Inspira Crea Transforma

UNIVERSIDAD EAFIT®

Agent based simulation of dynamic pricing policies of academic courses

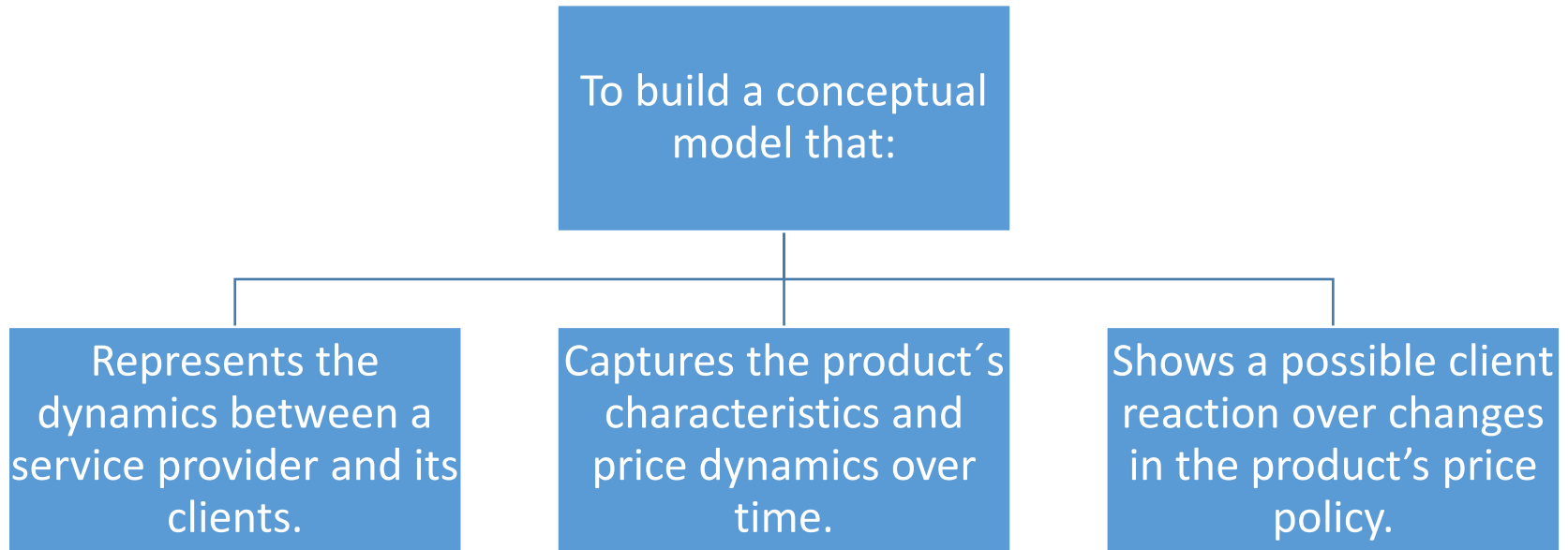Tutor: Prof. Paula Alejandra Escudero-Marín. (pescuder@eafit.edu.co)

Student: Andrés Felipe Rojas-Amar. (arojasa1@eafit.edu.co)

Research Practices for Mathematical Engineering

Progress report

Mathematical Sciences Department

EAFIT University

April 10 2015

Inspira Crea Transforma

What is the objective?

To build a conceptual model that:

Represents the dynamics between a service provider and its clients.

Captures the product´s characteristics and price dynamics over time.

Shows a possible client reaction over changes in the product's price policy.

