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## Explore the World of Software Development Estimating

### *Abstract*

*This white paper explores the complex and often fallible process of custom software development estimating and describes a unique approach that has proven to deliver accurate and repeatable software development estimates.*

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## Executive Summary

Accurate software development estimating is hard. Incorrect initial estimates lead to unnecessary delays to valuable IT projects. This



white paper will review the key principles defined by Gustav Karner's 1993 master Thesis, followed by an overview of how HyperProductive has leveraged these key principles to devise a method for accurate and repeatable estimating.

## History of Software Development Estimating

Software development estimates are notoriously inaccurate and heavily padded. Too often the people and teams involved in the estimating process use a gut feel approach; aka "the guesstimate". In addition, individuals and teams themselves have a propensity to over or understate their abilities. All these factors lead to inaccurate and non repeatable processes to



estimate a projects cost. An organization's ability to accurately estimate a projects cost early on is paramount to creating real value for the organization.

Over time there have been multiple estimating models developed to help with project resource estimation. Many industry experts feel that the development of an estimating concept called Use Case Points has built the foundation for early stage accurate and repeatable resource estimation.

Gustav Karner's 1993 Masters Thesis developed a method that expanded upon earlier estimation models. Karner cites the Objectory method, by Jacobson I., Christerson M., Jonsson P. and Övergaard G. (1992). The Objectory method is a well defined process for developing industrial object oriented applications. He also references: Symons (1988) who define a criterion for a technical factors. The following is a brief review of the key concepts which Gustav describes in his thesis.

### *Unadjusted Use Case Points (UUCP)*

One of Karner's most important insights is the introduction of "Unadjusted Use Case Points" or UUCP. UUCP's give development teams a unit of measurement for requirement complexity to be used across different projects. By objectively counting the number of actors and individual steps in a given use case, estimators can compare the complexity of completely different requirements across a range of projects

### *Technical & Environmental Factors*

Karner's thesis builds on this idea that functional requirements don't exist in a vacuum. His thesis identified various factors which contributed to a project's complexity, what he refers to as "Technical" or "Environmental" factors. While UUCP's give an accurate measure of the complexity of a project's specific requirements, there are other factors that impact the cost and timeline.

The environmental factor captures the components that influence a project that are unrelated to the chosen technologies and platform. These general business criteria are based on the individuals involved with the project, as well as the circumstances surrounding a project's inception. These elements of the equation are weighted and when computed produce the Environmental Factor.

Similarly, the Technical Complexity Factor is a weighted summation of various objective measures of a project's chosen platform and non-functional requirements.

### *Individual Team Velocity*

Karner also highlighted that productivity with a specific technology varies widely across development teams. This concept is akin to a golfer's handicap but in this case it is a blended handicap for a team or individuals abilities with a specific technology. For example one developer within a team may be faster and more accurate when coding in Java vs. .Net.

### **System for Accurate Estimating of Team Velocity**

Know how to measure your team's velocity? There are a couple of validated tools out there. One that is widely accepted is the Personal Software Process (PSP) designed by Watts Humphries at the Software Engineering Institute at Carnegie Mellon University.

The PSP is used by individuals and teams to track actual development time for specific tasks during projects. You achieve three goals by recording the actual time it takes to complete a requirement of a given complexity across development teams and across projects.

First, with a sufficient sampling of data you can compute the average actual number of hours required to complete a single UUCP with a specific technology/complexity.

Second, objective feedback is provided to internal and external development teams.

Third, it provides the necessary information to facilitate accurate and repeatable estimating for software development projects.

### **HyperProductive's Accurate and Repeatable Estimating Model**

The HyperProductive estimating model is based on the work of the International Function Point User Group (IFPUG), Gustav Karner, Watts Humphries' PSP/TSP and the COCOMO/II project.

The magic of HyperProductive estimating model is a culmination of best practices layered on top of field tested experiences. Accurate estimating



is an Art, not pure Science. It is the insight and knowledge of how to apply the

science to the model that produces accurate and repeatable estimates.

One example of HyperProductive's unique approach to estimating is the blue prints which they have developed to insure that Unadjusted Use Case Points maintain a consistent degree of granularity across projects.

Another example would be how they leverage checklists associated with documented use cases points. This helps them maintain an accurate and repeatable process over time. It also insures critical items are not missed and best practices are being adhered to.

## Conclusion

HyperProductive's model allows it to uniquely engage with its clients to maximize value. They accomplish this by helping customers make an informed decision that explores all available options given specific timeline and budget requirements.

Their model and resulting estimate then



becomes a business tool for making informed business decisions, thus giving the project owners more control over the scope and shape

of the ultimate solution.

## Three Takeaway Questions

1. Did your last three projects come in on time and on budget?
2. Have you ever had a project timeline or price change mid project? Was it due to items being overlooked or left out of the initial estimate?
3. Ask your software development vendor to explain how they arrive at their estimates. If they hesitate when they answer, then they guesstimate.

## About HyperProductive, LLC.

HyperProductive is a Cleveland based IT Consulting and Services Company that offers a variety of software development, IT solutions and training options to its clients.

HyperProductive specializes in two key practices: Software & Application Development Services and IBM's Smarter Planet Software Suite.

Your feedback is welcomed....

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## References

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- Watts Humphries at the  
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