

# Regulation & Technology

*Artificial Intelligence*

*Blockchain*

*Data Analytics*

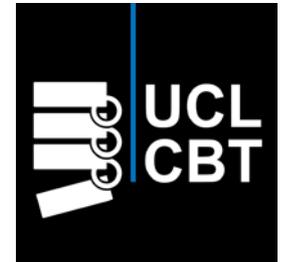
*Robo Advisory*

...

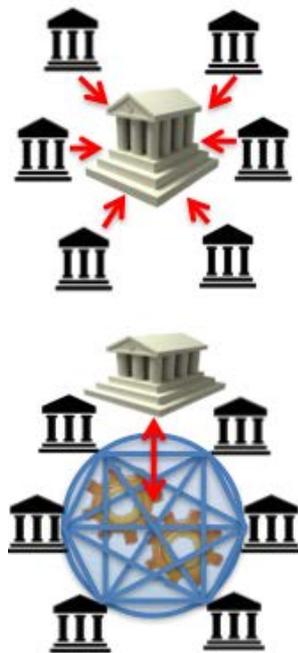


**Tomaso Aste**

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**BARAC aims to investigate the feasibility of using distributed ledger technology for regulation and compliance**



### Project Outcomes

Design of blockchain technology for regulation and compliance

Blockchain-enabled big data feeding & extraction layer

Sensitive data handling in DLT environment

Fully functional proof-of-concept prototype platform

Development of algorithms for automated, data reconciliation compliance and reporting

Development of algorithms for automated regulation

### Project Impact

#### Science

- Complex systems
- Consensus dynamics
- Big data analytics
- Information Security & Cryptography

#### Engineering

- Big data handling over distributed ledgers
- Blockchain design and architecture
- Data integration

