Study of Ontological and Epistemological Worldviews of Science Teachers in the Digital Age

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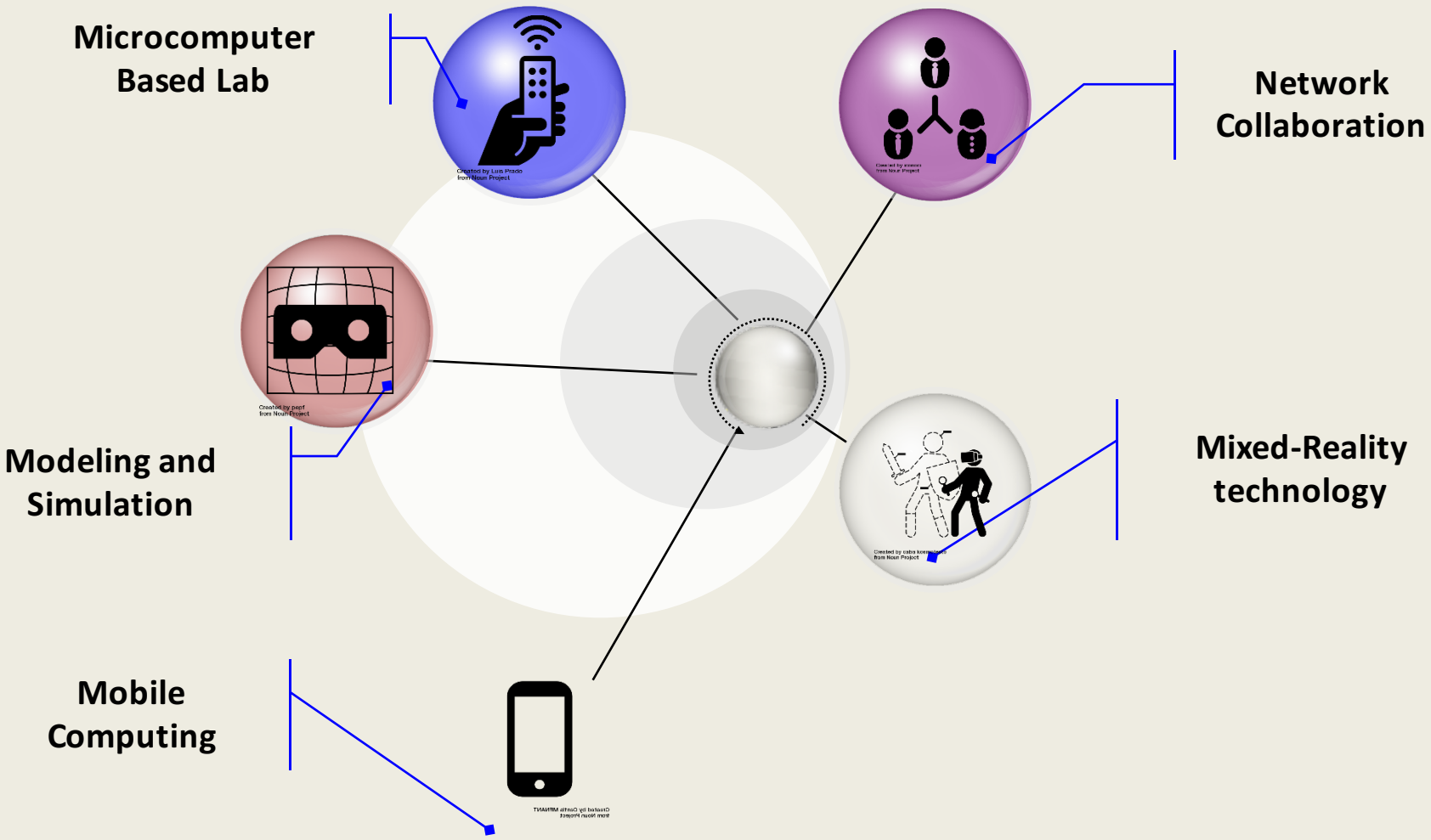
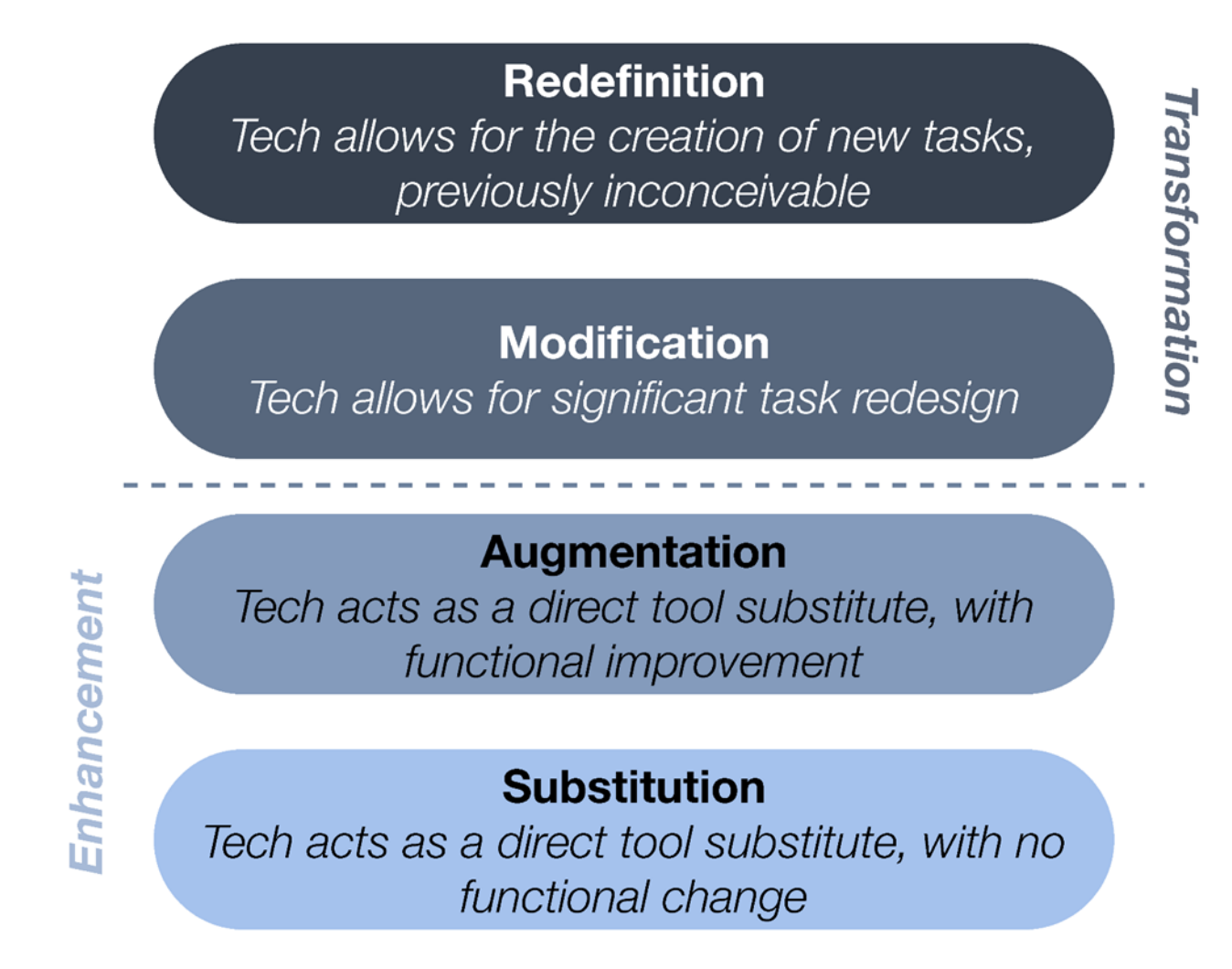
ICT in Science Education