Proposed activities

➢ Literature review

• Recollection and data analysis

➢ Conceptual model construction

• Conceptual model validation

• Model codification

Literature review

A systematic literature review was carried out using the ISI Web Of Science (WOS) scientific citation indexing service.
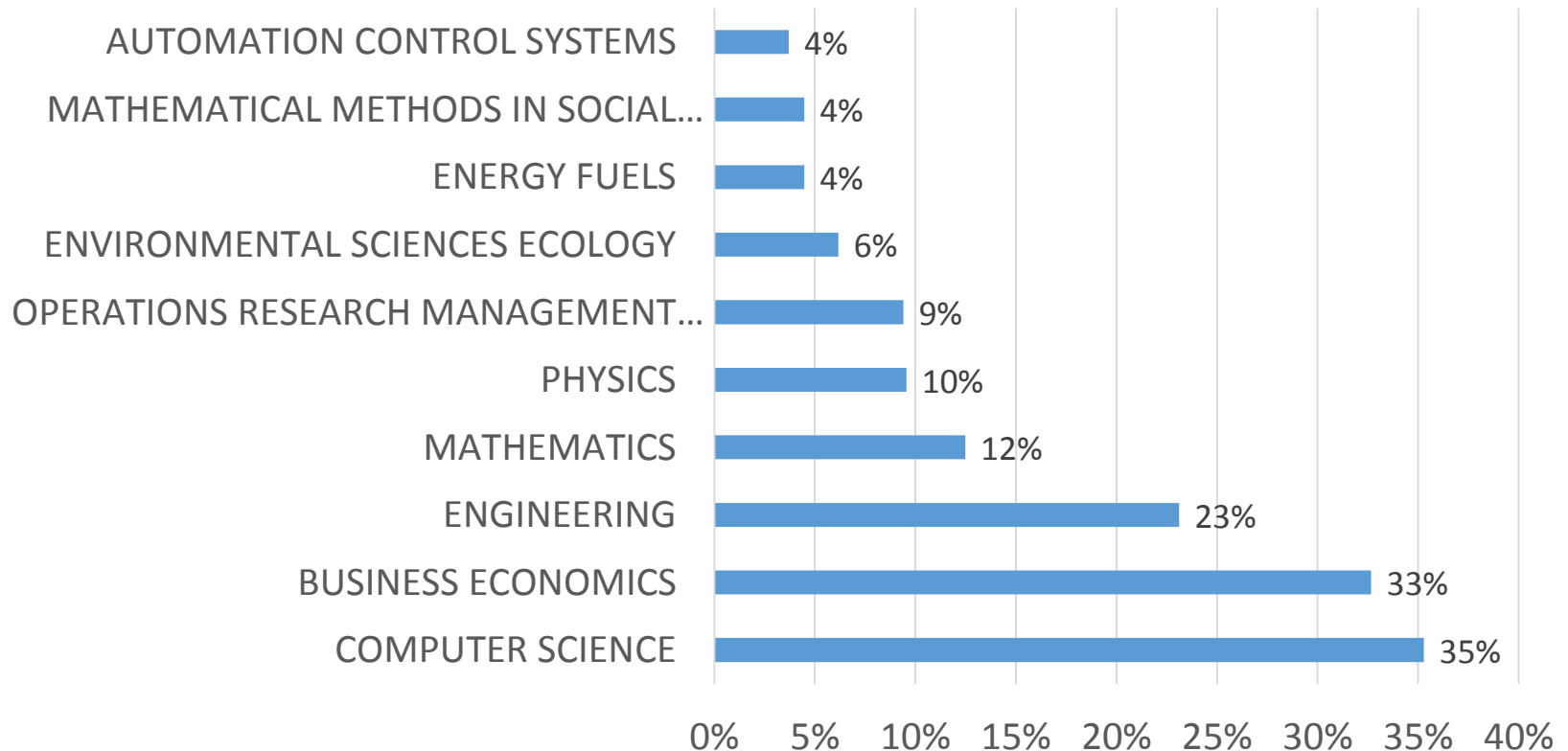