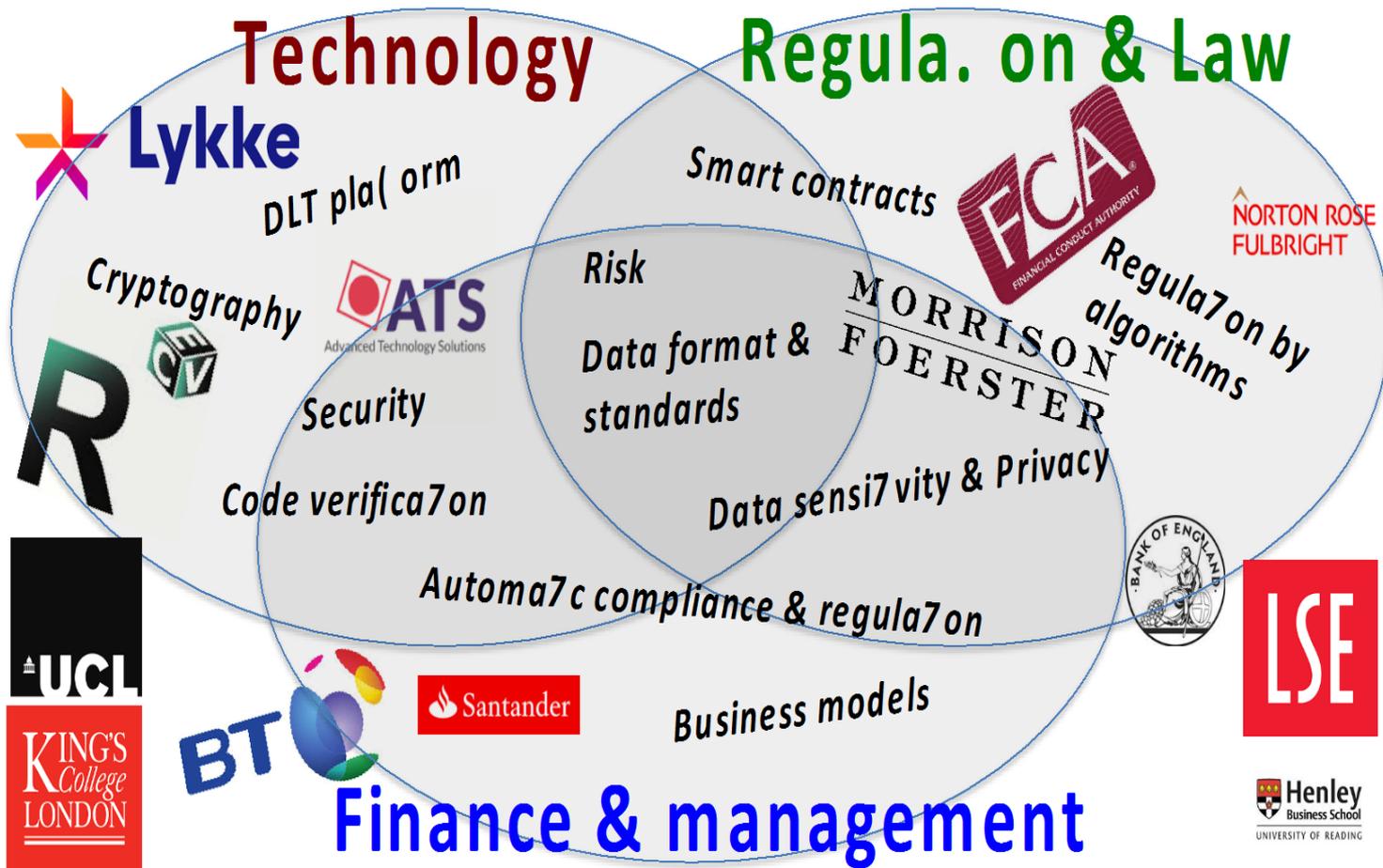
#### Law & Regulation

- Regulatory vetting and reporting
- Rule by coding
- Self enforced regulation

#### Economics

- Financial Stability
- Risk: Systemic, Operational, Counterparty
- Nowcasting

**Overturn current regulation and compliance models via DLT**





- Centre for Doctoral Training
