

## DIRECTED RISK RESEARCH PROBLEM STATEMENT

<b>Risk Theme</b>	Operational Risk	<b>Problem Nr.</b>	PS19006
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<b>PS Status</b>	Open	<b>Date</b>	15 Oct 2019	<b>Revised PS</b>	(Office use)
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**PROJECT TITLE:** Quantitative analysis of financial fraud networks – applications in banking, insurance.

### PROJECT GOAL

To identify entities and clusters of entities within broader networks, that commit financial fraud, e.g. through false loan applications, fraudulent insurance claims and money laundering activities.

### HIGH LEVEL DESCRIPTION OF PROBLEM

There is a need for research about the identification of fraudulent activity, with the assistance of network theory. Nodes in networks can consist of entities such as companies, bank accounts, individual persons, or banks while edges could be represented, for example, by telephone numbers, transactions, and addresses that connect the nodes in the fraud network. Network analysis has been applied in many areas, e.g. social sciences, biology, chemistry and physics. It could be necessary to conduct the network analysis for weighted and directed graphs. Potential approaches that can be followed include:

- *K*-core techniques;
- Average and/ or shortest path measures;
- Centrality measures; and/or
- Clustering coefficients.

Financial crime activities are typically linked to financial institutions, bank accounts, and persons via financial transactions, phone calls, and addresses. Money laundering is the most common financial crime that includes turning illegal money into legal money by making small transfers into bank accounts.

### PROJECT OBJECTIVES

- Develop models to assist in identifying nodes or node clusters in a financial or general network to improve fraud modelling.
- Test and calibrate models on real world data, and conduct simulations studies in order to gain an improved understanding of how fraud networks react to interventions.

## **OUTPUTS REQUIRED**

- A paper in the academic financial literature
- Methodologies for fraud network modelling that can be useful in practice.

## **STRATEGIC VALUE TO DIRECTED RISK RESEARCH**

This research will contribute to the understanding of fraud networks and of models to identify fraud in such networks. Improved modelling can lead to highly significant cost savings for financial institutions and general financial networks.

## **REFERENCES**

Miller. V, in *An introduction to Graph Theory and Complex Networks*, Amsterdam, Steen, 2010, pp. 36-56.

Williams. D, "Network visualisation for financial crime detection," *Journal of Visual Languages and Computing*, vol. 25, no. 3, pp. 433-451, Jan 29 2014.