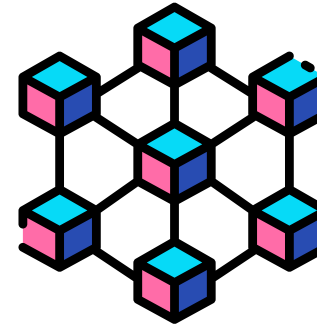


# Fin-tech HO2020

*A Financial supervision and Technology compliance programme*

## WP4: Blockchain Research



*Disclaimer: This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement no. 825215 (topic ICT-35-2018, Type of action: CSA). The content reflects only the author's view and the Commission is not responsible for any use that may be made of the information it contains*

# Outline

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- Outline of tasks, deliverables and milestones under WP4 – Blockchain Research
- Detailed overview of ZHAW's activities
  - *Monitoring the research progress*
  - *Repository*
  - *Use case collection*
    - *FRM Financial Risk Meter*
  - *Validation workshop*
- Concluding remarks

# WP4 – Blockchain Research (GA)

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- **Task 2.1. Technical coordination (ZHAW).** ZHAW is responsible for monitoring the progress of the research efforts of individual partners within the consortium. Each partner will be required to share new research (papers and use cases), related to risk management models related to the application of the blockchain in finance, to ZHAW, which will launch and maintain paper repositories accessible by all.
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# WP4 – Blockchain Research (GA)

## List of deliverables

Deliverable Number <sup>14</sup>	Deliverable Title	Lead beneficiary	Type <sup>15</sup>	Dissemination level <sup>16</sup>	Due Date (in months) <sup>17</sup>
D4.1	Repository of research consortium papers (BC)	10 - UP1 ZHAW	Websites, patents filling, etc.	Public	30

## Schedule of relevant Milestones

Milestone number <sup>18</sup>	Milestone title	Lead beneficiary	Due Date (in months)	Means of verification
MS76	Completion of final workshop	2 - UBER	30	Completion of final workshop
MS79	Completion of Research workshop on BC model validation	3 - ZHAW	27	Completion of Research workshop on BC model validation

# WP4 – Blockchain Research (GA)

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# ZHAW's Activities – I

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- For this purpose, ZHAW has organized **variety of meeting with partners** within the network that work on Blockchain so to individually discuss the topic as well as the specific use cases we should focus on:
  - Bilateral discussions on topics
  - Survey on the planned activities

Quite **positive**  
feedback from  
partners

Do you have any thoughts or input how the Blockchain WP should look like over the next 12 months?

What would it take for you that:

1. You are actively involved?
2. What kind of activities would you like to see?
3. What could and/or would you like to contribute?
4. What do we need to do that there is more cooperation across the entire network?

Initial thoughts are:

1. Sharing of material across the entire network
2. Bi-weekly/monthly seminars (online)
3. Special Issue in Frontiers in Blockchain



# ZHAW's Activities – I

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## Internal Workshop on Blockchain Research

- When: **29<sup>th</sup> September 2020**
- Who: entire network
- Topics:
  - Discuss the current activities
  - Collect feedback and recommendations
  - Partners' **contributions to the package**

## Contributions (up to now):

- Use cases: 8 partners (**BUES, UNIPV, UP1, UCL, UW, UR, Inesc-Tec, UBER**)
- Talks at research seminars: 4 partners (**UW, UCM, Panteion, UBER**)
- Editors of the Special Issue - 2 partners in the lead: **UCM, KTU**



# ZHAW's Activities – II

- **ZHAW will organize monthly research webinars** at which academics, Fintechs and regulators, both internal and external to our network, present their working papers on the financial applications of the blockchain technology.

**Recordings** are available so to enhance dissemination efforts



## Momentum and contrarian effects on the cryptocurrency market - an interactive shiny application

The main purpose of the application is to allow the user investigation of the momentum and contrarian effects on cryptocurrency markets. The investigated investment strategies involve 100 cryptocurrencies (amongst over 1200 present as of Nov 2017 and over 5500 as of May 2020) with the largest market cap and average 14-day daily volume exceeding a given threshold value. Investment portfolios are constructed with different assumptions regarding the portfolio reallocation period, width of the ranking window, the number of cryptocurrencies in the portfolio and transaction costs. The performance of strategies is benchmarked against: (1) equally weighted and (2) market-cap weighted investments in all of the ranked assets, as well as against the buy and hold strategies based on (3) S&P500 index, and (4) Bitcoin price.