- in Financial Computing & Analytics
- Financial Risk Management MSc
- Computational Finance MSc
- Business Analytics MSc
  
- Centre for Blockchain Technologies



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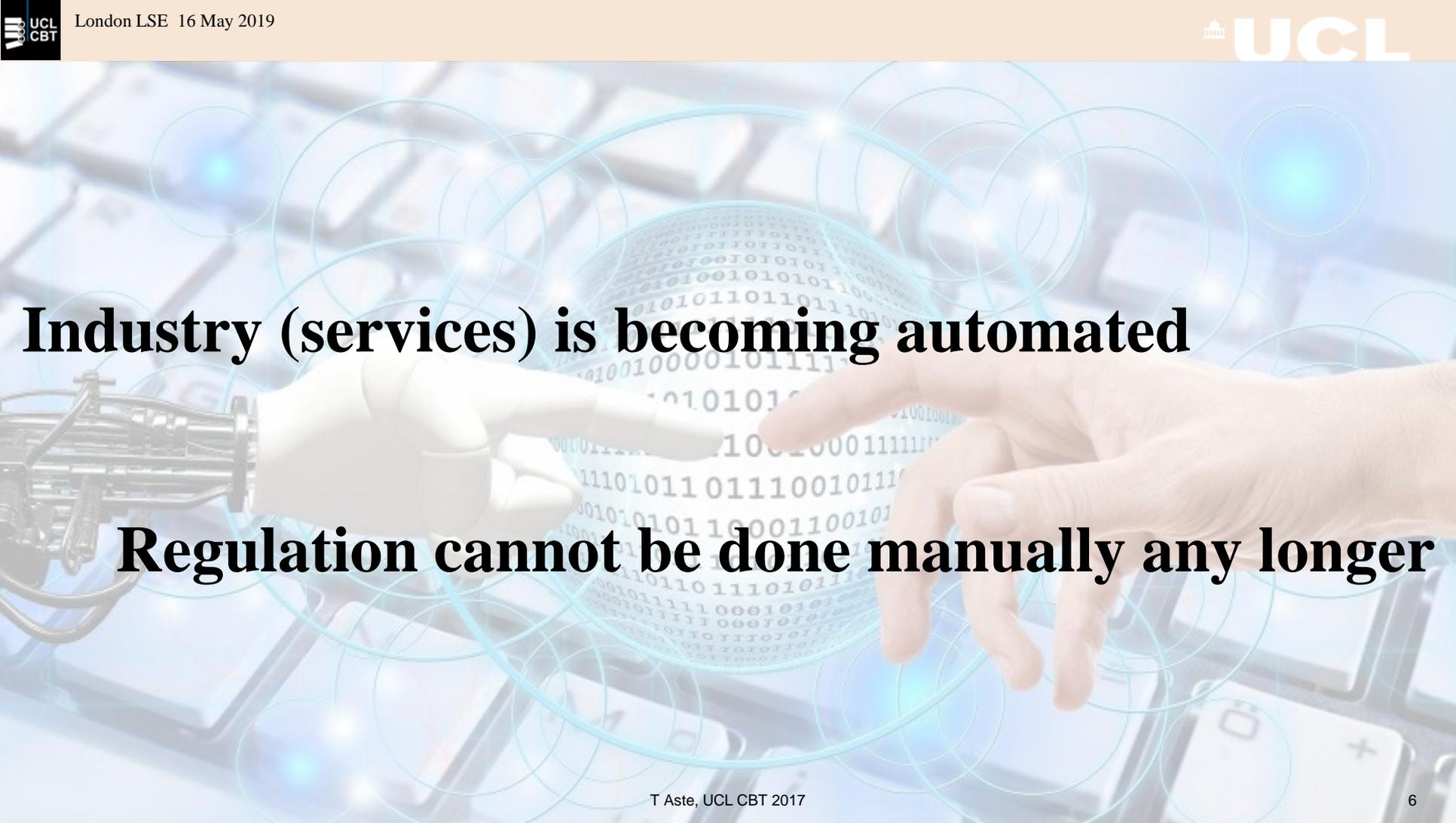
Ariane Chapelle



