Does it really require those umpteen yardsticks to assess the software size before one can plan for the software build? The obvious answer to the question fortifies the argument whilst the assessment process complexity presents colossal challenges to estimation process; it is the identification of the “right yardstick” which merits much of the required deliberation. Today, IT industry has certain proven estimation models (FP, UCP etc.) that provide standard guidelines for the software size estimation and are widely used for sizing J2EE and .net solutions but the estimation requirements for implementation projects in Enterprise Application Integration (EAI) space not only demand assessing the size of many discrete components that finally constitutes the EAI interfaces but also considering size of the tasks like monitoring, sequencing, application availability and performance that impact the required effort (a function of size). We, therefore, need not labour the point that sizing an EAI implementation, inextricably tied with the effort by productivity, is mostly compromised with “direct” effort calculation, a Modus Vivendi, which provides ad interim relief but does not compensate for, as a quid pro quo, the need to identify a right EAI estimation yardstick.
Today, the manifest estimation trends in EAI space are,

- WBS (Work Breakdown Structure) followed by an cognitive SMC (Simple, Medium, Complex estimation technique)
- Historical effort data serving as productivity baseline
- Project or account specific in-house estimation tools

**Cosmic FFP overview**

Cosmic FFP estimation model, founded in 1998 under Common Software Measurement International Consortium (COSMIC), is the next generation of estimation model typically for MIS & real time software sizing which is purely FUR (Functional User Requirements) based & considers developer measurement viewpoint while assessing the software size.

Cosmic FFP proposes to decompose the software in-question first to functional processes & then to functional sub process (FSP). Each of these FSPs should be envisaged as a collection of final atomic units, termed as “Data Groups”. The movements of such data atoms constitute the software sizes & the manipulation of such data atoms is considered ignorable.

Following figure represents the generic software model proposed by Cosmic FFP. In this model software functional user requirements are decomposed into various independent functional processes which further contain various functional sub processes. These functional sub processes either perform a data movement or a data manipulation. Cosmic FFP assumes that data movements capture almost the full size of software & hence data manipulations are not considered for sizing purpose.
In order to assess the size of the data movements the first required step is to define the software boundaries. The functional sub process decomposition of the software is done by mapping the software FURs to the Cosmic FFP generic software model. The data groups related to these FSPs are now identified & size is determined based on the these data group movements i.e. one CFSU (Cosmic Functional Size Unit) is awarded for,

- Each entry/exit of a data group between front end & software
- Each read/write operation by a data group between software & back end

Why Cosmic FFP for EAI Estimation?

Following factors advocate use of Cosmic FFP estimation technique in a typical EAI scenario,

- EAI today serves as enterprise data movement & manipulations layer & Cosmic FFP also envisages FUR finally in terms of data group movements
- Cosmic FFP is suitable for MIS & real time software & EAI solutions are mostly designed considering a real time data integration requirement

Cosmic FFP sounds promising to provide a good estimation support for EAI scenarios with one challenge that current EAI trends attempt to provide more data transformation (manipulations) as an added value over movements.
EAI Productivity with Data Movements

Following is the productivity graph from a survey conducted in an IT service company for an EAI interface which was developed using a standard EAI process automation tool (EAI vendor is one of the most popular choices).

The survey's objective was,

- To size the EAI interface by sizing the data movement using Cosmic FFP
- To plot effort-size graph to check for any productivity patterns.

The correlation coefficient “r” measures the linearity between size & effort.

The linear relation between effort & size is 0.6 which does not signify a strong linear relation. The reasons for the above not-so-linear can be explained with following,

- In EAI scenarios, data movements definitely contribute to software size but data manipulations cannot be ignored
- Today, EAI interfaces (function of EAI off-the-shelf tools) offer data transformation as a value-added service & hence manipulations should be seen as mandatory FURs

Survey results suggest a productivity correction approach which should measure & add the data manipulation size to data movement size to determine the actual size

Productivity Correction for Data Manipulations – An Approach

In order to size the data manipulations in EAI scenario, let’s first try to mathematically model it on a plane with vertical & horizontal manipulations factors. Here,

- Vertical manipulation factor signifies the complexity of different Functional sub processes
- Horizontal manipulation factor signifies the external project conditions which have an impact on size (environment complexity, data size, strong performance requirements etc.)
A suitable mathematical function of these two manipulations can be added to data movement size to come up with the final software size.

Mathematically let’s assume that,

\( V_i \) = Vertical Manipulation factor (Complexity) related to ith FSP

\( H_j \) = jth Horizontal Manipulation factor

Then Correction Factor Size (Data Manipulation Size) is,

\[ \sum_{i} \sum_{j} V_i H_j^{(V_i)} \]

Here,

\( i = 1, 2, 3, 4 \ldots \ldots n \)

\( j = 1, 2, 3, 4 \ldots \ldots m \)

\( V_i \geq 0 \)

\( H_j > 0 \)

\( H_j^{(V_i)} \) is represents a particular value of \( H_j \) for a specific \( V_i \)

Ranges for \( V_i \) & \( H_j \) - \( V \) can take a 0 value in case the complexity of a FSP is negligible but \( H \), being the external factor is not allowed to make any vertical factor as null. In case, \( H \) is not impacting the size, it must assume a value “1”

The final size can be obtained by adding this correction to the data movement size,

\[ \text{Software Size} = \text{Data Movement Size} + \text{Correction Size} \]

After implementing the above discussed productivity correction approach, the same survey in the same IT service company is repeated (survey conditions remain the same as of previous one) & we observe a better linearly related effort-size this time as shown in the following productivity curve.

The above graph shows a good linear relationship between size & effort & hence fosters consideration of the data manipulation size along with the data movement size.
Finally……

- Cosmic FFP could bestow EAI with a good estimation methodology as it is designed to suit the real time software & captures data movements for sizing which are the prominent features of an EAI implementation.
- In EAI scenarios, the data manipulation size should be measured with the approach provided. An addition of this size to the data movement size facilitates a better size-effort relation. Regression analysis of such strongly liner size-effort trends can serve as a good input to the EAI productivity baseline.

About the Author

Naveen Krishna is a Project Manager with Infosys Enterprise Solution group. He has several years of experience in large EAI implementation projects & has worked in domains like retail, manufacturing, telecom, aerospace, energy & utilities. His experience includes estimation, presales, planning, costing, delivery management & resource management in EAI space. He can be contacted at Naveen_Krishna@infosys.com