Valer Bocan, PhD, CSSLP

Department of Computer and Information Technology Politehnica University of Timişoara
Timişoara, 300223, Romania
valer.bocan@upt.ro
ORCID: 0009-0006-9084-4064

December 23, 2025

To the Editor-in-Chief *Computer Standards & Interfaces* Elsevier,

Subject: Submission of original research article

Dear Editor,

I am pleased to submit the enclosed manuscript entitled ***IPFLang: A Domain-Specific Language for Standardizing Multi-Jurisdiction Intellectual Property Fee Calculation*** for consideration for publication in *Computer Standards & Interfaces*.

The global intellectual property (IP) management ecosystem currently suffers from a significant specification gap. While data exchange standards exist for bibliographic data, there is no standard for the computational logic of fee calculation. This forces patent offices to rely on fragmented, proprietary web calculators lacking programmatic interfaces, resulting in interoperability issues and high error rates in cross-border filings.

This paper addresses this standardization challenge by introducing IPFLang, a domain-specific language that provides a standard specification for jurisdiction-specific fee rules. This work is relevant to *Computer Standards & Interfaces* as it presents a novel application of formal language design and type systems to solve a regulatory interoperability problem affecting the global IP management industry.

Contributions of this work are as follows:

- **Language Specification:** A complete EBNF grammar with declarative fee computation blocks, explicit input type declarations, temporal operators for date-dependent calculations, and jurisdiction composition for code reuse.

- **Currency-Aware Type System:** A dimensional type system supporting 161 currencies with formal typing rules that prevent cross-currency arithmetic errors at compile time, along with a type safety argument.

- **Static Verification:** Algorithms for completeness checking and monotonicity verification, ensuring fee definitions behave correctly across all valid input combinations.

- **Provenance and Auditability:** Execution tracing showing how final amounts derive from input parameters, with counterfactual analysis enabling what-if scenarios for regulatory compliance.

- **Comprehensive Validation:** An open-source reference implementation (GPLv3) with 260 test methods and expert validation of 118 production jurisdiction files covering PCT national/regional phase entry fees for major patent offices worldwide, achieving sub-millisecond execution.

This research sits at the intersection of software engineering, formal language design, and legal informatics. It demonstrates how domain-specific standards can replace proprietary "black box" implementations to achieve transparency and interoperability in government-to-business interfaces.

I confirm that this manuscript is original, has not been published elsewhere, and is not currently under consideration by another journal. I have no conflicts of interest to declare. This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

Thank you for your time and consideration of this work.

Sincerely,

Valer Bocan, PhD, CSSLP
Politehnica University of Timişoara, ROMANIA