# *“Glazing into the crystal ball”*

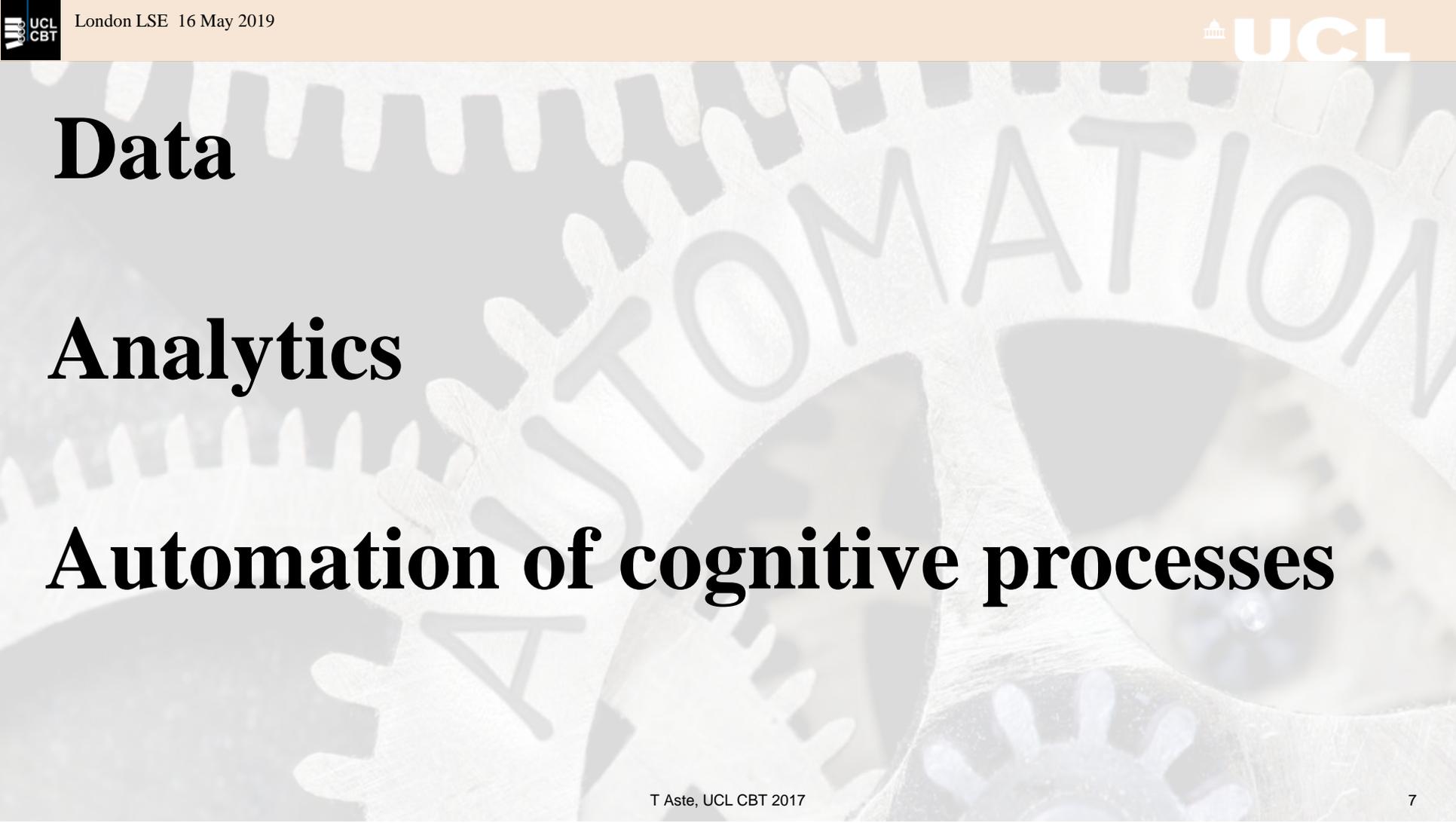


*Prediction is very difficult, especially about the future. (Niels Bohr)*

A hand and a robotic hand are shown reaching towards a glowing sphere of binary code (0s and 1s). The background is a blurred image of a computer keyboard with blue light effects and circular patterns overlaid. The text is centered over the image.

**Industry (services) is becoming automated**

**Regulation cannot be done manually any longer**



# Data

# Analytics

# Automation of cognitive processes

# Data

A lot of them

For businesses, individuals and regulators

Digital traces

Easy to keep, hard to delete

**Privacy [Anonymity, Distributed Systems]**

**Concentration [Distributed Systems]**

**Consistency & Consensus: a unique truth [Blockchain]**

# Analytics

**Powerful**

**For businesses and regulators**

**Privacy [Anonymity]**

**Concentration [Distributed Systems]**

**Merging heterogeneous data sources [current research]**

# Automation of cognitive processes

Next revolution?

For businesses, individuals and regulators

Automation of decisions

**Interpretability [current research]**

**Ethics [current research]**

**Concentration [Distributed Systems]**

**Consistency & Consensus [Blockchain]**

# A Use Case: Automated credit rating for P2P lending

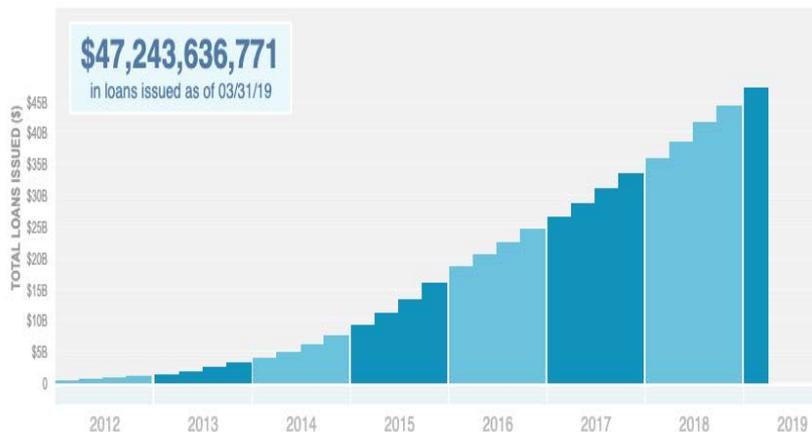
Founded 2006

Personal loans between \$1,000 and \$40,000.