### Speaker



**Paweł Sakowski**,  
Assistant Professor at  
University of Warsaw

Assistant Professor at University of Warsaw. Head of Master in Quantitative Finance program at the University of Warsaw. His research interests concentrate on volatility modeling, algorithmic trading, derivatives pricing and financial time-series analysis. Paweł is also a professional data analyst, statistician and independent statistical consultant. 15+ years of experience in market data analysis focused on financial econometrics and machine learning solutions for high-frequency data. Experience in numerous commercial and academic research projects. He also spent several years in market research industry, being responsible for developing quantitative tools for segmentation and conducting multivariate data analysis.



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Join Zoom Meeting: <https://zhaw.zoom.us/j/98940126441>  
Meeting ID: 989 4012 6441



## Explainability of a Machine Learning Granting Scoring Model in Peer-to-Peer Lending

Peer-to-peer (P2P) lending demands effective and explainable credit risk models. Typical machine learning algorithms offer high prediction performance, but most of them lack explanatory power. However, this deficiency can be solved with the help of the explainability tools proposed in the last few years, such as the SHAP values.

In this work, we assess the well-known logistic regression model and several machine learning algorithms for granting scoring in P2P lending. The comparison reveals that the machine learning alternative is superior in terms of not only classification performance but also explainability. More precisely, the SHAP values reveal that machine learning algorithms can reflect dispersion, nonlinearity and structural breaks in the relationships between each feature and the target variable.

### Speaker



**Javier Arroyo**,  
Associate Professor at  
Universidad Complutense  
de Madrid

Javier Arroyo received the PhD degree in computer science from Universidad Pontificia Comillas, in 2008. Since 2013, he has been an Associate Professor with the Department of Software Engineering and Artificial Intelligence, Universidad Complutense de Madrid (UCM), and a Researcher with the Instituto de Tecnología del Conocimiento. His research interests include time series forecasting and machine learning applied to different domains and real-life problems. He is currently the PI of a national research project on Decentralized Autonomous Organizations in the blockchain and of the H2020 Fin-Tech project at UCM.



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How to join the meeting:  
ZOOM link:  
<https://zhaw.zoom.us/j/99030552606>



# Research Seminars: end of 2020

- 30<sup>th</sup> September 2020 → Dr. Veni Arakelian: Blockchain for finance: Bond issuance and asset trading
- 29<sup>th</sup> October 2020 → Dr. Simon Trimborn: Investing with Cryptocurrencies - On the Informative Effects of Experts Sentiment
- November 2020 → Xinwen Ni: A Machine Learning Based Regulatory Risk Index for Cryptocurrencies



## Blockchain for finance: Bond issuance and asset trading

The blockchain is like a permanent book of records that keeps a log of all transactions in chronological order. It builds on the idea of P2P networks and it provides a shared and trusted ledger of transactions, where immutable and encrypted copies of information are stored on every node in the network. Economic incentives in the form of native network tokens are applied to make the network fault-tolerant, and attack and collusion resistant. The goal of this presentation is twofold. First, to introduce to the main concepts of Blockchain, and show live who it works using python. Second, to discuss the concept of Blockchain on asset trading and settlement and we present a Blockchain architecture for green bonds issuance.

Zürcher Hochschule  
für Angewandte Wissenschaften

zhaw



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## Speaker



Veni Arakelian,  
Senior Manager,  
Piraeus Bank

Dr. Veni Arakelian is an academic expert in macrofinance and financial econometrics. More than fifteen years of experience in research, teaching, and working for the banking sector. Author and co-author of several publications in leading scientific journals in finance, statistics, and econometrics. Her research interests are systemic risk, macroeconomic uncertainty, and the implications of both asset pricing and portfolio allocation. Veni currently works as a Senior Manager at the Division of Economic Research & Investment Strategy of Piraeus Bank. She is also an industry associate at UCL Center for Blockchain Technologies

