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Editorial

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This marks the inaugural issue of the Springer-Verlag journal *Software Tools for Technology Transfer* (STTT). The journal's *raison d'être* may be summarized as follows.

> *STTT intends to provide a forum for issues on the development, deployment and use of tools for the construction and analysis of correct and reliable systems.*

This aim goes hand in hand with the technology transfer support offered by the related *Electronic Tool Integration* (ETI) platform, which enables users to experiment with tools, both in isolation and in tandem, in order to gain practical experience with the concepts described in the journal papers. ETI is designed to allow this experimentation with minimum expertise; it is intended to enable newcomers easily to orient themselves in the fast-growing tool community. The STTT/ETI venture also includes an *on-line forum* that functions as a moderated discussion site where readers and tool users are invited to comment on, question, and provide feedback about tools and papers. Relevant points and excerpts from discussions will be published electronically.

In the remainder we discuss the state of affairs that that led us to found STTT/ETI and to organize it in the manner that we have.

The Need for STTT/ETI

STTT/ETI was born in light of the following observations concerning the current state of the tool development arena, from the point of view of tool research, tool construction, and tool usage.

Research into tool support for system development, analysis, validation, and verification has exploded in recent years. This has been due on the one hand to demands from the application world, in which the expense of hardware or software bugs can seriously impede an organization's or product's competitiveness, and on the other hand to advances in areas as diverse as testing, model checking, term-rewriting, domain (knowledge) modelling, software component management and reuse, as well as data-flow and type analysis. Individually or in combination, these advances have greatly affected the state of the art of central pillars of systems engineering such as compiler, database, network, and hardware technology.

Tool builders from different areas in computer science share similar goals: they are confronted with the traditional challenges to computer science and systems engineering of "*more, faster, cheaper*", a take-off on the Olympic motto capturing the coarse criteria for survival in highly competitive technology markets. Thus tool builders of different background could directly or indirectly profit from each other's research and development efforts by exploiting synergies at different levels. An example would be the identification and reuse of algorithms and implementation strategies developed in another application field, which are therefore shareable without undermining competitive advantage.

Currently, tool builders are mostly prevented from such "reuse" by communication, presentation, and acceptance hurdles that result from differing conceptual, notational and terminological conventions. These obstacles can seem insuperable and capable of hindering any form of inter-domain discourse.

Potential tool users find it sometimes extremely difficult to locate tool descriptions, experience reports, and case studies concerning tools or applications they might be interested in. As a consequence it is nearly impossible to compare features of tools or to investigate the collaborative application of tools with complementary functionalities.

One therefore sees a huge gap between a growing demand on the one hand for advanced tools supporting the design, development and analysis of complex, reliable and efficient systems on the one hand, and the currently chaotic state of information dissemination, communication, and evaluation concerning the demand-and-offer of advanced, practicable, fielded technology on the other. Too often this hampers real progress, as tool builders and users either rediscover and reimplement at great expense the same wheel or settle for familiar though inadequate solutions.

The effects of this dychotomy also show up in research settings, as evidenced by the unpredictable way tool-related paper submissions are currently reviewed in technical conferences. Although program committees are beginning to recognize that tools have a standing of their own, evaluation criteria are still far from uniform: very good system-level presentations may be rejected because of "missing theorems," while second-class tool presentations may be accepted because of a committee's laudable but perhaps ill-informed desire to "encourage practicality." In addition, tool design and implementation issues are rarely written about; this also dramatically impoverishes the literature and makes tool-building more difficult.

The STTT Solution

STTT/ETI aims to overhaul the current state of tool literature by providing an accessible yet rigorous forum for discussing all issues associated with tool design, development, deployment and usage. Particular emphasis will be placed on following three major areas, which we consider as equally important ingredients of an approach to characterizing tool quality.

Tool implementation issues, including

- Design and implementation: modularity, efficiency, portability, integrability, and reusability.
- Automatic support: tool generators, integrators, and interface builders.
- Interfaces: graphics, hypertext, retrieval, and transparency.

System design and analysis issues, such as:

- Hierarchical and compositional approaches to system construction and analysis.
- Rigorous approaches to all aspects of the system life cycle, including requirements capture, design, implementation, verification, testing and maintenance.
- Frameworks analyzing non-functional aspects of system behavior, such as real time, probability, and efficiency.

Experience information, such as:

- Tool performance and adaptability.
- Case studies and experience reports.
- Methodological observations on tool usage.

Besides providing a new "home" for contributions meeting this characteristic profile, we also hope that STTT/ETI will grow into a meeting point for theoreticians, tool builders, users, and practitioners and will therefore contribute to the quality of software tools developed in an academic as well as in an industrial context.

