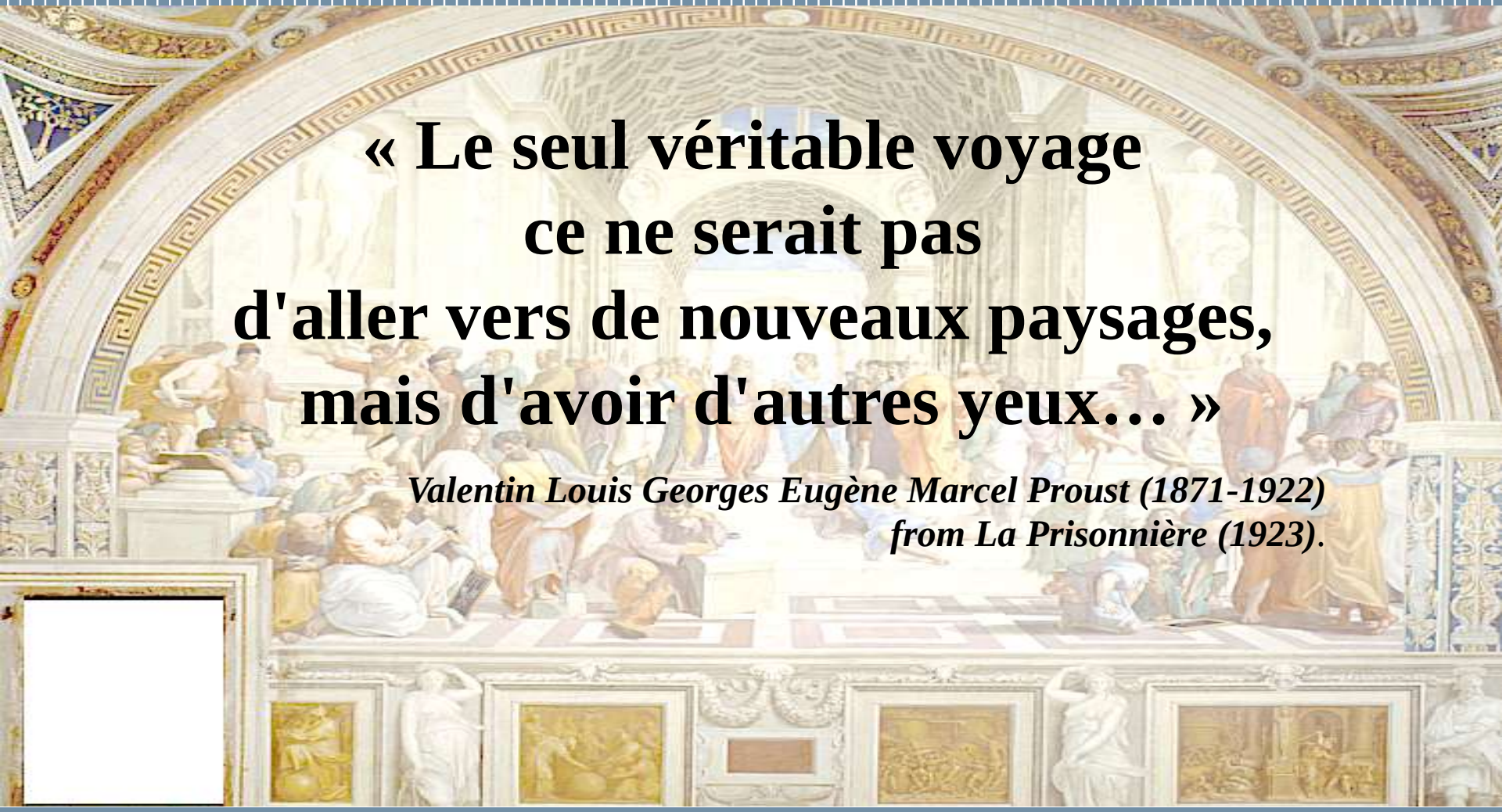
"Latin America Perspective"

Windsor Florida Hotel – Rio de Janeiro, Brazil November 12 – 14, 2018

Panel 01: Critical Issues for the Future of Education

Rodolfo A. Fiorini – What is Transdisciplinary Education?

What is Transdisciplinary Education?