## How to join the meeting:

ZOOM link:

<https://zhaw.zoom.us/j/91277339847>

MEETING ID: 912 773 39847

# WP4 – Blockchain Research (GA)

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# ZHAW's Activities – III

- The initial repository was already completed (May 2020).
- We will conduct periodic updates on the repository
- Insights → 3 main topic identified among research:
  - 1) **Cryptocurrency markets** (trading and arbitrage, price prediction, tail risk etc.)
  - 2) **Blockchain technology** (emergence of blockchain, its feasibility for electronic transfer payments, high level overview of technology)
  - 3) **Regulation/governance** (what are the main regulatory issues; how should we regulate it; classification issues – cryptocurrencies, coins/stable coins, etc.)

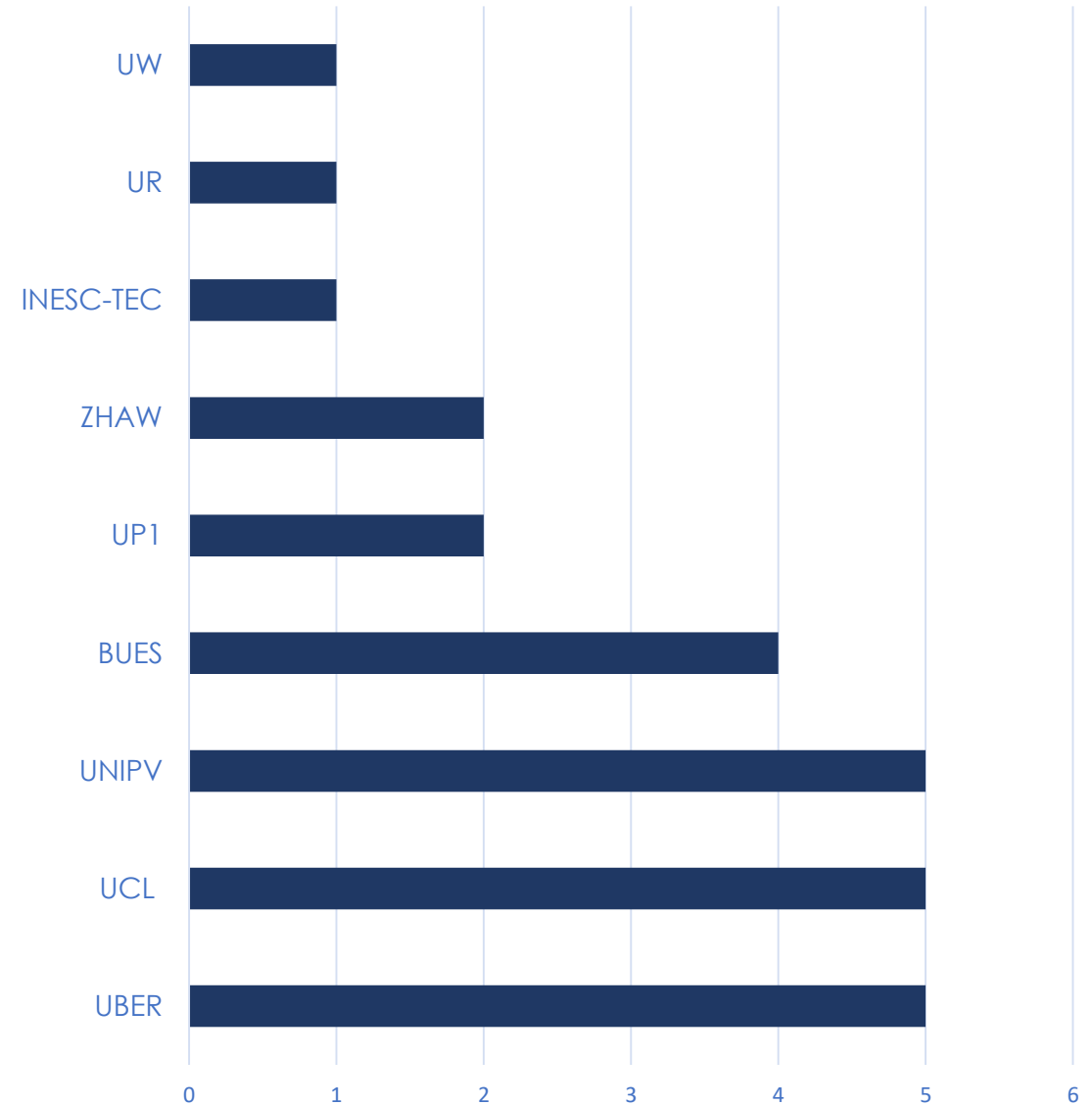
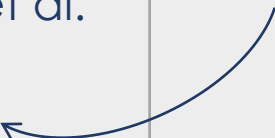