STTT's Mission

The primary focus of STTT/ETI is to provide a forum for researchers and practitioners to present and discuss all aspects of system-development tools. It is intended to support the transfer of technology from researchers and tool builders to practitioners and tool users and, indirectly, to channel feedback, commentary, and also criticism from users to the developers.

The success of this venture depends heavily on the accessibility of the contributions to people of other communities, as well as on the openness of the audience when approaching a new field. Of course, it can be extremely difficult to present technical ideas, born in a specific context and with a specific point of view, in a generally understandable fashion. This problem becomes particularly acute when one is writing about recent results and experiences; the community-specific assumptions and jargon can provide presentational short cuts that are difficult to resist when one is "under the gun." However, the effort of doing so is worth investing: striving for a degree of maturity and a distance from a particular perspective is the best foundation for reaching other communities. As it is the key towards inter-community communication, an according presentation style is obligatory for STTT contributions. Contributions are in fact written and reviewed with this explicit goal in mind.

In the beginning STTT/ETI may experience some infancy problems, in terms of papers that are still too narrow in their presentation style or too technical, and which may therefore be accessible only by readers already somewhat familiar with the topic. We therefore actively encourage unhappy readers send us their feedback. As time and experience accumulate, authors, editors, reviewers as well as readers will become acquainted with the new style STTT is intended to promulgate. The accumulated feedback over the journal's many communications channels and the papers provided by other authors may remind prospective authors of the difficulty and need of bridging sometimes unsuspected gaps.[1] We are therefore confident that infancy problems can be

[1] In support of this "cross-cultural activity" we will maintain an electronic "jargon dictionary" that authors as well are readers may consult.

overcome in the near future in cooperation with all the involved parties (the authors, readers, tool builders, tool users, editors, and publisher). We hope that these links will motivate researchers in their work and encourage practitioners to try new tools and methodologies.

Frequently asked questions.

Whenever a new journal appears several questions naturally occur to many prospective readers, who harbor a reasonable suspicion about a new venue that aims to claim part of their attention every time a new issue comes out. We have drawn together some of these questions below and given answers that may convince the reader that, far from being just another journal, *STTT* offers unique possibilities to those who read and contribute to it.

Do we really need another journal?

Maybe not; researchers and practitioners both have numerous venues in which to publicize their work. However, *STTT* is not just "another journal"! We intend *STTT* to offer advantages of both accessibility and interactivity that more traditional scholarly journals lack, while providing the rigor and intellectual *gravitas* missing from the popular computer press.

That sounds good in principle, but doesn't every journal claim to be unique?

Indeed, every journal claims to differ in some aspects from its competitors; otherwise publishers would not publish them. However, *STTT* will exploit a combination of printed and electronic material that has yet to be seen in any other venue. The most interesting innovation concerns the *Electronic Tool Integration*, or ETI, platform, which provides users with a concrete means for actually experimenting with tools described in *STTT*. ETI draws upon recent advances in co-ordination mechanisms to provide users with a uniform interface to disparate tools with a minimum of overhead to the tool builder as well as to the users. Through ETI readers of *STTT* may try out tools on case studies of their own devising; compare the relative performances of tools described in the journal; and experiment with combining tools with complementary functionalities.

The ETI concept appears interesting, but how does it make STTT *"interactive and accessible?"*

By itself, the ETI doesn't necessarily do these things, although it already distinguishes *STTT* from other tool-oriented journals. Another novel feature of *STTT*, however, will enable readers of the journal to interact with each other and with paper authors. Using *STTT*'s on-line forum, readers may pose questions about papers to other readers; offer viewpoints on the technical and experimental aspects of different pieces of work appearing in *STTT*; exchange information about tool usage via the ETI; share experiences on case studies; and more. Thus the forum will provide more feedback opportunities that a traditional letters to the editor column would, and without the publication delay.

This sounds nice, but who is going to be able to read and understand the papers?

We take the "technology transfer" portion of the journal's title seriously, and our goal is that any technically proficient researcher, either academic or industrial, should be able to read and understand any paper. To the extent that a paper is turgid, disorganized or jargon-laden, it fails in this task; we consequently place utmost importance on clarity of exposition in the papers appearing in the journal. In practice, this will mean that prospective authors can expect to interact more extensively with editors than in other journals in order to improve the presentation in a paper. Rather than being a chore for the author, however, we view this as an advantage, as the end product—a readable and cogent presentation of research results—will be more compelling.

I can see submitting a paper to STTT*, but why would I want to make my tools available on the ETI?*

In a word, to publicize them! Consider the advantages.

1. Users can try out your tools without having to go through the effort of installing them themselves and asking you for help.
2. Case study data can also be put on-line for users to experiment with.
3. The hardware sophistication of the ETI server will yield impressive performance.