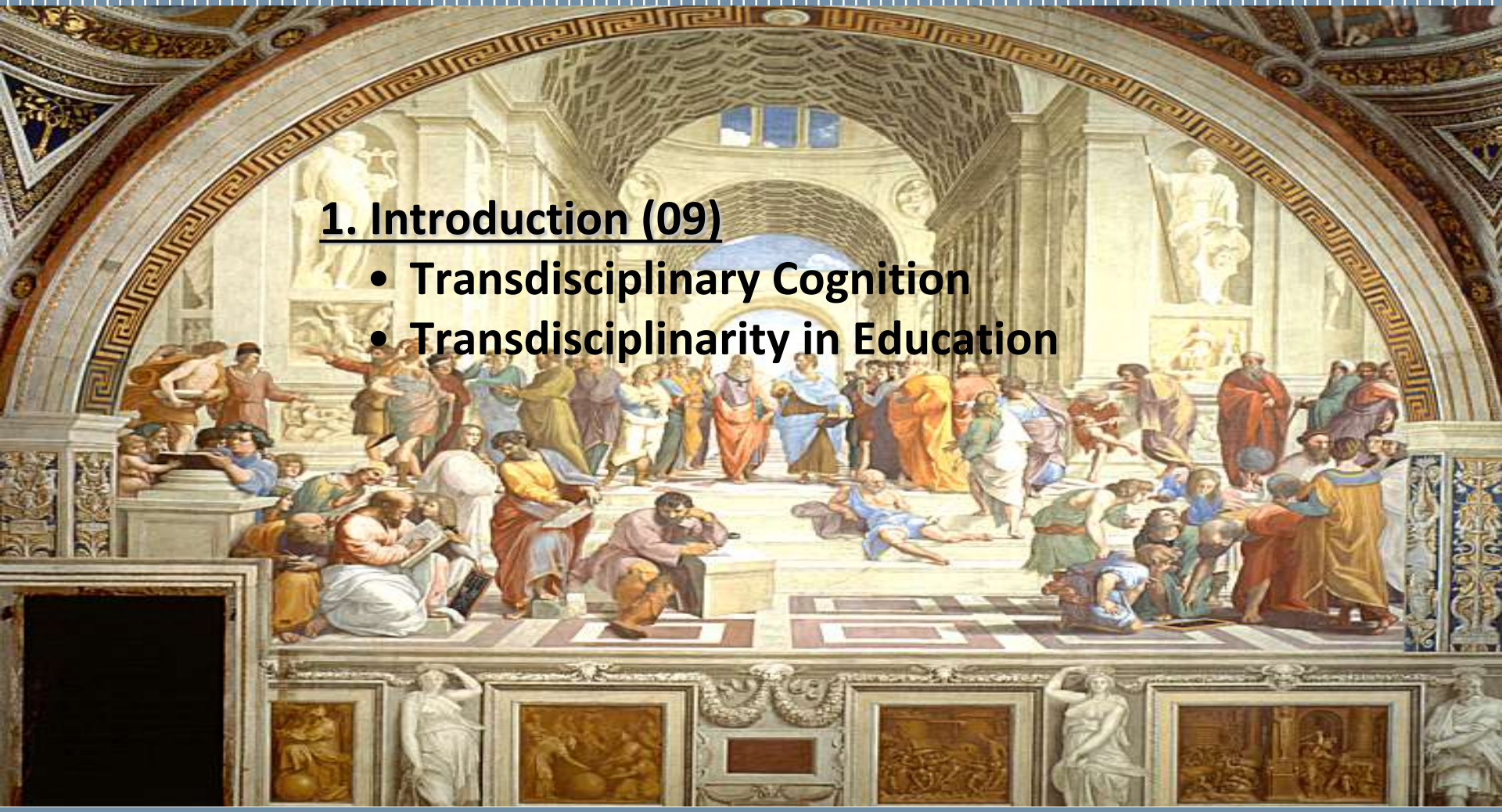
« Le seul véritable voyage
ce ne serait pas
d'aller vers de nouveaux paysages,
mais d'avoir d'autres yeux… »

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

Presentation Outline

1. Introduction (09)
   - Transdisciplinary Cognition
   - Transdisciplinarity in Education
2. The Challange 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**

What is Transdisciplinary 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.

New Eyes (Is)

Transdisciplinary Cognition

(Cognitive Transdisciplinarity)

Transdisciplinarity in Education for Deep Learning, Creativity and Innovation

http://worldacademy.org/files/rome2017/papers/RCP-S6-6.2.Transdisciplinary-Education-RF.pdf

New Eyes (Is)

Cognitive Transdisciplinarity ?

1. Humanity and Technology

2. Mind, Thinking and Rationality

3. Creativity

4. Modeling Social Reality

5. Education in the 21th 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/iccicc-19

http://www.iccicc19.polimi.it (mirror site)

Paper submission:

https://easychair.org/conferences/?conf=ieeeiccicc19

2019 THEME

Cognitive Learning Systems, Brain-Inspired Systems, Cognitive Robotics, and Art & Science

What is Transdisciplinary Education?

2019 THEME

Cognitive Learning Systems, Brain-Inspired Systems, Cognitive Robotics, and Art & Science

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

What is Transdisciplinary Education?