Figure 1. Partners' participation in the research repository

Cryptocurrency markets	Blockchain	Regulatory/governance
<ul style="list-style-type: none"> <li>- Lead Behaviour in Bitcoin Markets (Ying et al. 2020)</li> <li>- A Statistical Classification of Cryptocurrencies (Pele et al. 2020)</li> <li>- VCRIX - A Volatility Index for Crypto-Currencies (Kim et al. 2019)</li> <li>- Momentum and contrarian effects on the cryptocurrency market (Kosc et al. 2019)</li> <li>- Using High-Frequency Entropy to Forecast Bitcoin's Daily Value at Risk (Pele and Pele, 2019)</li> <li>- Phenotypic convergence of cryptocurrencies (Pele et al. 2020)</li> </ul>	<ul style="list-style-type: none"> <li>- A Decentralised Digital Identity Architecture (Goodell and Aste, 2019)</li> <li>- The other side of the coin: Risks of the Libra blockchain</li> </ul> <p>70% of research</p> 	<ul style="list-style-type: none"> <li>- A probative value for authentication use case blockchain (Guegan et al. 2019)</li> <li>- Can Cryptocurrencies Preserve Privacy and Comply with Regulations? (Goodell and Aste, 2019)</li> </ul>

# Bibliometric Analysis of Papers

TITLE	AUTHOR	PARTNER	DOWNLOADS/ ACCESS
Editorial on Special Issue on Cryptocurrencies	Osterrieder, J & Barletta, A.	ZHAW	7,901
Can Cryptocurrencies Preserve Privacy and Comply with Regulations?	Goodell, G. & Aste, T.	UCL	6,659
Analysing Social Media Forums to Discover Potential Causes of Phasic Shifts in Cryptocurrency Price Series.	Burnie, A., Yilmaz, E., & Aste, T	UCL	3,333

Figure 2. Most downloaded papers from the network

TITLE	AUTHOR	PARTNER	CITATIONS
Cryptocurrency Options: The Case of Bitcoin and CRIX	Hou et al.	UBER	18
Crypto Price Discovery through Correlation Networks	Giudici, P. & Polinesi, G.	UNIPV	8
Using High-Frequency Entropy to Forecast Bitcoin's Daily Value at Risk. Entropy	Pele, D.T. & Pele, M.M.	BUES	7

Figure 3. Most cited papers from the network

PARTNER	DOWNLOADS	ABSTRACT VIEWS	CITATIONS
BUES	1,341	1,516	11
UBER	1,306	6,565	22
UCL	12,666	865	11
UNIPV	3,877	2,194	14
UP1	1,353	1,377	4
UR	13	106	-
UW	31	-	3
ZHAW	9,089	1,023	1
<b>TOTAL</b>	<b>29,676</b>	<b>13,646</b>	<b>66</b>