ICT in Science Education

- In comparison with the great success of ICT in all spheres of the life, integration of ICT in education seems to remain modest
- Many researchers tend to believe that the main bottleneck of ICT integration into education stems from teachers' lack of technological literacy
- We assume that success of the ICT integration requires significant changes in teachers' worldview

SAMR Framework for Assessing ICT Integration in Science Education



SAMR Framework for Assessing ICT Integration in Science Education

- **We consider the Redefinition as the supreme, creative form of the understanding of technology in education**
- **Our hypothesis is that the changes of teachers' worldview are vital for their understanding the role of technology in science education in its transformative stage (Modification/Redefinition)**

Towards the Model of Studying Teachers' Worldview

1. Components of Worldview and Corresponding Transformations of Digital Society
2. Epistemological and Ontological Worldviews
3. Worldviews Realist-Relativist approach

Components of Worldview and Corresponding Transformations of Digital society

Components of worldview

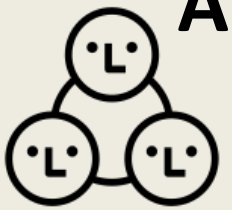
Floridi, 2014

- Self-conception
- Mutual interactions
- Conception of reality

- Blurred distinction between reality and virtuality
- Blurred distinctions between human, machine, and nature
- Reversal from information scarcity to information abundance

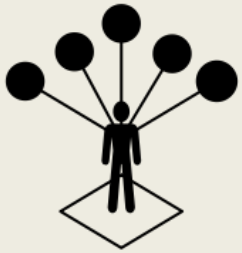
Transformations of Digital society

Self Conception



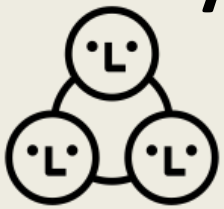
A blurred distinction between reality and virtuality

Digital representations can be said to exist, and whether they can be said to be an extension of reality



Mutual interactions

A blurred distinction between human, machine, and nature



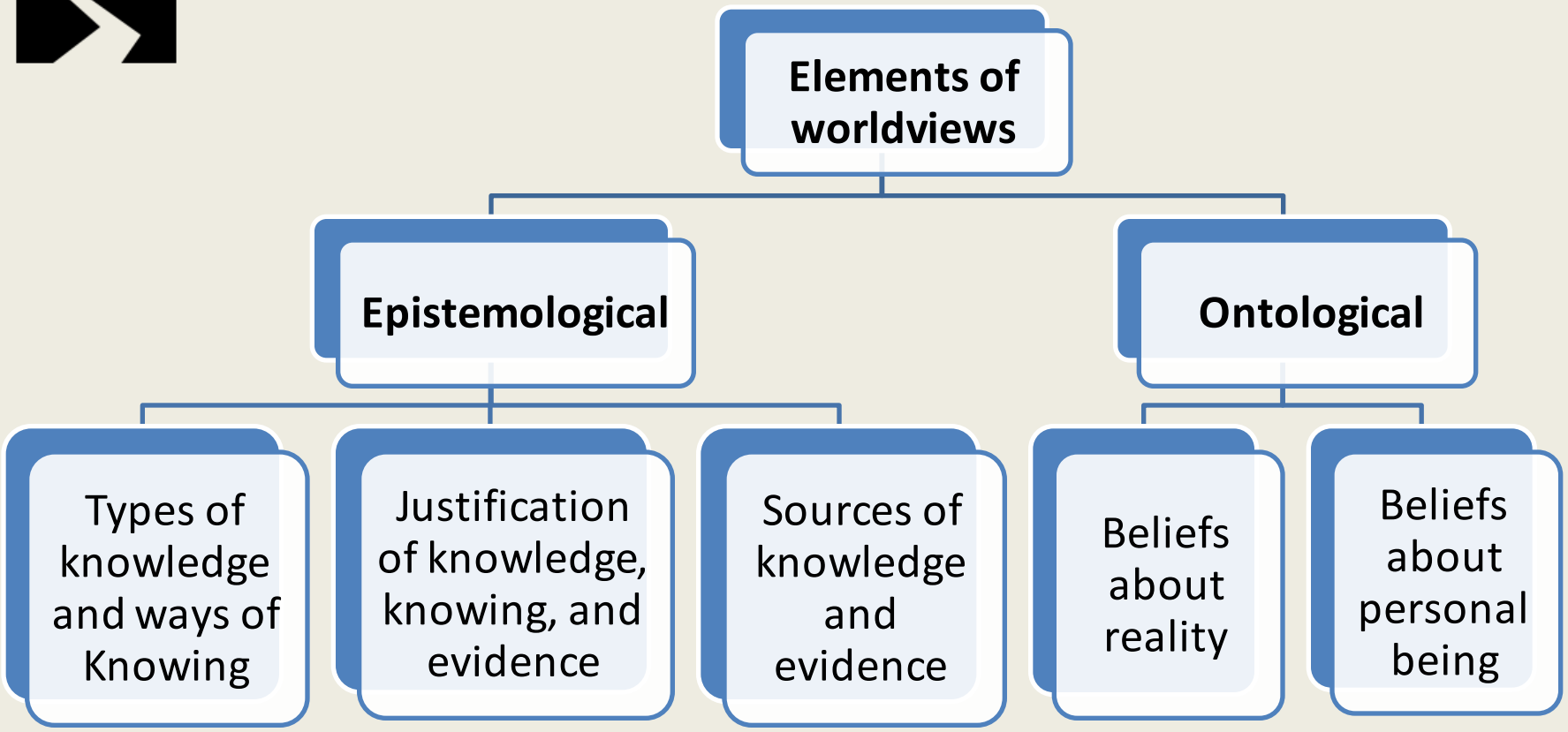
- Phenomenon of ubiquitous computing, embedded systems, and computer mediation of human activity (social networks, cloud computing)
- Redefinition of our environment through integration with technology, and the reevaluation of the nature of humanity through interaction with technology