2019 THEME

Cognitive Learning Systems, Brain-Inspired Systems, Cognitive Robotics, and Art & Science

World Academy of Art and Science (WAAS)

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 infomatics
- Modeling reality for decision-making

What is Transdisciplinary Education?

2019 THEME

Cognitive Learning Systems, Brain-Inspired Systems, Cognitive Robotics, and Art & Science

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

2019 THEME

Cognitive Learning Systems, Brain-Inspired Systems, Cognitive Robotics, and Art & Science

Cognitive Informatics

- Informatics models of the brain
- Cognitive processes of the brain
- The cognitive foundation of big data
- Machine consciousness
- Neuroscience foundations of information processing
- Denotational mathematics (DM)
- Cognitive knowledge bases
- Autonomous machine learning
- Neural models of memory
- Internal information processing
- Cognitive sensors and networks
- Cognitive linguistics
- Abstract intelligence (αI)
- Cognitive information theory
- Cognitive information fusion

Cognitive Computing

- Cognitive computers
- Cognitive robotics
- Autonomous Computing
- Knowledge processors
- Cognitive semantics of big data
- Cognitive machine learning
- Knowledge manipulations
- Pattern recognition
- Cognitive agent technologies
- Cognitive inferences
- Computing with words (CWW)
- Cognitive decision theories
- Concept & semantic algebras
- Fuzzy/rough sets/logic
- Affective computing

Computational Intelligence

- Cognitive computers
- Cognitive systems
- Cognitive man-machine communication
- Cognitive Internet
- World-Wide Wisdoms (WWW+)
- Mathematical engineering for AI
- Cognitive vehicle systems
- Semantic computing
- Distributed intelligence
- Mathematical models of AI
- Cognitive signal processing
- Cognitive image processing
- Artificial neural nets
- Genetic computing
- MATLAB models of AI