Figure 4. Summary view: Downloads, abstract views and citations per partner

# WP4 – Blockchain Research (GA)

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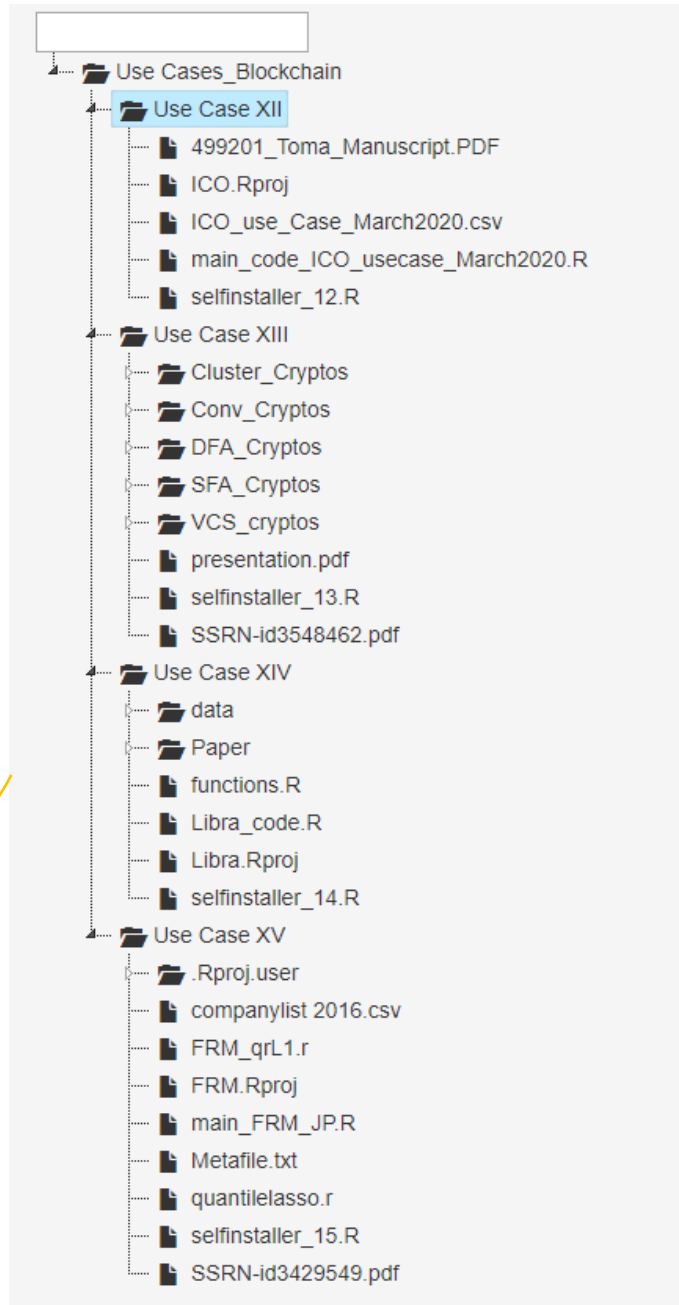
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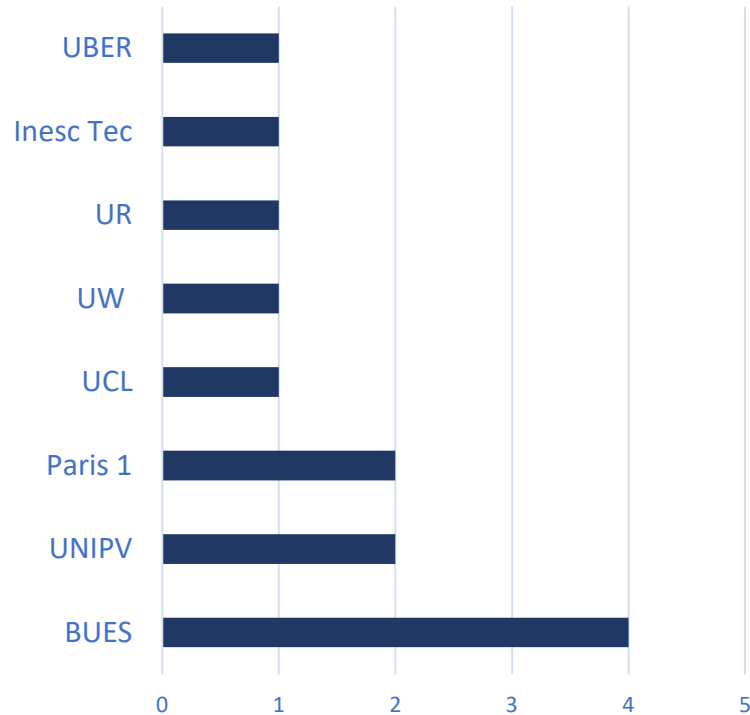
# ZHAW's Activities – IV

Together with the global coordinator, selecting a subsection of use cases coming from the FinTech-ho2020 network

- We have published a call for papers within the fintech-ho2020 network (November 2019);
- We have **collected 13 proposed use cases** from the network;
- **Four use cases** are already available on the platform.
- ZHAW, UCM and KTU are in the process of establishing a collaboration with **Frontiers in Blockchain** for a Special Issues on Blockchain in Finance which in turn will result in an e-book.



