Research Hypothesis

> *... research hypothesis for fund oversight solutions*

Commercial Objective

- commercial objective of research hypothesis is to provide **actionable insights** into the fund oversight processes and **minimise the human effort and process time**
    1. **Actionable Insights**
        a. identification of human effort and process time
            i. human interventions
            ii. number of exceptions
            iii. time to diagnosis and impact assessment, and to remediate
        b. providing the causality of certain events to the business operator (not just an information or vanity metric)
            i. understanding of changes in predictors with regards to responses, i.e. understand process statuses in terms of user behaviour influence (=and how to refine the behaviour if necessary
            ii. meaningful insights into trends, patterns, and process vulnerabilities that are currently not possible to surface (or are not easily seen in the current processes), e.g. trades that were not send in, patterns in market behaviour / signals, and risk factors
    2. **Minimisation of Human Effort and Process Time**
        - getting to the minimal 'reasonable' number by fully exploiting technology to our current understanding
        - for instance, we can create a benchmark showing the lowest reasonable effort after we fully exploited the technology
- correctly identifying commercial values in developed research hypothesis will lead to commercial outcomes in marketing (next instalment feature) or system scalability (reduced labour)

Validated Research Hypothesis

- developing **testable hypotheses** from ideas about product features and validating their commercial objective
    - clear = written as if-then statement
    - provable = identified variables and demonstrated relationships
    - reproducible = collected enough data

> *EXAMPLE:* "The water pollution (dependent variable) increases with the greater number of coal plants in a region (independent variable). If you change the independent variable (building more coal factories), it will change the dependent variable (amount of water pollution)."

number	hypothesis statement	dependent variable (target)	independent variable	commercial objective
1	• **presumed relationship** *"Factors that impact the risk in fund (dependent variable) are more dominant in funds with risky or difficult characteristics, and in market with unstable behaviour (independent variables)."* • **anticipated change** *"If the market behaviour or fund characteristics change, the impact of risk factors on fund will change as well."* • **example** *"Risk factors will have lower influence on the fund when the market is stable and fund is easy."*	oversight risk factors of fund	• fund characteristics • market behaviour	*"Knowing the risk factor in fund is a product functionality organisations would find extremely useful for the risk identification in their funds. For instance, it will enable organisations to highlight certain funds with considerable operational risk in them, get staffed appropriately, and adjust validation tolerances in fund oversight processes."*

2	• **presumed relationship** *"Drivers of uncertainty in fund valuation (dependent variable) are more impactful or increase in numbers in funds with more dominant fund risk factors (independent variables)."* • **anticipated change** *"If risk factors of fund change, the drivers of fund valuation uncertainty will change as well."* • **example** *"A fund will have strong drivers of its valuation uncertainty when the factors that impact the risk in fund are strong."*	drivers of fund valuation uncertainty	• fund risk factors • fund characteristics • market behaviour	*"Knowing the drivers of uncertainty in fund valuation gives organisations more transparency into the fund oversight. For instance, organisations will know the factors contributing to inaccurate processes that are impacting valuations on their funds."*
3	• **presumed relationship** *"The fact checking for results of fund oversight processes (dependent variable) is more difficult with the greater complexity of fund characteristics and oversight validations (independent variables)."* • **anticipated change** *"If fund characteristics and validations change, the fact checking of fund oversight changes as well."* • **example** *"The fund oversight fact-check will be easy when the fund is easy and its oversight validations are simple."*	fund oversight fact-check	• fund characteristics • fund oversight validations • market data	*"Having the key processes in fund checked for facts whenever data are available gives organisations another level of confidence in the fund oversight. For instance, it will give organisations the ability to check a certain pool of data to know if the fund oversight processes were right."*
4	• **presumed relationship** *"The ability of synthetic benchmark to mimic fund performance (dependent variable) increases with the greater number of real benchmark candidates and availability of their performance data for attribution analysis to track this particular fund (independent variables)."* • **anticipated change** *"If benchmark candidates and their performance data change, the ability of synthetic benchmark changes as well."* • **example** *"The fund will have an accurate synthetic benchmark predicting the fund's value when lot of benchmark candidates and their performance data are available."*	synthetic fund benchmark	• fund characteristics • benchmarks	*"The availability of 'synthetic' benchmark that is closely tracking the fund gives organisations more confidence in their NAV value of that fund - better index. It also removes organisations' need to maintain their own 'composite' indexes - less effort (operational overhead)."*
5	• **presumed relationship** *"The ability to narrate the current processes in fund validations (dependent variable) increases with the greater amount of previous user-defined narrations of NAV events, fund data, and market data (independent variables)."* • **anticipated change** *"If historical narrations, fund data, and market data change, the automated narratives will change as well."* • **example** *"The NAV movement can be described with an automatically generated commentary around corporate actions impacting the fund price when the user commentaries and fund data are available on historical market events for this particular fund oversight."*	automated fund narratives	• user event narrations • fund data • market data	*"A communication protocol for describing the behaviour of fund will eliminate organisations' manual efforts and may introduce different metrics to spot issues in their fund oversight. For instance, anomalies in funds can be described by automatic commentaries with a language that is easily understood by organisations."*

