

INTELLIGENT TECHNOLOGIES IN E-LEARNING AND INTELLIGENT TUTORING SYSTEMS

Tatyana Ivanova

Technical University of Sofia, Bulgaria

tiv72@abv.bg

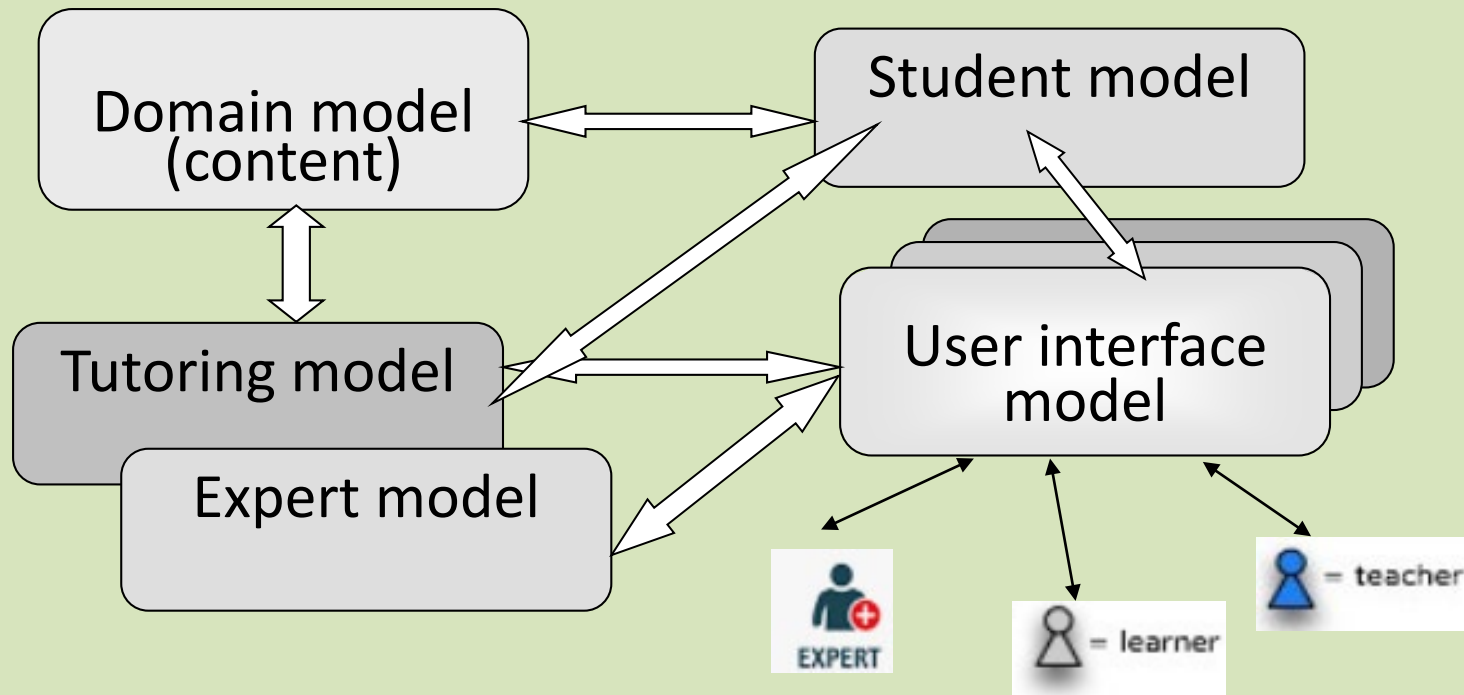
Our main research questions are:

- To analyze and classify Technologies and architectures, used to implement ITSs;
- To analyze results of usage of AI technologies in ITSs and practical tutoring capabilities of ITSs;
- To clarify relations between concepts, as personalized learning, adaptive learning, and technology – based learning, and ITSs;
- To discuss applicability of ontologies in ITSs and its potential to improve learning;
- To discuss and outline main development problems of ITSs.