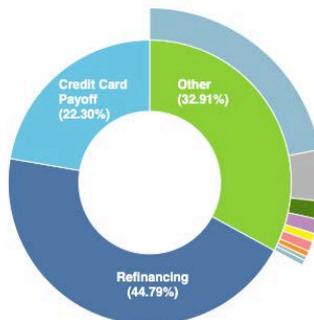
\$47 billion in loans



TOTAL LOAN ISSUANCE

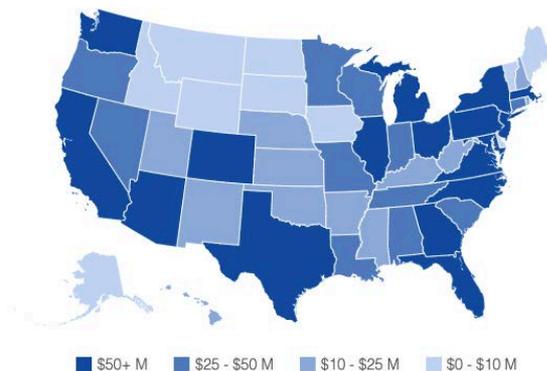


REPORTED LOAN PURPOSE

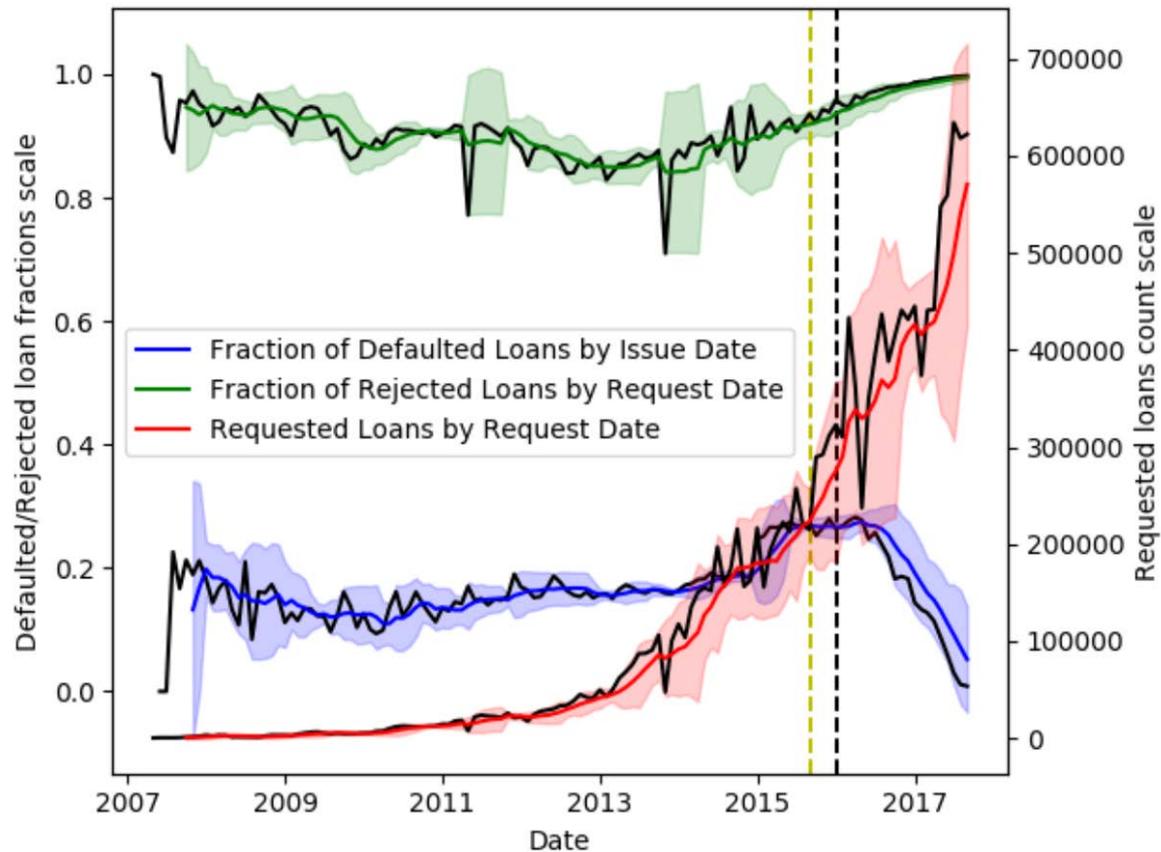


67.09% of LendingClub borrowers report using their loans to refinance existing loans or pay off their credit cards as of 03/31/19.<sup>1</sup>