Conception of reality

Shift from the scarcity of information to abundance of information

Changes in learning and understanding caused by the growing accessibility of information worldwide, as well as the ease of gathering and creating information

Epistemological and Ontological Worldviews


Elements of worldviews
Epistemological
Ontological
Types of knowledge and ways of Knowing
Justification of knowledge, knowing, and evidence
Sources of knowledge and evidence
Beliefs about reality
Beliefs about personal being

Schraw, 2013

Ontological Worldview

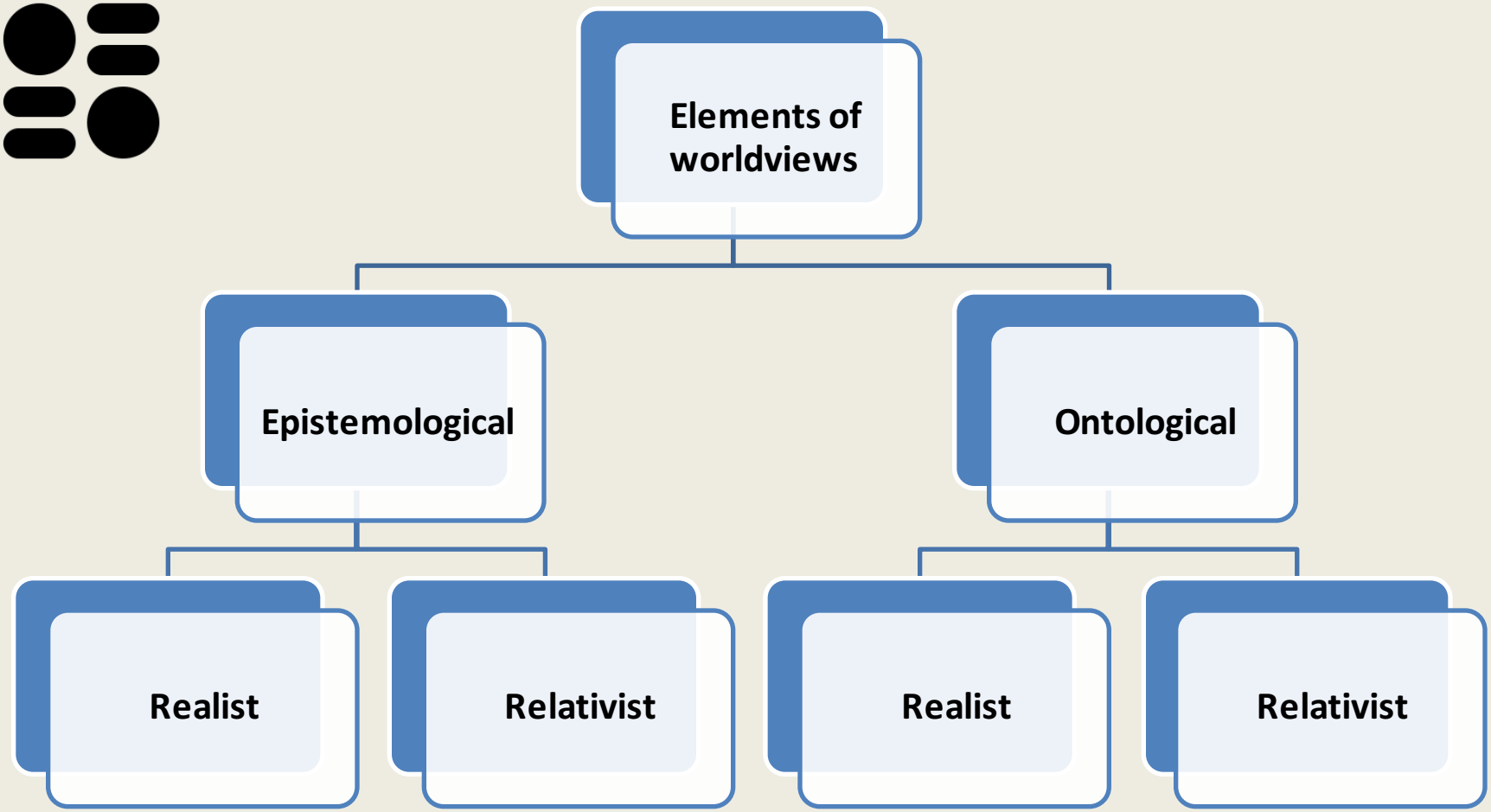
- **Individual's collective beliefs about the nature of reality and being**
- **Explicit and implicit beliefs, attitudes, and assumptions about the nature of reality and being in Digital Society**