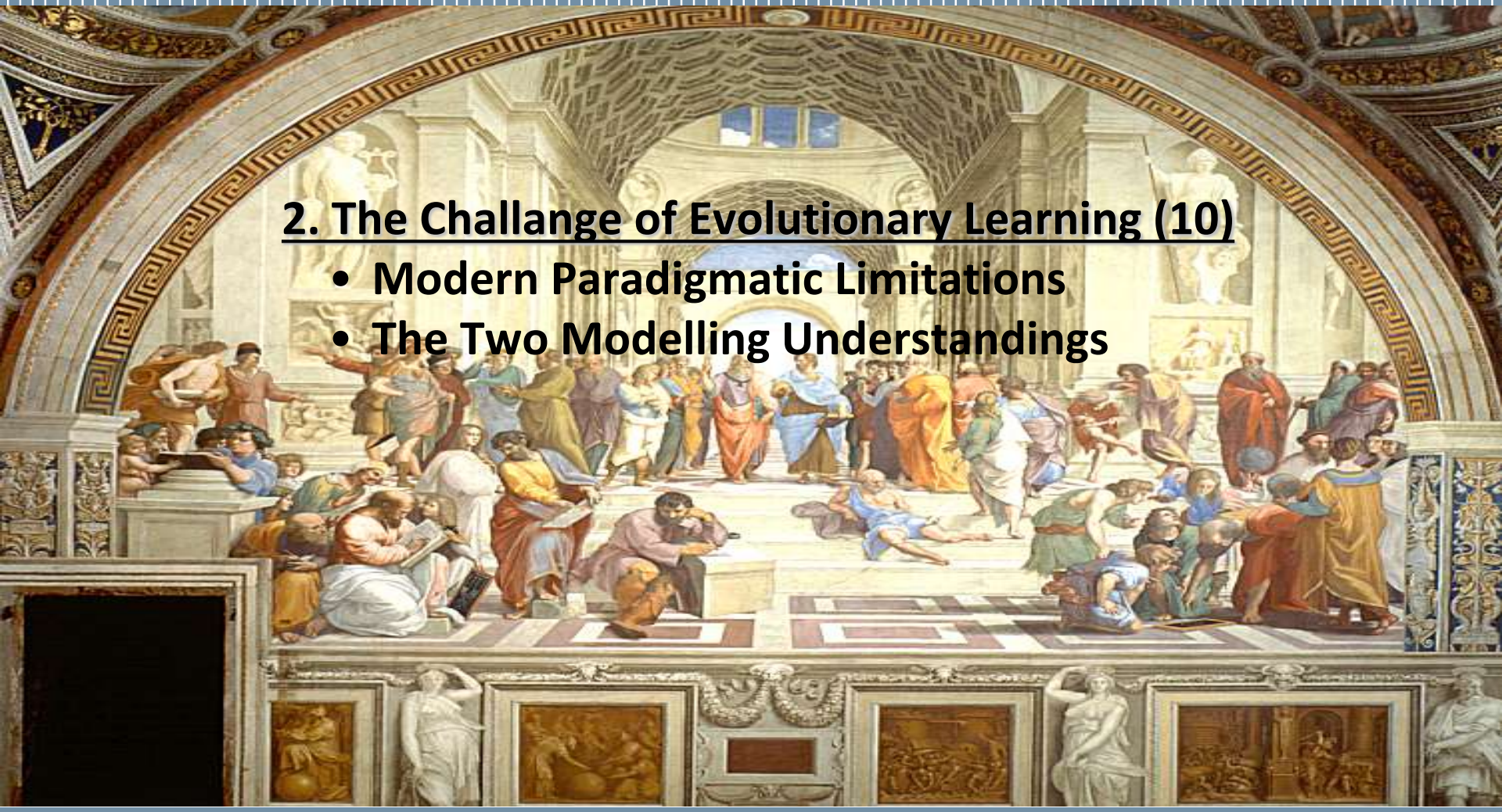
Brain Informatics

- Brain-inspired systems
- Neuroinformatics
- Neurological foundations of the brain
- Computational brain science
- Software simulations of the brain
- Brain-system interfaces
- Neurocomputing
- eBrain models
- DNA and genome cognition
- Computational neurology
- Brain image processing
- Bioinformatics
- System models of the brain
- Cognitive process models
- Neurocircuit theories

Symbiotic Science & Art

- Foundations of symbiotic systems
- Technology and society
- Symbiotic autonomous systems (SAS)
- Mind, thinking, and rationality
- Value judgement in decision making
- Social implications of AI
- Human-machine cooperation
- Creativity and wisdom
- Emotion and affective computing
- Roles of AI in social organization
- Computational intelligence in art
- Transdisciplinary cognition
- Science and art symbiosis
- Education for sciences vs. arts
- Concrete and abstract sciences

What is Transdisciplinary Education?



2. The Challange of Evolutionary Learning (10)

- Modern Paradigmatic Limitations
- The Two Modelling Understandings

On Paradigmatic Limitations

MODERN PARADIGMATIC LIMITATION EXAMPLES

Optimal Control Theory System Robustness
&
System Risk Analysis.

What is Transdisciplinary Education?

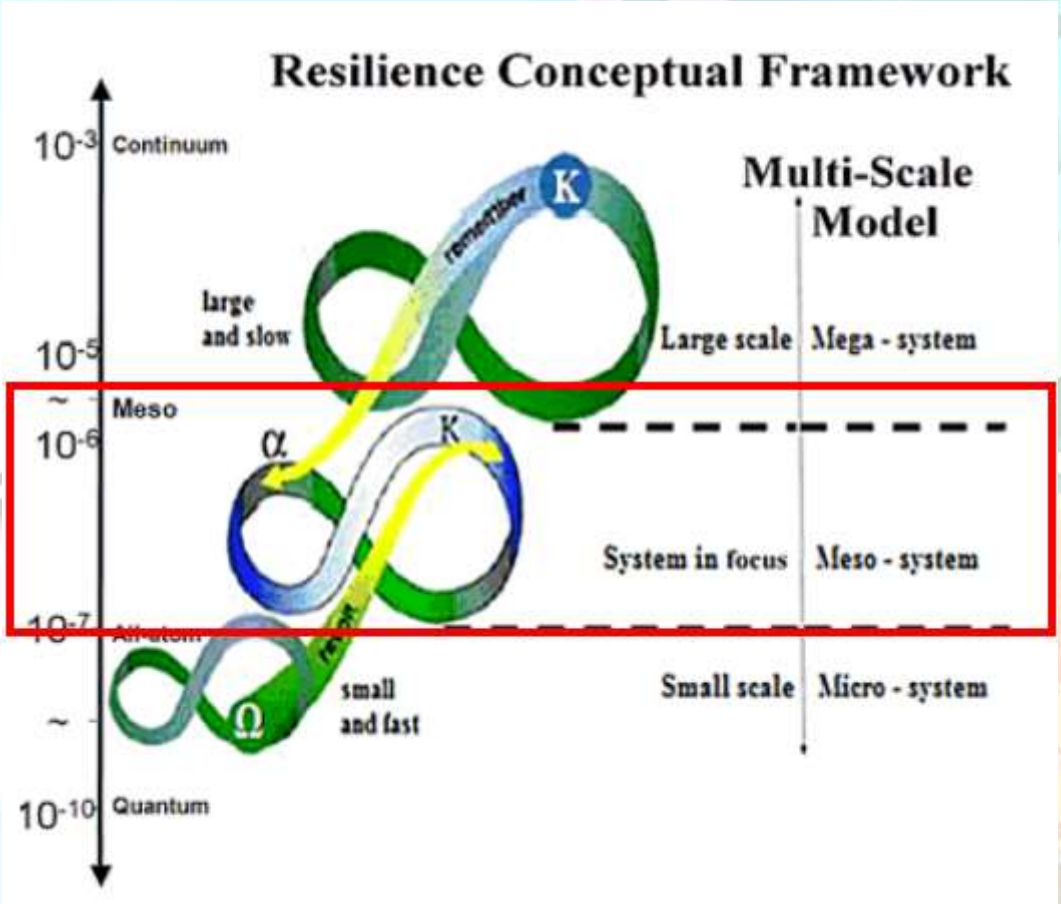
To face the challenge of life as complex systems understanding and reliable arbitrary complex multiscale (ACM) system modeling, **we need to be able to manage system uncertainty quantification from macroscale, through mesoscale, till nanoscale and beyond.**

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

What is Transdisciplinary Education?