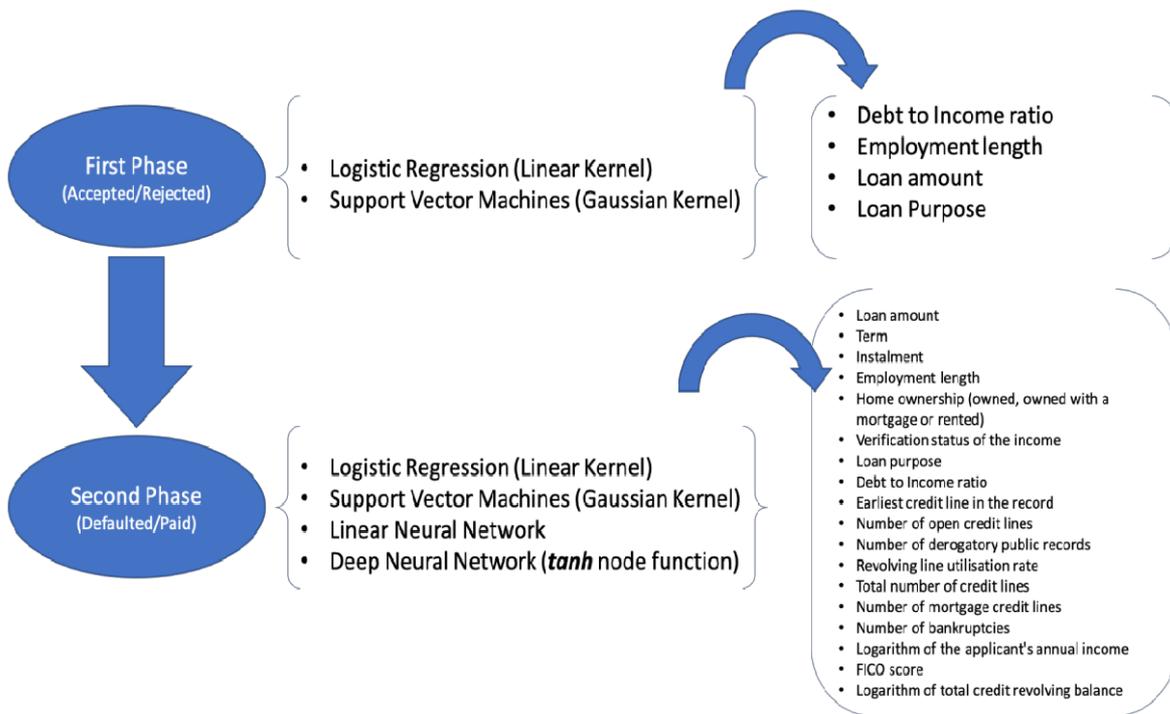
LOAN ISSUANCE BY STATE



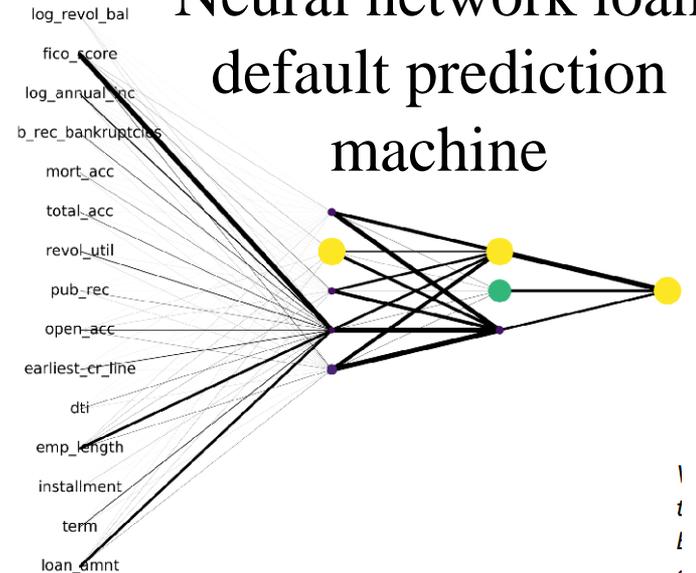
# Data



# Analytics & Automation of decision



## Neural network loan default prediction machine



Representative diagram outlining the two phases of the model with machine learning methods applied and features considered for each phase

# Phase 1: Loan Selection

Loan Selection Results					
Model	Recall Train	AUC Test	Recall Macro Test	Recall Accepted Test	Recall Rejected Test
LR	79.8%	86.5%	77.4%	69.1%	85.7%
SVM	77.5%	-	75.2%	66.5%	84.0%

# Phase 2: Loan Default Prediction

Loan Default Prediction Results					
Model	Recall Train	AUC Test	Recall Macro Test	Recall Default Test	Recall Paid Test
LR	64.3%	69.0%	63.7%	63.8%	63.6%
SVM	-	64.3%	62.15%	58.7%	65.6%
LNN <sup>a</sup>	-	67.8%	-	60.0%	-
LNN <sup>b</sup>	-	68.7%	-	62.7%	-
LNN <sup>c</sup>	-	69%	-	65%	-
DNN <sup>d</sup>	-	68%	-	67%	-
DNN <sup>e</sup>	71%	66%	-	75%	-
DNN <sup>f</sup>	68%	69%	-	72%	-



Credit risk on unsecured loans can be algorithmically managed through data analytics

Through fractional-reserve system (digital) money can be created this way!

Algorithmic Bias?

# Project MAISON, automated regulatory reporting via DLT

## Maison UI: Real-time Dashboard (Regulator view)



## Conclusions

Machines that operate autonomously cannot be controlled and regulated by humans

The same technology that is used to automate industry can be used to automate regulation

Data, Analytics and the Automation of cognitive processes have a lot of issues that require solutions

Technology is moving fast research must accelerate