Epistemological Worldview

- **Individual's collective beliefs about the nature and acquisition of knowledge, and about the knowledge justification**

- **Explicit and implicit beliefs, attitudes, and assumptions about the informatisation of education**

Worldviews
Realist-Relativist approach



Shadish's et al., 2002

Ontology

Realist	Relativist
• One underlying reality that is the same for everyone • Identifies specific ideas which reflect the 'true' and 'fundamental' nature of reality • Fundamental nature and role of ICTs has already been reflected in their early manifestations	• Different people have different realities • Teachers are collaborators, co-participants, and facilitators of learning who work to meet the individual needs of students • Nature of ICTs is flexible, changing, and dependent on the user

Epistemology

Realist	Relativist
• Limited set of methods needed to instruct • Curriculum is fixed and permanent • ICTs have a specific and fixed role in all aspects of their use	• Variety of methods for learning and a wide range of potential learning goals • Curriculum is changing and student-centered • ICTs have varying roles and uses in the modern classroom

Model for Studying Teachers' worldviews

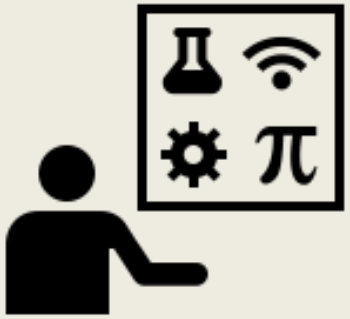
Components of worldview	Transformations of Digital Science	Ontology	Epistemology
Self-conception	A blurred distinction between reality and virtuality	Realist-Relativist	Realist-Relativist
Mutual Interactions	A blurred distinction between human, machine, and nature	Realist-Relativist	Realist-Relativist
Conception of reality	Reversal from information scarcity to information abundance	Realist-Relativist	Realist-Relativist

Research Question

Which ontological and epistemological worldviews have the contemporary science teachers?

Sample

High school in-service science teachers from Tel Aviv area (n=15)



Data Collection

- Semi-structured interviews
- Repertory Grid Technique

Data Analyses

- Qualitative-constructivist content analysis
- Statistical analysis of qualitative data

Expected significance

- **Theoretical significance:**

Contributes to the existing ontological and epistemological knowledge of integrating ICT into educational practice

- **Practical implications:**

Effecting the teachers' professional growth

Finding new ways to support the teachers' training

Thanks!

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