6	• **presumed relationship** *"The confidence in fund valuation (dependent variable) decreases with the greater difference between actual and expected NAV value of the fund, lower explainability of NAV movement for the fund, lower number of fact-checked processes of fund oversight, and more impactful drivers of fund valuation uncertainty (independent variables)."* • **anticipated change** *"If the NAV value differential, NAV movement explainability, fund oversight fact-check, and drivers of fund valuation uncertainty change, the uncertainty of fund valuation will change as well."* • **example** *"The confidence in fund valuation will be high (i.e. low uncertainty in the fund valuation) when the fund has low percentage of NAV difference, NAV movement of fund can be explained in detail, all processes in fund oversight are fact-checked, and drivers of uncertainty in fund valuation are weak (or not present)."*	fund valuation confidence	• NAV value differential • NAV movement explainability • fund oversight fact-check • drivers of fund valuation uncertainty • fund risk factors • fund characteristics • market behaviour	*"Justifying the confidence in fund valuation helps organisations to establish more trust in their fund valuation. For instance, organisations can have more confidence in their fund oversight and backup fund valuation during outages. It also raises the authority of MG in fund accuracy solutions (pControl Fund Valuation Confidence)."*
7	• **presumed relationship** *"The false-positive exceptions in fund oversight processes (dependent variable) increase with the greater number of systematic issues coming from the organisation and partially from the fund oversight system (independent variables)."* • **anticipated change** *"If the number of systematic fund issues changes, the false-positive exceptions in fund oversight changes as well."* • **example** *"The fund will have less false-positive exceptions in oversight processes when fund manager is booking their journals correctly and puts the right prices for the oversight processes."*	exception categories for fund pre-oversight	• systematic process issues • fund data • market data validations • market data	*"Organisations will have an early warning signal for the oversight of their funds when identified exceptions in their upstream systems are categorised for remediation purposes - refining the end-to-end oversight process. For instance, organisations can be automatically notified whenever they or their vendors are providing incorrect data into the fund oversight processes and will have the option to fix such data before the validations are run (instead of clearing more exceptions later on)."*

8	• **presumed relationship** *"The tolerances for fund oversight validations (dependent variable) more closely align to current market movements with the increasing amount of market data used to update such tolerances and with the increasing frequency of such updates (independent variables) ."* • **anticipated change** *"If the market data and frequency of updates change, the dynamic tolerances will change as well."* • **example** *"Fund validations will produce lot of exceptions in the fund oversight processes when the tolerances are set manually set on a sporadic basis, i.e. when tolerances are not updated to the current market conditions on a regular or real-time basis."*	dynamic tolerances for fund oversight validations	• fund oversight validations • validation tolerance records for the fund • market movements	*"Organisations' manual efforts to manage exceptions in their fund oversight processes will be reduced with dynamic tolerances on such fund validations, i.e. fund oversight processes will produce less exceptions compared to validations with static tolerances. Organisations will also gain new means to measure volatility and highlight anomalies in their portfolios. For instance, tolerances can be automatically adjusted according to benchmarks and validations can be tailored for stocks (based on the volatility over the last 30 days)."*
9	• **presumed relationship** *"The confidence in fund oversight processes before they are run (dependent variable) increases with the greater number of validated trading and market data for that fund (independent variables)."* • **anticipated change** *"If the number of validated data change, the fund oversight confidence changes as well."* • **example** *"The confidence to successfully run fund oversight will be low (high uncertainty in fund oversight processes, no evidence from trading and market data for clearing oversight validation errors, etc.) when fundamental data are not validated for that fund."*	fund pre-oversight confidence	• market data validations • fund data • trading data • market data	*"The ability to measure a confidence in fund data at pre-oversight stage will provide organisations with an estimate of success for their fund oversight processes before they are run. Users from operations can compare this confidence number at the start of day with their previous experience, e.g. comparing market conditions and their funds on different days. This can also improve the current solution with a new validation in pControl, which can indicate further processes in fund oversight. For instance, alerting on arrival of new assets that has not been setup yet (new share class, fund structure, etc.)."*