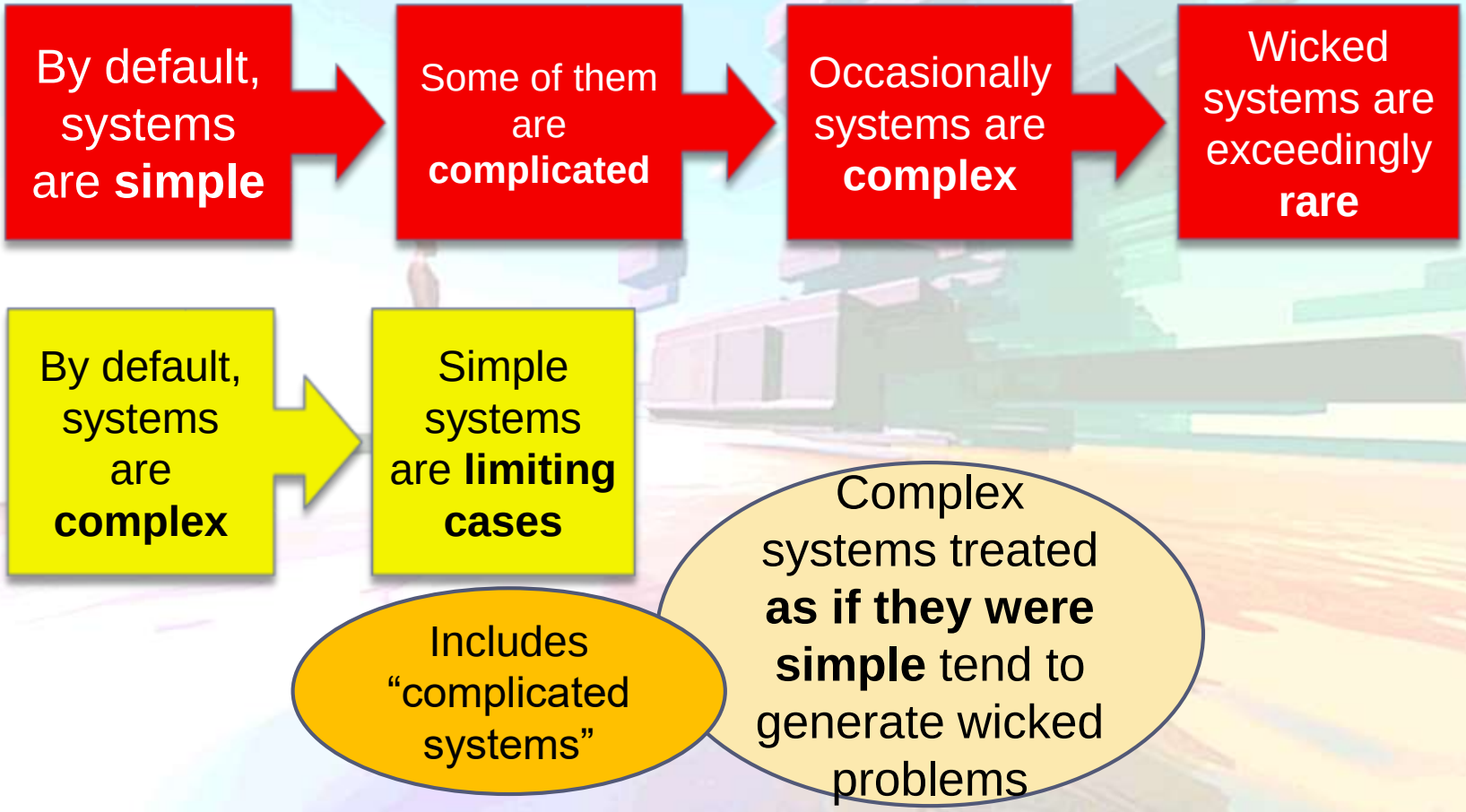
Complexity
is the impossibility of
separating a system from its context.

A living being from its environment.

An object from
its measuring instrument.