THE WORLD'S MOST TRUSTED CITATION INDEX

WEB OF SCIENCE℠

COVERING THE LEADING SCHOLARLY LITERATURE

Literature review

Search parameters and results

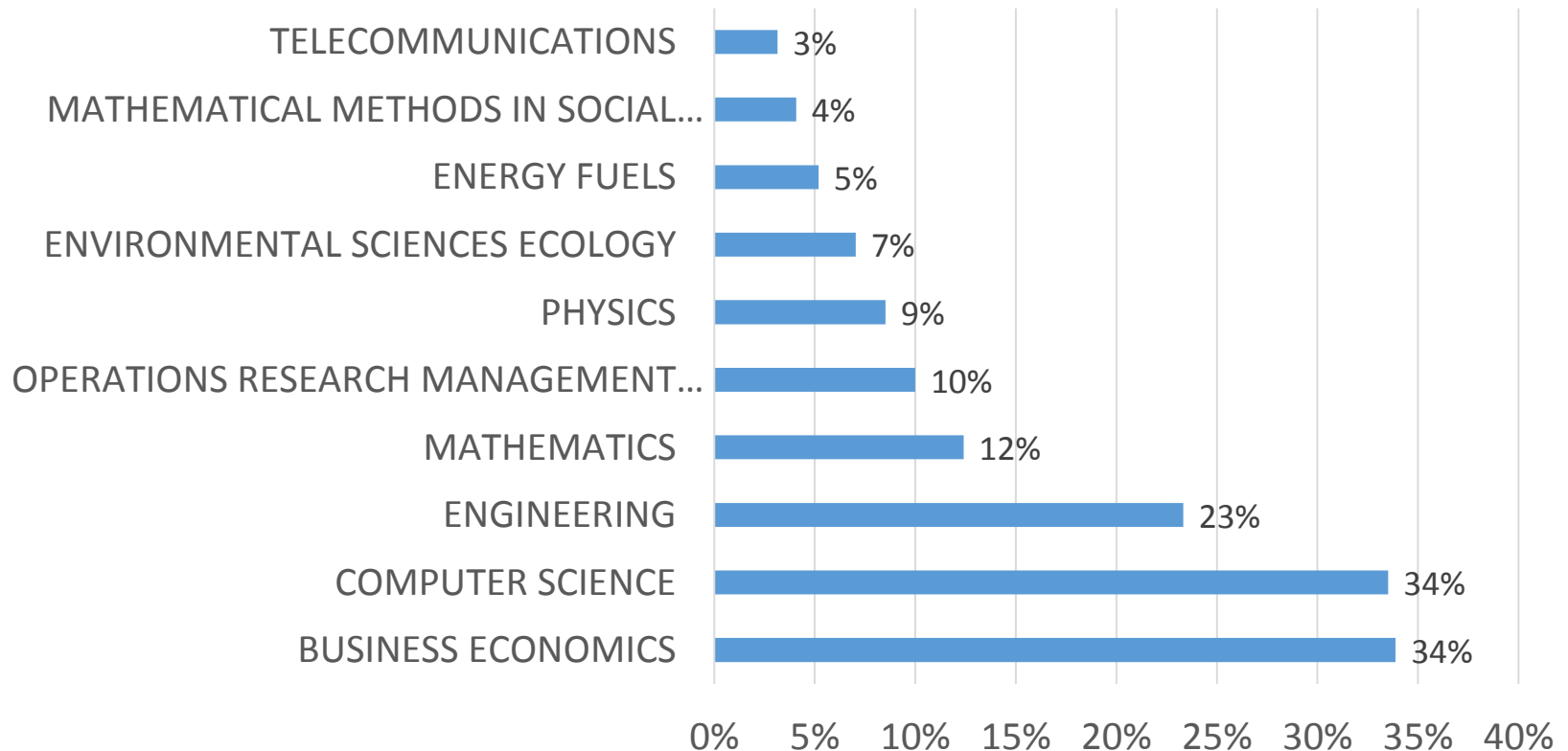| Searched string	Years of search	Number of results
('Agent based' AND 'dynamic pricing')	All 2005 - 2015	649 540
((('Agent based') AND ('dynamic pricing')) AND ('academic courses')))	All	0
(('dynamic pricing') AND ('academic courses'))	All	0