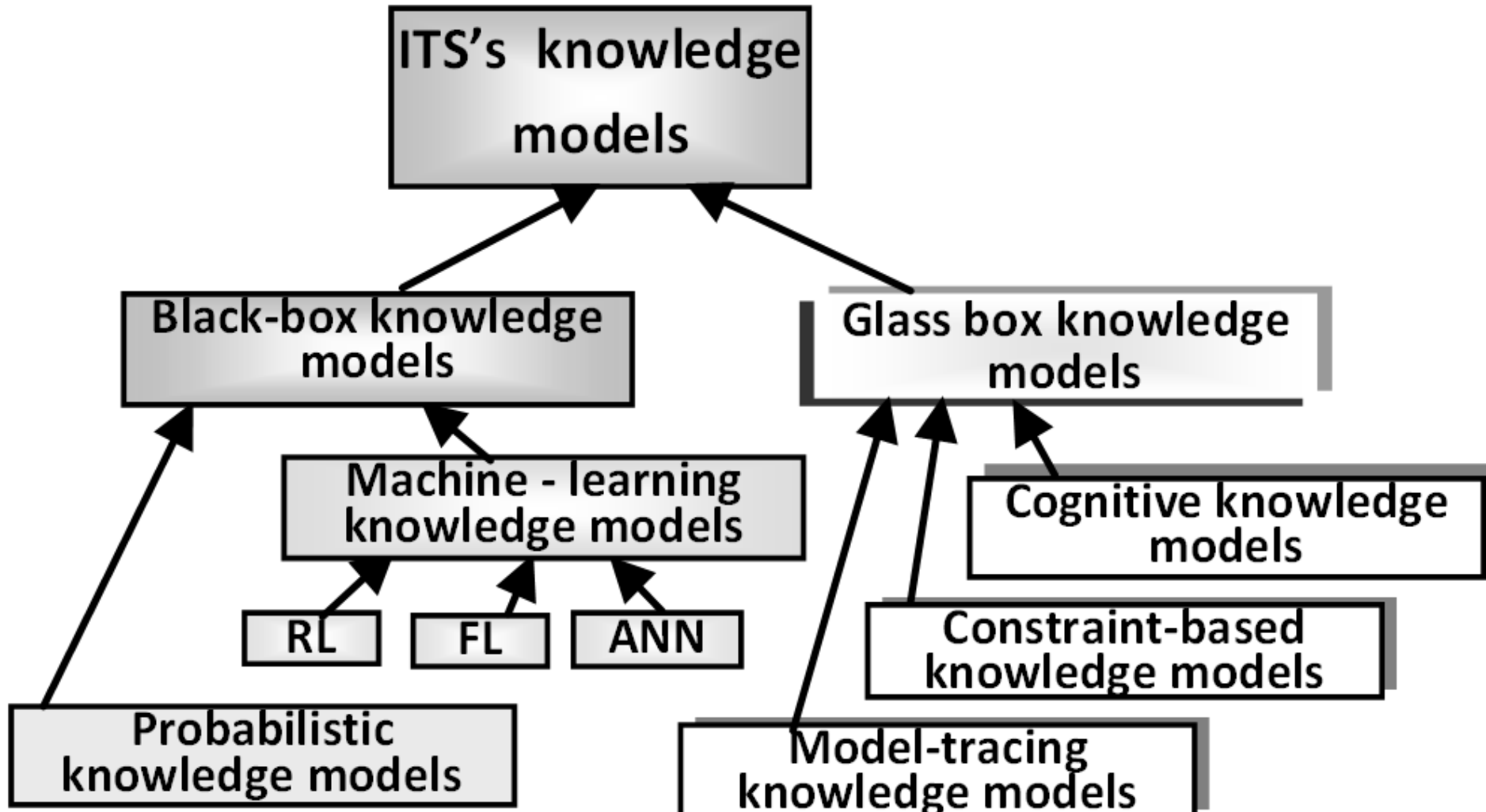
ARCHITECTURE OF A TYPICAL ITS

Two main parts: information storing module and software module

- **ITS's knowledge model**



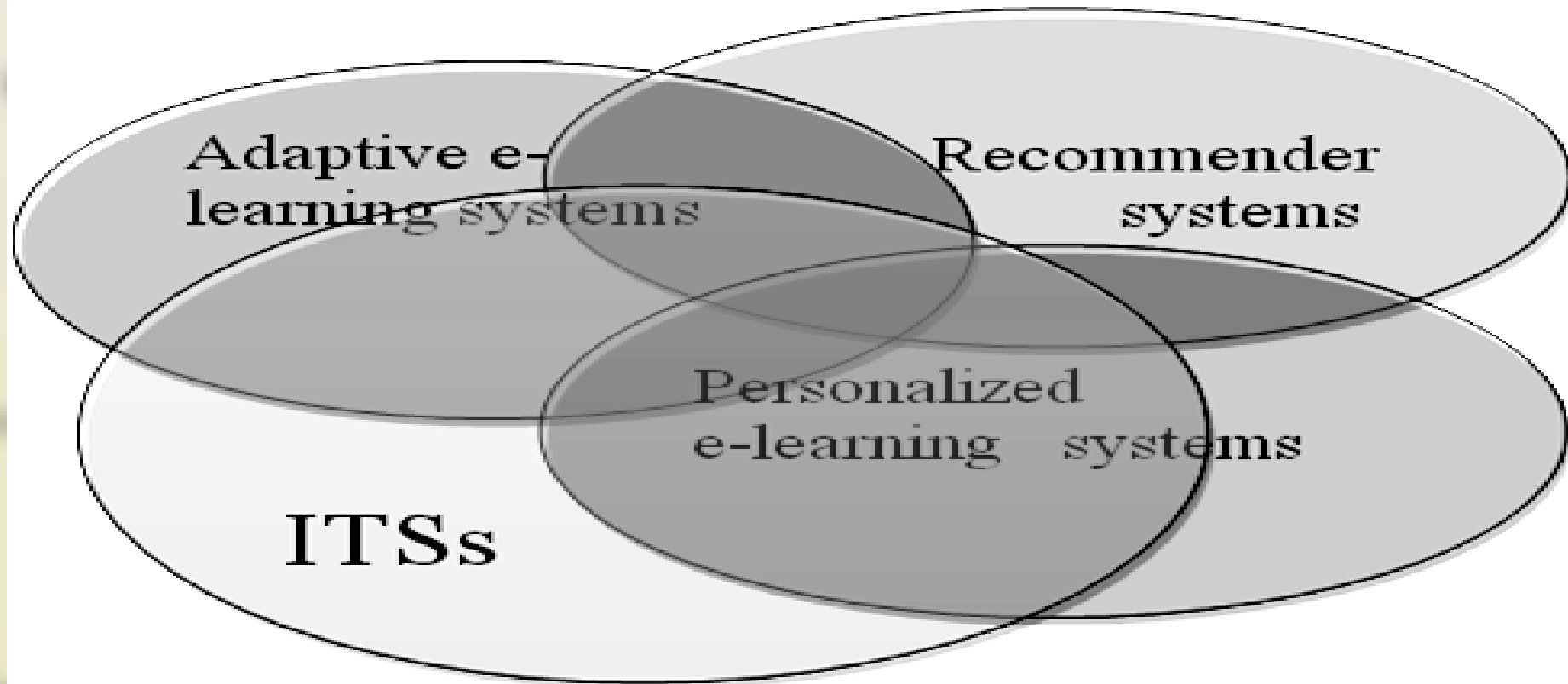
ITS's knowledge models classification



Usage of ontological approach in ITSs

System type or name	Purpose	Models, using ontology	Year	Additional technologies
ITS	Modeling ITS	Tutoring	2020	Data mining
Architecture	Modeling ITS	Learn. domain	2017	Games, cloud
ITS	Personalization	All models	2004	
architecture	Annotation	Domain	2010	
ITS	Recommender	Learn. space	2015	agents
Protus	Recommender	All models	2012	
Model	Engage	Domain, tutor	2019	games
ITS	Training	Learn. domain	2021	Virtual reality
Simulator	Study medic.	Learn. domain	2021	Natural language
MATHEISIS	Modeling ITS	all models	2014	metaknowledge
Rimac	Learn Phys.	Student	2021	
ITS	Personalization	all models	2017	
Prototype	Adaptive learn.	all models	2019	
	Modeling ITS	all models	2018	Cloud, agents

E-learning systems, used intelligent technologies



Main problems, making development of ITSs difficult and ineffective

- It is no gold standard for measuring or judgment of emotions during learning;
- Generating intelligent explanations is difficult and rarely supported in ITSs;
- High domain dependence – there are domains in which traditional approaches for building tutoring systems are not work well (ill-defined domains, [16]);
- In almost all ontology-based ITSs ontological models are manually-defined, difficult to enhance or reuse, and do not contain internal evolution mechanisms;
- Computer Assisted Assessment has not fully been resolved yet;
- Integration of learning management standards and intelligent techniques in ITS is still problematic