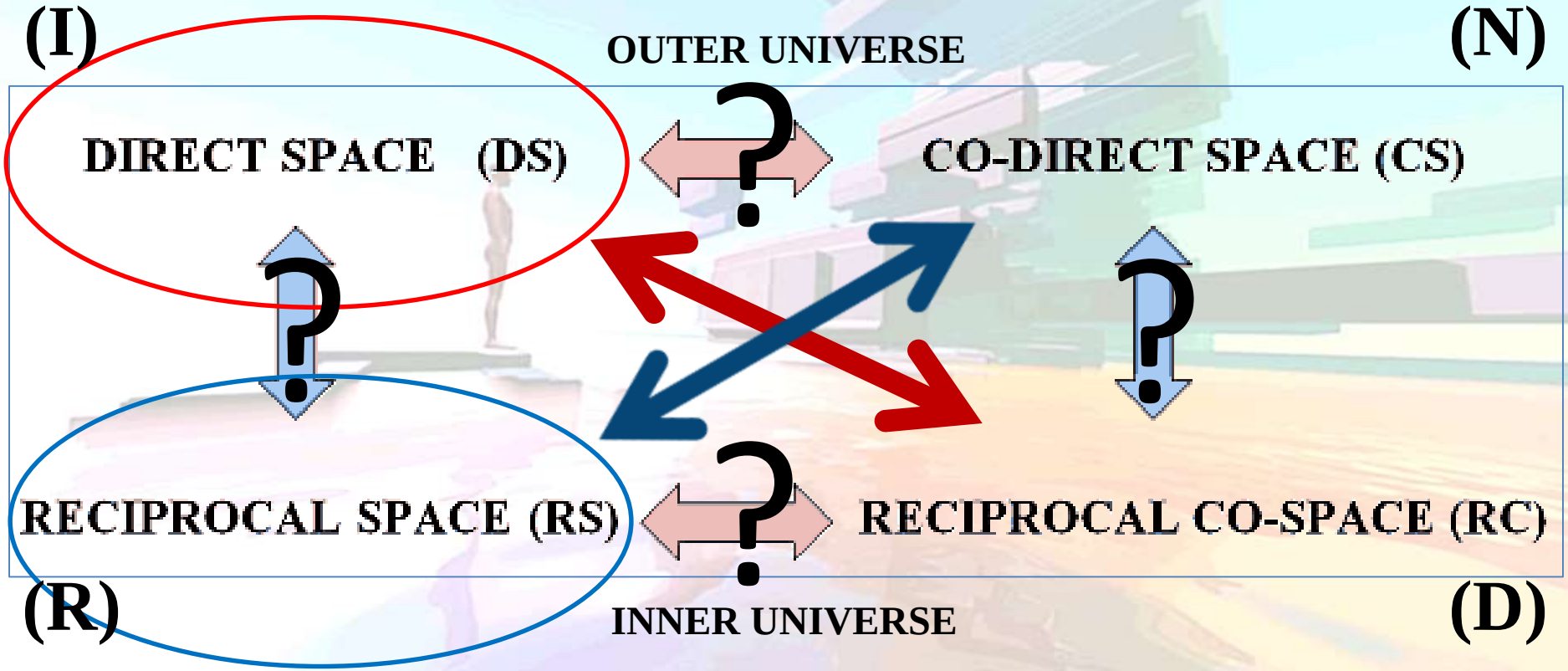
What is Transdisciplinary Education?

The Two Modelling Understandings



What is Transdisciplinary Education?