Literature review

Segmentation of the results

Category	Percentage
COMPUTER SCIENCE	35%
BUSINESS ECONOMICS	33%
ENGINEERING	23%
MATHEMATICS	12%
PHYSICS	10%
OPERATIONS RESEARCH MANAGEMENT...	9%
ENVIRONMENTAL SCIENCES ECOLOGY	6%
ENERGY FUELS	4%
MATHEMATICAL METHODS IN SOCIAL...	4%
AUTOMATION CONTROL SYSTEMS	4%

Literature review

Segmentation of the results from 2005

Category	Percentage
TELECOMMUNICATIONS	3%
MATHEMATICAL METHODS IN SOCIAL…	4%
ENERGY FUELS	5%
ENVIRONMENTAL SCIENCES ECOLOGY	7%
PHYSICS	9%
OPERATIONS RESEARCH MANAGEMENT…	10%
MATHEMATICS	12%
ENGINEERING	23%
COMPUTER SCIENCE	34%
BUSINESS ECONOMICS	34%

Literature review

Search parameters and results

Searched string	Years of search	Number of results
((('dynamic pricing') OR ('revenue management')) AND ((academic courses) OR (tuition fees) OR (university schedule)))	All	42
	2005 - 2015	20
("tuition" AND "pricing")	All	27
	2005 - 2015	18

Literature review

| Searched string	Authors	Overview
((('dynamic pricing') OR ('revenue management')) AND ((academic courses) OR (tuition fees) OR (university schedule)))	Wilkins, S., Shams, F., & Huisman, J. (2013)	The decision-making and changing behavioral dynamics by statistical analysis.
	Hillman, N. W. (2012)	Studies how institutionally-funded financial aid generates additional revenue by statistical analysis. Tools for financing the operability costs.

Inspira Crea Transforma

UNIVERSIDAD EAFIT®

Literature review

| Searched string	Authors	Overview
("tuition" AND "pricing")	Rao, C., Liu, H., & Ieee. (2009)	Pricing model based on Multivariate Linear Regression. A grey relational analysis is used to identify key variables for the regression.
	Chen, C., Zhao, S., & Hu, C. (2012)	This paper proposes a "satisfaction" model. It has given a reasonable tuition charge standard and investment recommendations.

Literature review

Searched string	Authors	Overview
("tuition" AND "pricing")	Logunova, O. S. (2011)	Studies de development of the higher education institutions since the appearing of private competitors in a undeveloping market.
	Gary-Bobo, R. J., & Trannoy, A. (2008)	Proposes an admission evaluation model that seeks to optimize revenue by combining private students and tuition programs.