# Use Cases Collection



- 1) A Decentralised Digital Identity Architecture (Goodell and Aste, 2019)
- 2) A Probative Value for Authentication Use Case Blockchain (Guegan, 2019)
- 3) Fostering consumer bargaining and e-procurement through a decentralized marketplace on the blockchain (Amorim et al. 2019)
- 4) Initial Coin Offerings: risk or opportunity? (Toma and Cerchiello, 2019)**
- 5) Metcalfe's law and log-period power laws in the cryptocurrencies market (Pele and Pele, 2019)
- 6) Momentum and contrarian effects on the cryptocurrency market (Kosc et al. 2019)
- 7) Phenotypic convergence of cryptocurrencies (Pele et al. 2019)
- 8) The other side of the Coin: Risks of the Libra Blockchain (Abraham and Guegan, 2019)
- 9) Using High-Frequency Entropy to Forecast Bitcoin's Daily Value at Risk (Pele and Pele, 2019)
- 10) Benefits of sectoral cryptocurrency portfolio optimization (Culjak et al. 2020)
- 11) A Statistical Classification of Cryptocurrencies (Pele et al. 2020)**
- 12) Libra or Librae? Basket based stablecoins to mitigate foreign exchange volatility spillovers (Giudici et al. 2020)**
- 13) FRM Financial Risk Meter (Mihoci et al. 2019)**

# Blockchain Use Cases

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## **Use Case I - Initial Coin Offerings: risk or opportunity?** | Toma, A. and Cerchiello, P. (UNIPV)

- In this use case, the authors employ statistical approaches to detect what characteristics of ICOs are significantly related to fraudulent behaviour.

## **Use Case II - A Statistical Classification of Cryptocurrencies** | Pele et al. (BUES/UBER)

- In this use case, the authors derive the main factors that separates cryptocurrencies from the classical assets, by using various classification techniques applied to the daily time series of log-returns.

## **Use Case III - Libra or Librae? Basket based stablecoins to mitigate foreign exchange volatility spillovers** | Giudici et al. (UNIPV)

- In this use case, the authors aim to assess the advantages of a stablecoin whose value is derived from a basket of underlying currencies, against a stablecoin which is pegged to the value of one major currency, such as the dollar.

# Blockchain Use Cases

- **Use Case IV – FRM  
Financial Risk Meter |  
Milhoci et al. (UBER)**

financialriskmeter



FRM

Crypto

Market Summary

Timeline

Details

Risk Levels

References

Who We Are

## Market | Crypto

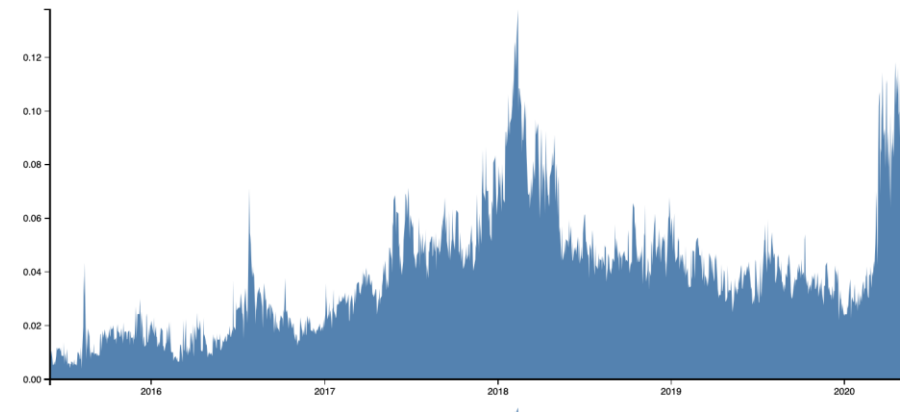
Current Risk Level:

severe risk of crisis

Red: severe risk of a crisis in the financial market.  
A financial crisis is imminent or occurring right now.  
Current risk level since 01/06/2020.