10	• **presumed relationship** *"The number of matches between fund oversight validations and onboarding data that are required for such validations (dependent variable) increases with the greater amount and diversity of data provided by organisations (independent variables)."* • **anticipated change** *"If the onboarding data change, the validation-onboarding match changes as well."* • **example** *"Fund managers can run only few oversight validations (from all validations available) when they have only limited amount of onboarding data for the oversight of their funds."*	validation-onboarding match for fund oversight	• fund oversight validations • fund oversight onboarding data (fund and market data)	*"Correlating organisations' raw data with fund validations will give organisations an answer to one of their most frequent questions about fund oversight - what data they need for turning on specific fund oversight validations. It will also provide organisations with answers to one of their first questions they ask at the onboarding stage - which fund oversight validations they can run with their raw data. Then, organisations will be able to automatically manage their fund setup based on the currently available data they provide. This will also build a foundation for data-driven fund oversight processes if organisations' raw data are automatically linked to fund oversight validations - modernising the pControl software."*
11	• **presumed relationship** *"The time required to manage exceptions in fund oversight processes (dependent variable) increases with the greater amount of manual effort involved to clear such exceptions, which was indicated by previous attempts for such tasks by users (independent variables)."* • **anticipated change** *"If the user behavioural data change, the time required to manage exceptions will change as well."* • **example** *"The fund will have estimated long time for managing its exceptions when users have previously taken long time to clear similar exceptions on that same (or similar) fund."*	exception management time	• fund oversight exceptions • manual effort • user behavioural data • number of users solving exceptions	*"The operational risk of organisations will be reduced when the time required to manage exceptions in their fund oversight is estimated and achieved. Organisations will know the operational risk associated to capacity management and will be able to plan their resource capacity to work with - delivering more efficient resource capacity management. They can also better protect their Service-Level Agreements (SLAs) due to an increased insurance for achieving SLAs - detecting operational impacts during the day that can be prevented rather than responding to consequences."*

12	• **presumed relationship** *"The cognitive ability of current processes for fund oversight (dependent variable) increases with the greater amount of user behaviour data and data describing the fund oversight processes as an environment, which is possible to interact with (independent variables)."* • **anticipated change** *"If the user behaviour data and oversight environment change, the cognitive abilities of fund oversight change as well."* • **example** *"The fund oversight can be run completely by 'virtual assistants' when the processes in fund oversight are defined as an environment that allows such software agents with their own exploration."*	cognitive oversight of fund	• interactive fund oversight environment • user behaviour data • fund data • market data	*"The investment industry's cost structure will be lowered with an automatic oversight of funds that is fully cognitive – minimising organisations' manual effort with improved quality of fund oversight processes. This only happens when fund oversight processes are demonstrating the full exploitation of state-of-the-art technologies to reach the current highest level possible of accuracy, efficiency, trust, and autonomy."*
13	• **presumed relationship** *"The quality of reporting on fund oversight processes (dependent variable) increases with the greater number of insights generated into those processes (independent variable)."* • **anticipated change** *"If the insights into fund oversight change, the reporting on fund oversight will change as well."* • **example** *"A fund will have less insightful reports available to organisation during its oversight when insights are not generated."*	fund oversight reporting	• fund oversight insights	*"Organisations will know what exactly has happened in oversight processes on their funds when insightful reports are available on the fly. For instance, they will be able to estimate how much money is possible to save by catching issues in their fund valuations. Also, the value of pControl solution for fund oversight will be easier to quantify to organisations when issues in their fund valuations are surfaced and clearly presented to them."*
14	• **presumed relationship** *"The fund behaviour at specific date (dependent variable) is easier to predict with the greater amount of available market events that are scheduled during the year and historic patterns for fund & market behaviour (independent variables)."* • **anticipated change** *"If the scheduled market events and historic patterns for fund and market behaviour change, the fund behaviour will change as well."* • **example** *"The fund behaviour will be hard to predict for specific date when market events are not scheduled at that date and historic patterns of fund & market behaviour are not available."*	fund calendar	• scheduled market events • operational fund events • historic patterns of fund behaviour • historic patterns of market behaviour	*"Organisations will know how valuations of their funds is impacted at the specific date based on relevant upcoming market and operational events. For instance, organisations can use such interactive fund calendar to know what is changing value of their fund (unemployment figures from market events, income distribution from operational events, etc.)."*