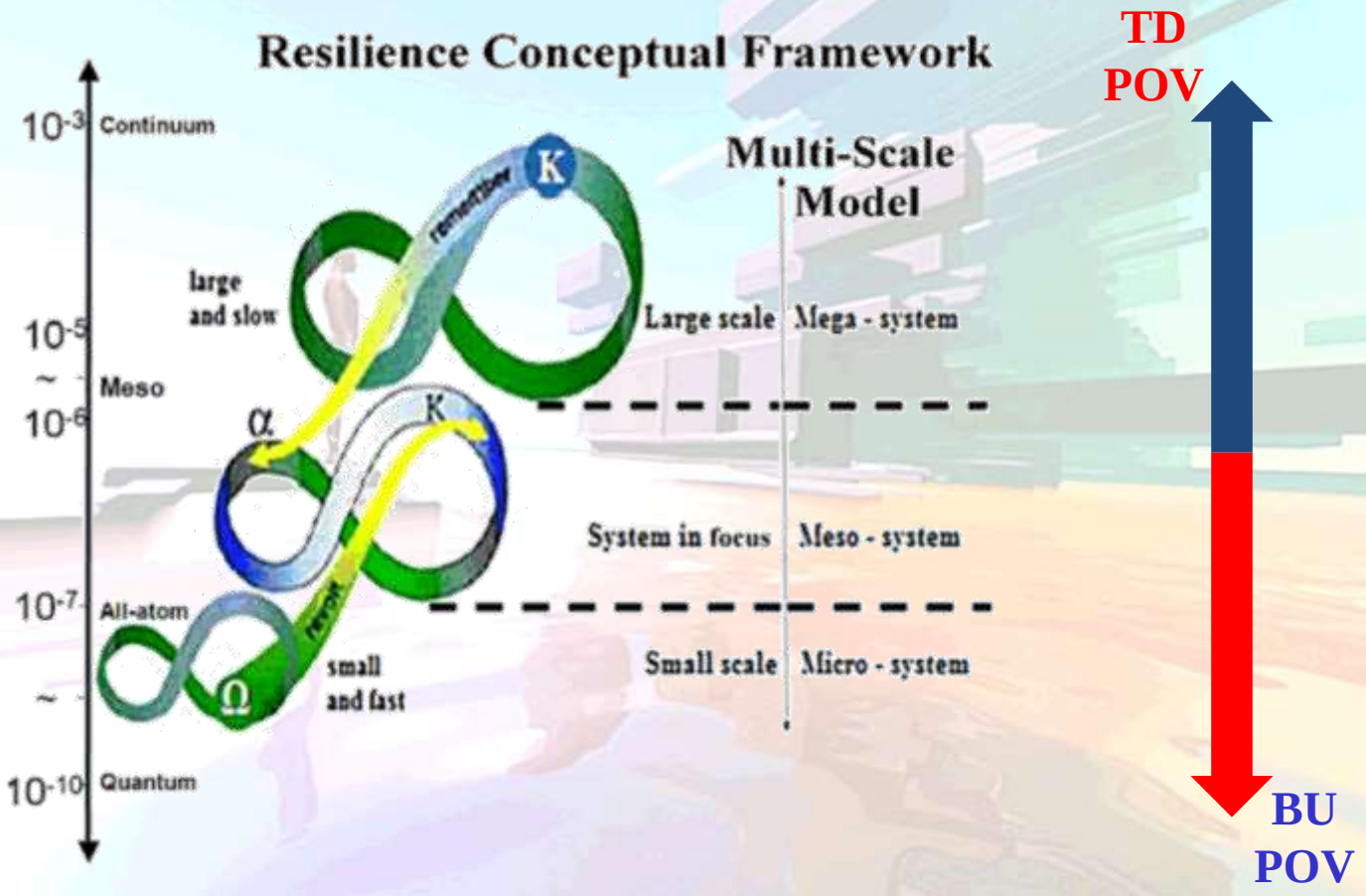
INNER vs. OUTER UNIVERSE (IOU) Mapping



R.A. Fiorini, 2014

What is Transdisciplinary Education?