As for potential disadvantages: as the ETI server will be secure, stealing software will be proscribed. Similarly, all rights to tools in the ETI will remain with the developers of the tools; ETI will only provide a "demonstration platform." We can think of no better way to make the larger community aware of your tools than including them in the ETI.

How are versions of tools maintained? I don't want my outdated, buggy software to remain accessible once a new version is available!

We plan to support updates on a regular basis. Particularly appropriate would be fixing the interfaces for single tools so that each tool's providers can exchange the versions themselves as long as no change to the current integration interface is required. Cooperative exchange could be offered by the ETI team in case of major updates. All the exchanges will be first carried on on a separate (trial) platform, and made operative for the on-line platform only after corresponding testing.

This sounds convincing for academicians, but why should industry bother presenting their tools in the ETI?

Tool evaluation in practice is very much neglected: in many cases, the time pressure leads to "home-made" special-purpose solutions, as there is no time to search for the appropriate available tool, while running the risk that nothing adequate is found. This awkward situation can be overcome by having an independent institution in charge of tool evaluation, as it is common practice for test or even certification of the quality of "standard" consumer products.

STTT/ETI aims at achieving such a role. The central advantage of their unique combination is that not only can written recommendations be made public in the journal or on the ETI site, but also the ETI allows potential customers to check the evaluation criteria themselves. Thus being part of the ETI provides an implicit recommendation for a tool to a large community of potential customers. This enables a fair evaluation of tools, increases the number of satisfied customers, and may easily lead to the discovery of unsuspected new areas of potential application: on the basis of abstract profiling, as it is typical for STTT/ETI, customers looking for solutions to a specific problem may well find a matching technology which was designed for a completely different purpose.

What about the copyright and licensing situation, and how can e.g. commercial tool providers be sure that users will not simply use the ETI environment rather than acquire the tools they want?

First of all, there are licensing and copyright forms to be signed by tool builders and the ETI team regulating the allowed use of integrated tools within the ETI. Authorization and logging of user's activity on the ETI site may be also explicitely agreed upon. More on this topic is found in the ETI special section in this issue and online on the ETI site.

STTT/ETI at a Glance

In general, each issue will contain a mix of papers devoted to a special topic together with others of more general interest. The following describes both kinds of contributions in more detail, with examples drawn from the current issue.

Themes for Special Sections. This issue of STTT features a special section on tools for verifying continuous real-time and hybrid systems. Such special sections will be a regular feature of STTT; they should in general contain an introduction that serves as an overview of the area being considered, while the following contributions can then focus on more specific topics. It is desirable to couple such papers with the installation of the described tool or algorithm in the ETI platform. We encourage researchers interested in organizing special sections to contact the chief editors with a proposal for a topic and a list of authors to be invited.

Regular Contributions. This issue contains the presentation of the Xesar/Aldebaran toolset which complements the tools of the real-time special section. Although it will not always be possible to enforce such synergies between regular contributions and special sections, we are convinced that there is a high potential for mutual support and enhancement, and we particularly invite papers addressing this issue. However, this invitation is nonexclusive: all papers describing new methods and tools in a sufficiently accessible way fall within the scope of STTT, in particular when they are accompanied by implementations that can be integrated in the ETI platform.

The ETI Online Service. The ETI platform is intended to serve as a Web-based active repository that enables users to experiment with tools on-line. It is *not* a distribution platform; tool builders whose contributions are incorporated into the ETI will retain full legal rights and also responsibilities for their software.

A second special section of this issue provides on a fairly detailed description of the platform, spanning the philosophy which led us to its creation, architectural and organizational concerns, the concrete description of the integration of the (sample) tools of this issue, and a sample user session.

Tool builders interested in adding their software to the ETI should submit a description of their software, and the software itself, to the ETI co-ordinator. The tool will be reviewed in a manner similar to that used for paper submissions, and upon acceptance it will be incorporated into the ETI in cooperation with the ETI team.

Typically integrated tools should also have a corresponding paper in the journal describing their purpose and use in a way accessible to non-specialists.

The Opinion Corner: Points of View from an Expert. This issue features a compact contribution on the much-debated question of formal methods and tools by an expert in the field. Such thought-provoking and discussion-generating short contributions are encouraged, although they will not be run on a regular basis.

A Reactive System: The On-Line Forum The on-line forum functions as a moderated discussion site where readers and tool users are invited to comment, to query, and to provide feedback about tools and papers; other readers and authors are encouraged to respond. Relevant points and excerpts from discussions will be published electronically.

Conclusion

We hope to have convinced you that *STTT/ETI* does indeed offer a unique opportunity for readers, authors, and tool builders, which no other technical journal provides, and we look forward to many interesting paper and software submissions. But please do keep us honest; we encourage all feedback, both positive and negative, about the journal.

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