# Introduction

Micro Focus is a multinational company with 3,500+ employees and 20+ offices in the United States. We at Micro Focus are supportive of the development standards and tools for reliable, robust, and trustworthy systems that use artificial intelligence (AI) technologies. As one of the largest software companies in the world, we at Micro Focus utilize AI technologies to help our customers in a number of areas: from IDOL's text analytics for data discovery and compliance, to Fortify's machine learning to reduce false positives in code scans, to Interset's unsupervised machine learning to detect cyber threats and attacks.

From these initially disparate products is an internal Micro Focus virtual community and center of excellence around the use of AI. These emergent standards and best practices from this Analytics Center of Excellence will be the focus of our comments to this RFI.

# Design, Architecture, and Development Standards

We at Micro Focus believe that the architecture, design, and development of AI is a structured and disciplined activity, similar to that of large-scale enterprise software. As a result, the best practices that have emerged from decades of experience in software development apply to AI technology-based solutions as well. Specifically, best practices in software design, architecture, and development are equally applicable to AI solutions.

## Design

Just as how a software product is designed around a specific use case rather than a technology, an AI solution should be designed around a specific need or problem statement rather than looking at a specific AI algorithm or machine learning method. This is important is because the AI consumer will determine the regulatory and ethical context for the technology. For example, when designing an AI solution to detect fraud, the audit and compliance requirements of the financial sector will require the output of your AI models to be explainable and describe decisions made by the models—a requirement that is not achievable with, say, deep neural networks.

## Architecture

Software products have a technical architecture, that shows the logical components of the solution and the relationships and flows between those logical components. Similarly, AI-based products should have a mathematical architecture: a high-level diagram that shows the overall flow of the AI algorithms, statistics and mathematics involved, and the full end-to-end lifecycle from datasets, to learning, to validating, to scoring, to results. This mathematical architecture is an important engineering artifact and also becomes a fundamental way to communicate how AI is used within the product. Disclosing how your AI works is vital for openness and transparency

and, ultimately, trust. We at Micro Focus would not expect a customer to acquire a software solution without understanding the technical architecture; similarly, we should not expect a customer to purchase an AI solution without being transparent about the mathematical architecture.

## Development

AI models and mathematics are developed and evolve over time, just like source code. For us to have trust in the systems we develop, the underlying design and experiments must be documented and reproducible for others. As a result, the same discipline around source code management applies to AI. The key tools for this are executable notebooks with code, examples, mathematical exposition and graphs, coupled with source code systems to track changes over time and for sharing. Mathematics should be well-documented with comments and stored in source code repositories, so that you can track the providence, changes, and contributions to the AI system over time. Ideally, the mathematics are described in an executable language, such as R or Python, so that the data science is both documented and reproducible by others beyond the original authors. At Micro Focus' Interset division, for example, we development our mathematics in R Markdown and version control it within GitHub.

# Dataset Management Standards

A unique challenge area within AI technologies is the management of datasets. Unlike other technologies, AI requires, as much as possible, actual, real-world datasets from actual users, customers, machines, sensors, etc. Simulated or generated data is insufficient. As a result, developers of AI-based technologies quite often find themselves dealing with datasets that may be sensitive, very large, and/or have regulatory requirements attached to them.

At Micro Focus, datasets are often provided by customers and, as a result, can only be used for the purposes agreed upon by the customer and the Micro Focus employees who have been granted permission to view the data by the customer. This means that not only are there access control and usage limitations placed upon the data itself, there may also be downstream restrictions placed upon the models that are developed from the dataset. The data provider needs to have a clear understanding about whether models that learn from the raw data inherits the same sensitivity as the source data, and that requires a transparent conversation about the AI algorithms used, any use of anonymization, pseudonymization or differential privacy methods, geopolitical in-country restrictions on the data, and potentially regulatory impacts such as the EU's GDPR or California's CCPA.

# Ethical, Responsible, and Trustworthy AI Standards

A relatively new but important focus area for the development of AI solutions at Micro Focus is to ensure that all AI is designed and executed with caution and the anticipation of unintended consequences. At Micro Focus' Interset division, we signed the Canadian Montreal Declaration

for Responsible AI in 2018, formally committing us as an organization to the ten principles laid out by the document: Well-being, respect for autonomy, protection of privacy and intimacy, solidarity, democratic participation, equity, diversity inclusion, prudence, responsibility, and sustainable development.

As a representative of industry, we believe that considering responsible AI is not only the right thing to do, it is a good business practice. Our customers appreciate that we can be transparent about our use of AI, that we can describe how we respect people's autonomy, that we have tried to anticipate any risks of misuse and protect the integrity and confidentiality of personal data, etc. A full description of the application of these principles can be found in the Interset & Responsible AI blog series[1].

We have found the Montreal Declaration for Responsible AI an important set of guidelines for the development of our AI solutions, and encourage the NIST to put forth a similar set of standards.

# Special Considerations for the Financial, Security, and U.S. Government Sectors

AI, as a new technology that is advancing very quickly, has proven itself to be very powerful but difficult to understand. Some of this complexity is real—the underlying technologies are fast-moving and based in areas such as statistical learning that can be tricky to understand without at least some background in quantitative sciences—but some of this complexity is also the result of unfounded market fear and hype.

While all of the standard processes described above that we use at Micro Focus for AI technologies are generically useful across all sectors, we have found that there is a pronounced need for them in the financial, security, and government related industry sectors. We believe that this is because those areas tend to be more regulated than other areas and, as a result, have a pronounced need for transparency.

In fact, two of the Micro Focus security product divisions that use AI—ArcSight and Interset—were In-Q-Tel portfolio companies. This early involvement and interest from the U.S. Federal Intelligence agencies validated and drove the adoption of the standards around the design, development, and communication of AI described above within Micro Focus.

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[1] https://interset.com/2019/01/30/interset-responsible-ai-part-1/

# A Final Note on the Opportunity for the U.S. and Federal Government Engagement

At Micro Focus, we believe that AI is an incredibly powerful and enabling set of technologies that has the potential to generate tremendous value and opportunity for the world. However, as with all new technologies, excitement and possibility needs to be balanced with responsibility and ethics. And these standards are best developed in an open, participatory, and democratic fashion that the U.S. Federal Government is positioned to take a leadership role in. While the impact is global, the conversations need to start locally, and to that end, Micro Focus supports this initiative and will happily share its experiences as an industry participant.