CICT Solution to the Problem for AMS System Modelling



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

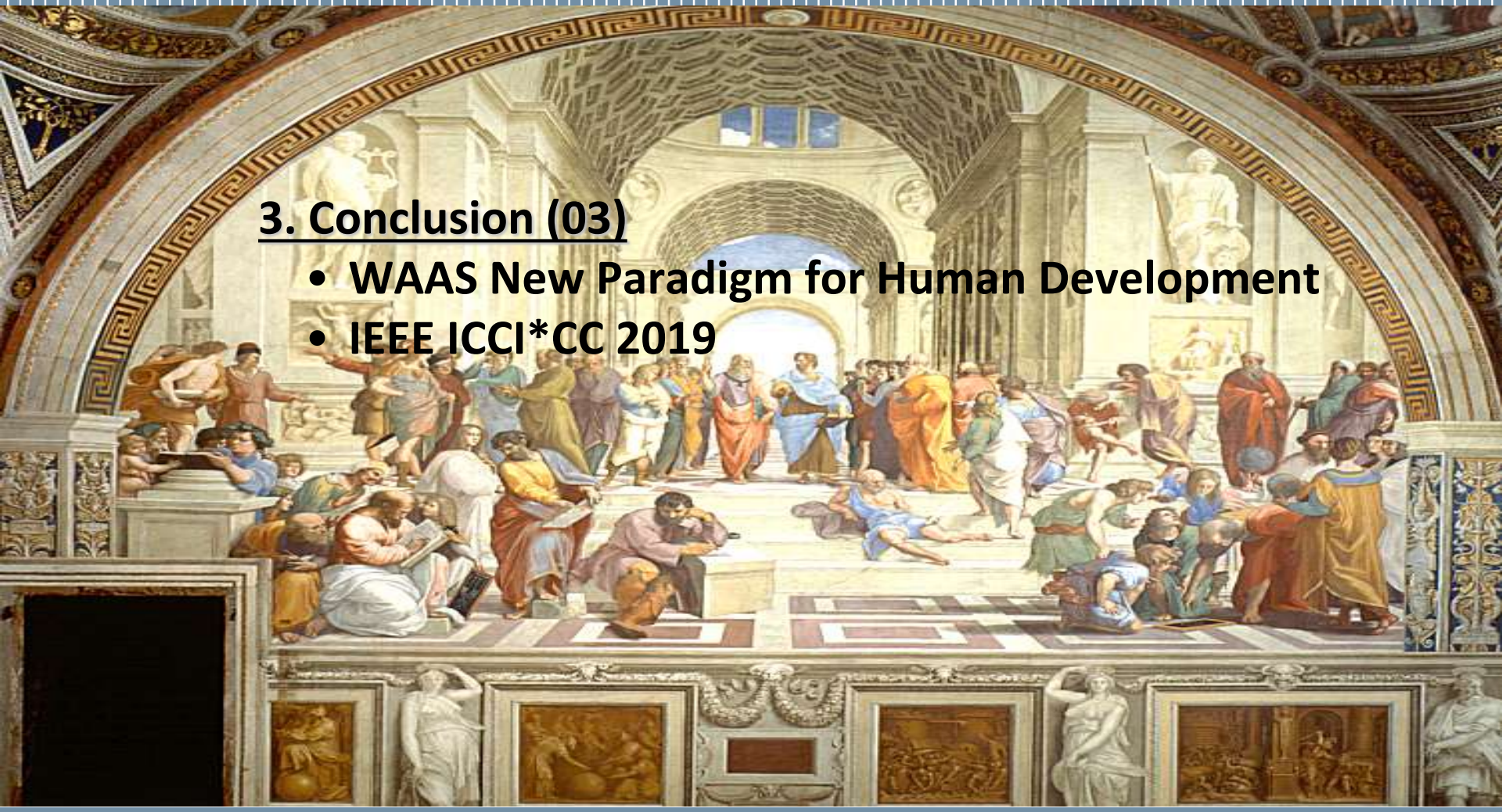
- Livig matter best representation operational compromise.
- An Outer Representation Space one-to-one linked to its Inner Representation Space.
- Natural system dynamics framework (Quantum Field Theory Approach).
- To model projective relativistic geometry and to anticipate emergent system dynamics.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

The Challenge of Evolutionary Learning

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

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.

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

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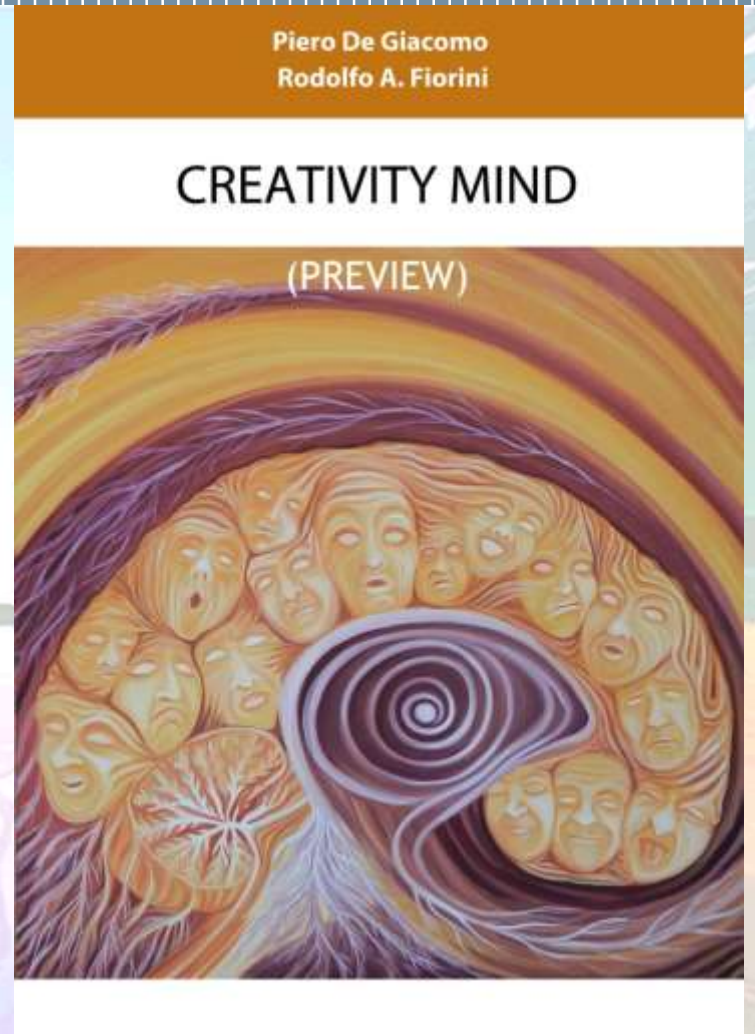


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Neuralizer Work In Progress

What is Transdisciplinary Education?