## Timeline

The Crypto FRM captures the systemic tail event behaviour in the largest 15 crypto coins by amount outstanding, but focussing on a more recent trading period given the availability of data. We start our analysis in 2015 with 8 crypto currencies, and extend to 15 from July 2017 onwards. The 2018 cryptocurrency crash is well captured after the rapid rise in crypto coins in 2017. Similarly the drop in Bitcoin prices at the end of 2018 led to another increase in systemic tail event risk.



# WP4 – Blockchain Research (GA)

---

- **Task 2.1. Technical coordination (ZHAW).** ZHAW is responsible for monitoring the progress of the research efforts of individual partners within the consortium. Each partner will be required to share new research (papers and use cases), related to risk management models related to the application of the blockchain in finance, to ZHAW, which will launch and maintain paper repositories accessible by all.
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# ZHAW's Activities – V

ZHAW will organize the **3<sup>rd</sup> validation and research workshop** on Blockchain and Risk Management **in Winterthur on 25<sup>th</sup> of March 2021**

## Draft Agenda

8.30 – 9.10 Registration and Welcome  
Address

9.15 – 9.30 Project Overview: FinTech-ho2020

**9.30 – 11.00 Industry Perspective**

11.00 – 11.30 Coffee break

**11.30 – 13.00 Regulatory Perspective**

13.00 – 14.00 Lunch

**14.00 – 16.00 Academic Use Cases**

16.00 – 16.30 Closing remarks

16.30 – 17.30 Management board meeting

Blockchain and Risk Management Conference

Horizon2020 Project: FINTECH-HO2020  
A Financial supervision and Technology  
compliance training programme



**1st European Workshop on Blockchain  
and Risk Management 2021**





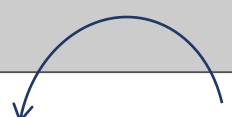
# Concluding Remarks

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# Progress on work plan and deliverables

- The deliverable associated with WP4 is due at month **30**.

List of deliverables

Deliverable Number <sup>14</sup>	Deliverable Title	Lead beneficiary	Type <sup>15</sup>	Dissemination level <sup>16</sup>	Due Date (in months) <sup>17</sup>
D4.1	Repository of research consortium papers (BC)	<div> <div>10 - UP1</div> <div>ZHAW</div>  </div>	Websites, patents filling, etc.	Public	30

- Irrespective of this, the repository is already launched. The same repository will be periodically updated so to reflect the changing state of art concerning the topic.

# Are the objectives still relevant?

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- “Governments should encourage innovation while protecting the interests of consumers and citizens. This requires communication and collaboration between all stakeholders, particularly with regard to regulation”

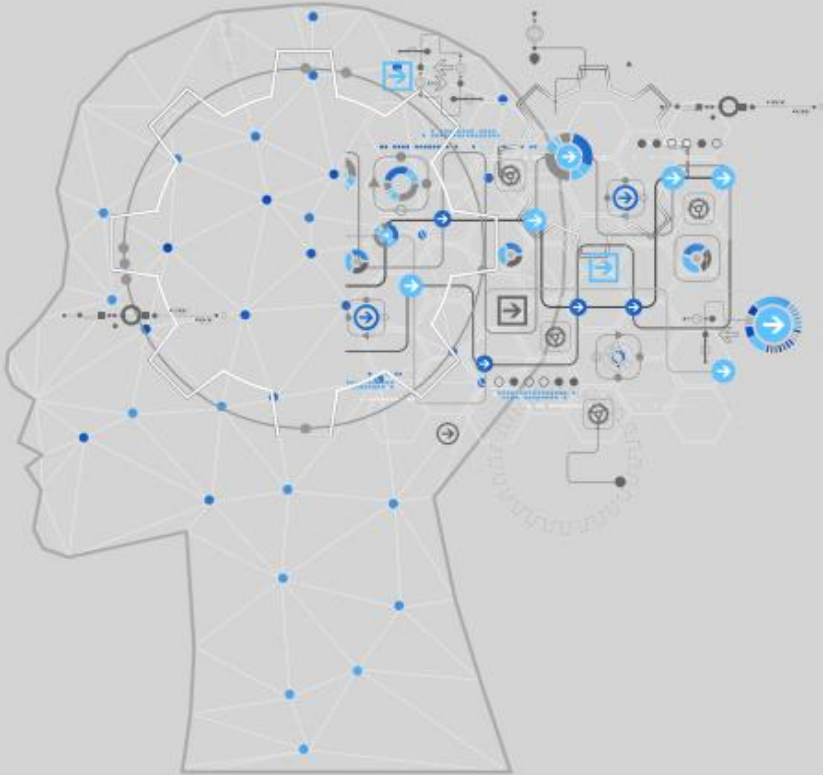
[The Policy Environment for Blockchain Innovation and Adoption OECD, 2019](#)

