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FuzzyCLIPS From Research to Product

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Abstract - This paper describes the commercial productization of FuzzyCLIPS which was developed under a NASA Phase II SBIR contract. The intent of this paper is to provide a general roadmap of the processes that are required to make a viable, marketable product once its concept and development are complete.

I. INTRODUCTION

FuzzyCLIPS was developed under a NASA Phase II SBIR contract. FuzzyCLIPS combines fuzzy reasoning capability with conventional rule based technology. It retains the flexibility and portability of CLIPS, targets development of both stand-alone and embedded systems, and extends rule syntax and user definitions of membership function types.

The rule based portion of FuzzyCLIPS was derived from NASA's version 5.1 of CLIPS (C Language Integrated Production System) which was developed by NASA's Johnson Space Center Software Technology Branch. The fuzzy portion of FuzzyCLIPS is based upon Togai InfraLogic's fuzzy logic products.

A number of demonstration examples were developed for FuzzyCLIPS during the Phase II SBIR implementation. Demo and alpha versions of FuzzyCLIPS were shown at several conferences during the Phase II SBIR implementation. Based upon reactions to these demonstrations and initial product inquiries, FuzzyCLIPS appears to have a bright future as a tool for developing intelligent decision making and control systems.

The technical development of FuzzyCLIPS is only part of the overall story of creating a commercial software product. The final productization process which is described in this paper required an additional 4 months of work following the final SBIR delivery to NASA.

II PRODUCT DEVELOPMENT

Market planning is a crucial part of the product development cycle. Since a primary objective of the Phase II SBIR program was to eventually commercialize the FuzzyCLIPS product, several key decisions related to its marketing were made early in the design phase of the project. These decisions then became important objectives of the overall development process.

CLIPS is available for IBM PC, Macintosh, and UNIX platforms. We decided that FuzzyCLIPS would also support these same platforms so that all current users of CLIPS would be able to take advantage of the fuzzy logic enhancements.

Once a decision was made on the platforms to be supported, the user interface was considered. We decided to retain the limited graphics approach that is used in CLIPS 5.1. This decision made portability of the final product across the 3 platforms fairly straightforward. A more extensive graphic interface would have been nice but would have required significantly more development effort, made the platform porting task more difficult, and increased our maintenance and support costs.

The FuzzyCLIPS extensions were developed in C to maintain maximum compatibility with CLIPS 5.1 and to simplify porting across the 3 supported platforms.

Testing new products is a major concern for developers. We decided to implement a Verification and Validation (V&V) tool utility to serve as an application example of FuzzyCLIPS and to provide a tool for evaluating and testing our own extensions. This V&V tool is included with the final FuzzyCLIPS product.

To further assist users with testing new applications, we developed several example applications which can be used as templates or benchmarks for user's own applications.

V PRICING

Pricing is the final factor that must be considered in productization. Competitive product pricing, general price range of other products the customers are used to purchasing, business revenue goals, and production costs are some of the elements that may influence a product's sale price.

Discounts must also be taken into account when establishing a product's price to ensure that there is adequate revenue margin. Discounts may be offered for quantity purchases, educational institutions, special time offers, rebate coupons, etc. Discounts may also be required when selling through resellers or distributors.

Terms of sale must also be determined. Sales can be offered via credit card, check, cash only, purchase orders, or credit lines. The specific methods that will be accepted must be determined before the sales effort begins.

There is no direct competitive product for FuzzyCLIPS at this time so competitive product pricing information was not available to us. We used the COSMIC pricing policy for CLIPS as a general guideline to determine a fair price range for products that our target customers are accustomed to paying.

To address the needs of a variety of potential customers, we decided to offer FuzzyCLIPS in three product versions: User, Developer, and Professional at prices of $199, $499, and $899 respectively.

FuzzyCLIPS Professional includes all CLIPS 5.1 source code, source code for the TIL fuzzy logic extensions, and the interactive executable files. FuzzyCLIPS Developer includes all CLIPS 5.1 source code, a run-time library of the TIL fuzzy logic extensions, and the interactive extensions. FuzzyCLIPS User contains the interactive executables for CLIPS 5.1 and the TIL fuzzy logic extensions. All versions include the TIL FuzzyCLIPS User's Manual, verification and validation files, and sample FuzzyCLIPS examples. An economical migration path is offered for users who start with the User of Developer version and wish to upgrade as their needs evolve.

At the present time we are not offering any discounts for FuzzyCLIPS. We are handling all sales direct so reseller discounts are not an issue. The User and Developer versions offer two low-cost options to organizations that are price sensitive such as educational institutions. These two versions are priced to be attractive to such organizations and the margins do not lend themselves to any further discounts.

We are presently accepting prepaid orders for FuzzyCLIPS via check, money order, or credit cards. We will accept purchase orders from major companies or educational institutions. Purchase orders may be accepted from other companies if accompanied by acceptable credit information.

Sales taxes and shipping costs are other factors that must be taken into consideration. We are currently applying a fixed shipping and handling fee to all orders and shipping orders via regular UPS ground service. We will ship via overnight Federal Express if the customer provides an account number for billing the overnight fee. All FuzzyCLIPS orders are processed at our Irvine, California office so all California residents must add California sales tax to their order or provide us with their tax-exempt ID number.

VI CONCLUSION

As discussed in this paper, product development is only 1 of 4 factors in the commercialization of a new product. Promotion, Distribution, and Pricing must also be considered.

Once a product is actually being marketed and sold, there are still other considerations such as: maintenance and support, upgrades, and enhancements.

We have established a 1-800 number for customers to call for questions or problems with FuzzyCLIPS or any other TIL product. Each software manual includes a Software Trouble Report that customers may mail or fax to us to describe any problems or offer suggestions.

We will maintain a database of all FuzzyCLIPS customers who return their postage-paid product registration form. When updates to FuzzyCLIPS are announced, we will mail all registered users information and instructions on how they may obtain an upgrade. We also offer an economical migration path for users who start with the User or Developer version and wish to upgrade to another version as their needs evolve.

A number of enhancements and add-on products are currently under development for extending the capabilities of FuzzyCLIPS. TIL also offers consulting and implementation services to customers who need assistance in developing their applications.

REFERENCES

Carreno, L., and Jani, Y.: "*FuzzyCLIPS User's Manual*", Version 1.5, Togai InfraLogic, Inc., 1993.