Conceptual model construction

Tako, A. A., & Robinson, S. (2010)
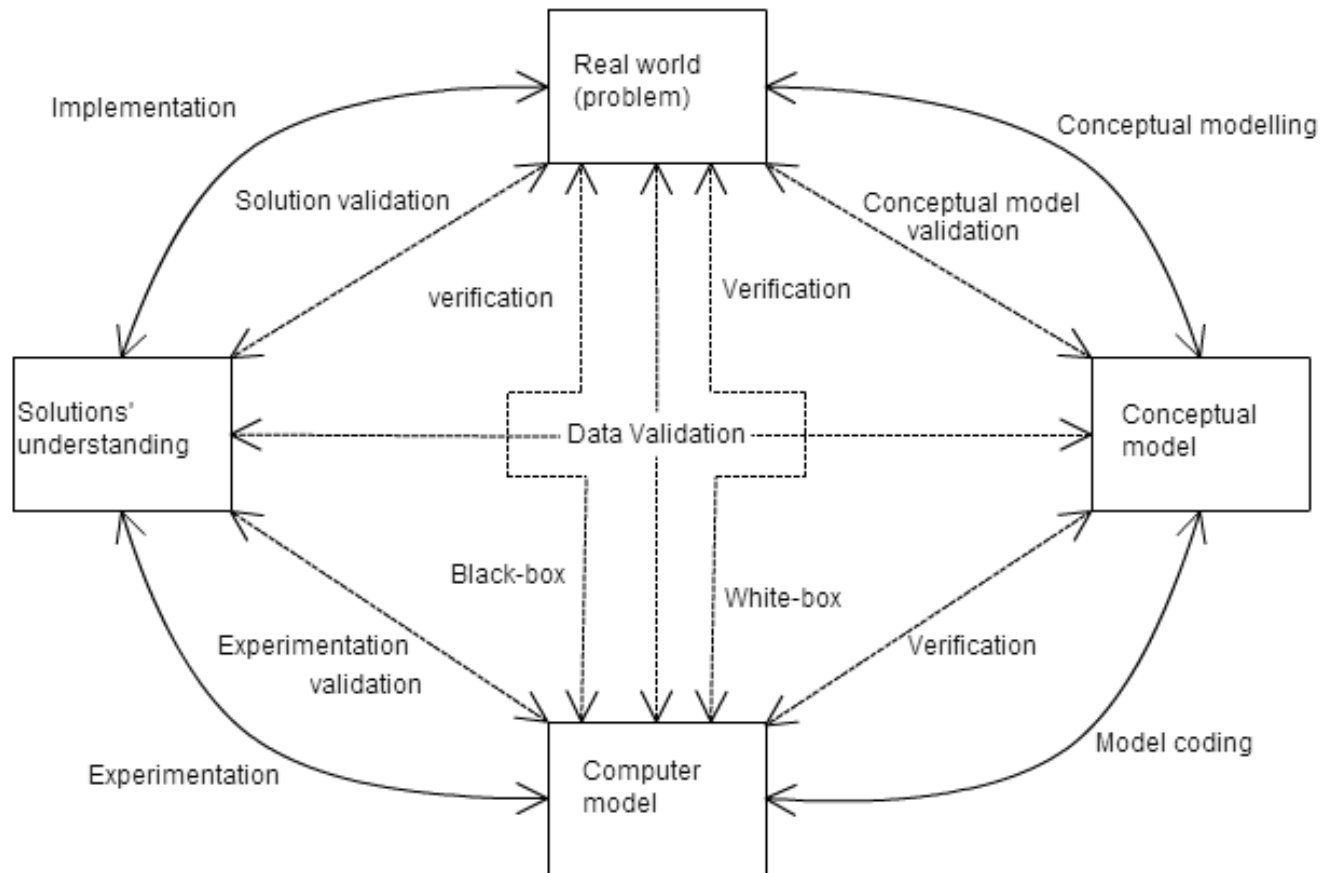
Conceptual model construction

The specific methodology for ABMS:

Salamon, T. (2011)
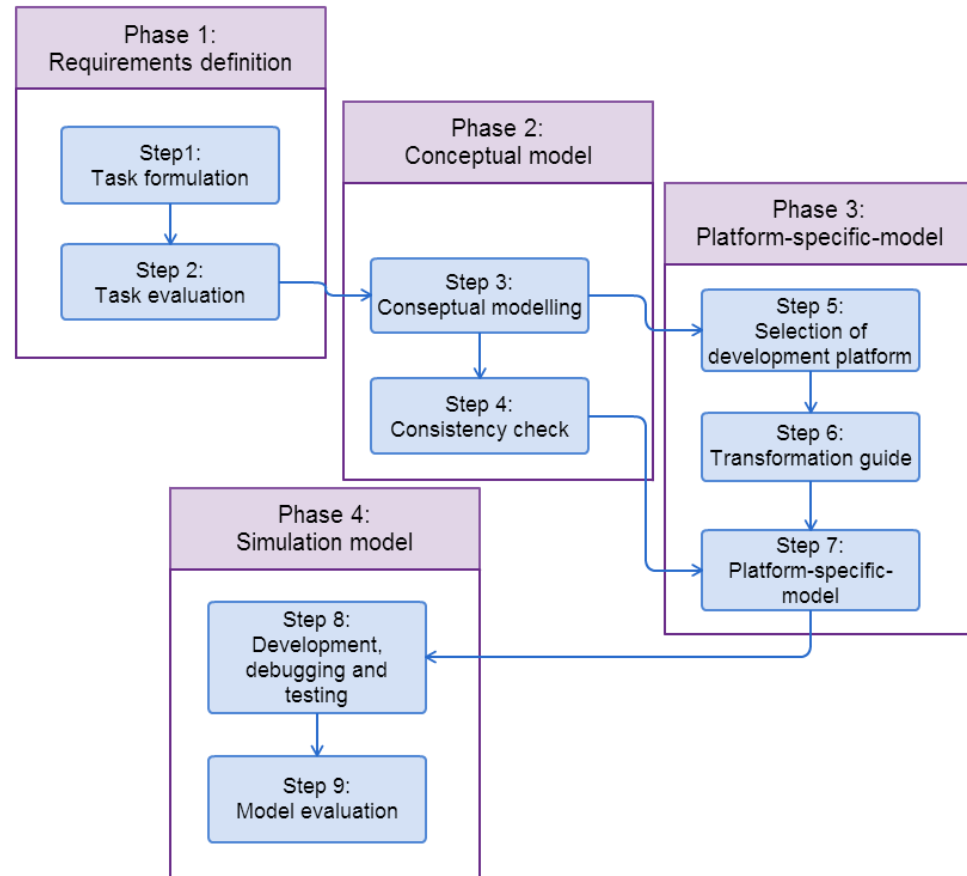
To do

➢Literature review
- It is an ongoing process

➢Conceptual model construction and validation
- According to Salamon and Robinson schemes

➢Model codification
- Repast Vs. Anylogic

Inspira Crea Transforma

UNIVERSIDAD EAFIT®

To do

➢ASOCIO conference (July 15)

Thank you

Bibliography

- Chen, C., Zhao, S., & Hu, C. (2012). Construction of Standard College Tuition Model and Optimization. *Computational Intelligence and Intelligent Systems, 316*, 40-49.

- Gary-Bobo, R. J., & Trannoy, A. (2008). EFFICIENT TUITION FEES AND EXAMINATIONS. *Journal of the European Economic Association, 6*(6), 1211-1243. doi: 10.1162/jeea.2008.6.6.1211

- Hillman, N. W. (2012). Tuition Discounting for Revenue Management. *Research in Higher Education, 53*(3), 263-281. doi: 10.1007/s11162-011-9233-4

- Logunova, O. S. (2011). Characteristics of the Formation of Pricing Strategies by the Higher Educational Institutions of Moscow. *Russian Education and Society, 53*(2), 49-63. doi: 10.2753/res1060-9393530204

- Rao, C., Liu, H., & Ieee. (2009). Pricing Model of Higher Education Tuition Based on Multivariate Linear Regression. *2009 International Conference on Artificial Intelligence and Computational Intelligence, Vol Iv, Proceedings*, 228-231. doi: 10.1109/aici.2009.355

- Wilkins, S., Shams, F., & Huisman, J. (2013). The decision-making and changing behavioural dynamics of potential higher education students: the impacts of increasing tuition fees in England. *Educational Studies, 39*(2), 125-141. doi: 10.1080/03055698.2012.681360

- Tako, A. A., & Robinson, S. (2010). Model development in discrete-event simulation and system dynamics: An empirical study of expert modellers. *European Journal of Operational Research, 207*(2), 784-794. doi: 10.1016/j.ejor.2010.05.011

- Salamon, T. (2011). Design of Agent-Based Models : Developing Computer Simulations for a Better Understanding of Social Processes. Repin, Czech Republic: Bruckner Publishing.

Inspira Crea Transforma

UNIVERSIDAD EAFIT®