- “Crypto-assets have raised concerns with regard to money laundering, market integrity and consumer protection – among other things – as well as possible implications for financial stability.

[Crypto-Assets, ECB \(2019\)](#)

- “To implement embedded supervision, regulators would also be required to acquire substantial technological know-how and the willingness to adjust their operational approach to the technology that is being developed by the financial sector.”

[Embedded supervision: BIS Working Papers No.811, 2019](#)



# Expected Impact

- **Scientific and technological** → novel risk management tools for blockchain applications;
- **Economic, competitive and social** → the adoption of blockchain by the financial sector promises increased efficiency and effectiveness of various processes. DLT can lead to lower cost of financial transaction and enable SMEs to source funds;
- **Dissemination** → organizing many event + participating in large conferences and industry focused workshops to present the use cases and the project's activities.

# Management procedure

- ✓ All partners are invited to contribute a use case;
- ✓ 8 partners responded to ZHAW's call with one or several proposed paper;
- ✓ Based on the stated criteria (open source paper/availability of data and code), four use cases were uploaded on the platform;
- ✓ Use cases are the foundation of the training materials that are consecutively shared at various events around Europe (suptech, regtech and research workshops).

Consistent approach  
across all research WPs

# Blockchain Use Cases

- Use Case IV – FRM  
Financial Risk Meter |  
Milhoci et al. (UBER)

financialriskmeter

FRM Updates  
via Twitter

RDC



FRM

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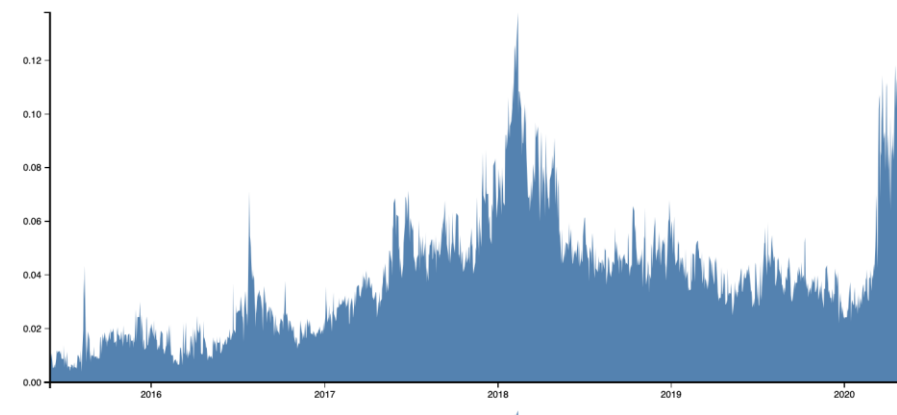
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# **ZHAW** – Zurich University of Applied Sciences



Prof. Dr. **Wolfgang Breymann**,  
SoE



Prof. Dr. **Jörg Osterrieder**,  
SoE



Prof. Dr. **Peter Schwendner**,  
SML



Dr. **Jan-Alexander Posth**,  
SML



Dr. **Branka Hadji Misheva**,  
SoE



Prof. Dr. **Harald Bärtschi**,  
SML