Integration Efforts Estimation in Service Oriented Architecture (SOA) Applications

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Abstract:

Service Oriented Architecture (SOA) is an emerging area of software engineering, based on the concept of "re-usable services" to support the development of rapid, economical and stable distributed application even in heterogeneous environments. Function point is considered an accurate and well established approach among its competitors to estimate the efforts, size and functionality of software development projects. Estimating the cost, size and efforts for SOA application is a difficult task due to its diverse nature and loose coupling behavior, which results in an inaccurate estimate to measure the efforts, size and functionality of SOA applications. This research paper highlights the integration efforts estimation using a work flow model, to accurately estimate the efforts and cost needed for SOA application.
Keywords: Service Oriented Architecture (SOA), Integration Efforts, Efforts Estimation, Function Point Analysis,

1. Introduction:

"Service Oriented Computing (SOC)" (Michael 2005) is a contemporary software engineering paradigm, construct on the notion of "service-logic" through which a kind of software development can be reached which is fast, low cost, and rapid, economical and up to the mark even in diverse environments. "Service Oriented Architecture (SOA)" is based on "service" logic, where the components come together to form a group of services, which are "loosely coupled" that fulfills the purpose and caters for the requirement of user and business process. SOA applications are able to assist all kinds of business applications and agile processes particularly in the domain of web services, sanitation, executive institutions of a country, education and on demand business.

1.2. Service

"A service is an implementation of a well defined piece of business functionality, which is discoverable through published interface and used by service consumers when building different applications and business process" (Zdravko 2009).

1.3. SOA Entities and Characteristics

"Service Oriented Architecture" is an architectural paradigm that incorporates a structure of coordination among the major functional components, where the "service consumer" interacts with "service provider" to locate a service which matches it requirement by a process of exploring for "service registry".
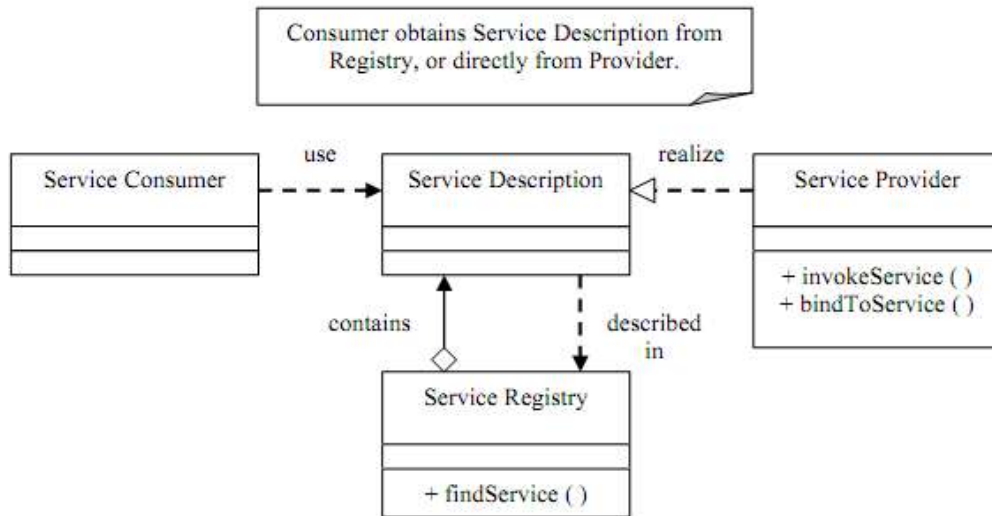

Figure 1.1   Service Oriented Architecture Entities Conceptual Model (James 2003)

Service Oriented Architecture" lies down some particular rules and features the application of which is mandatory for development of service oriented architecture applications (Bieber 2001).

- Services are self discoverable and dynamically bound
- Services are self contained and modular
- Services are loosely coupled.
- Services are contractual.
- Services are stateless.
- Services are interoperable.
- Services have network addressable interface.
- Services are coarse grained.
- Services are autonomous.
- Services are reusable entities.
- Services are abstract.

2. Effort estimation techniques

"The National Estimating Society has defined Cost Estimating as: The art of approximating the probable cost of something based on information available at the time".
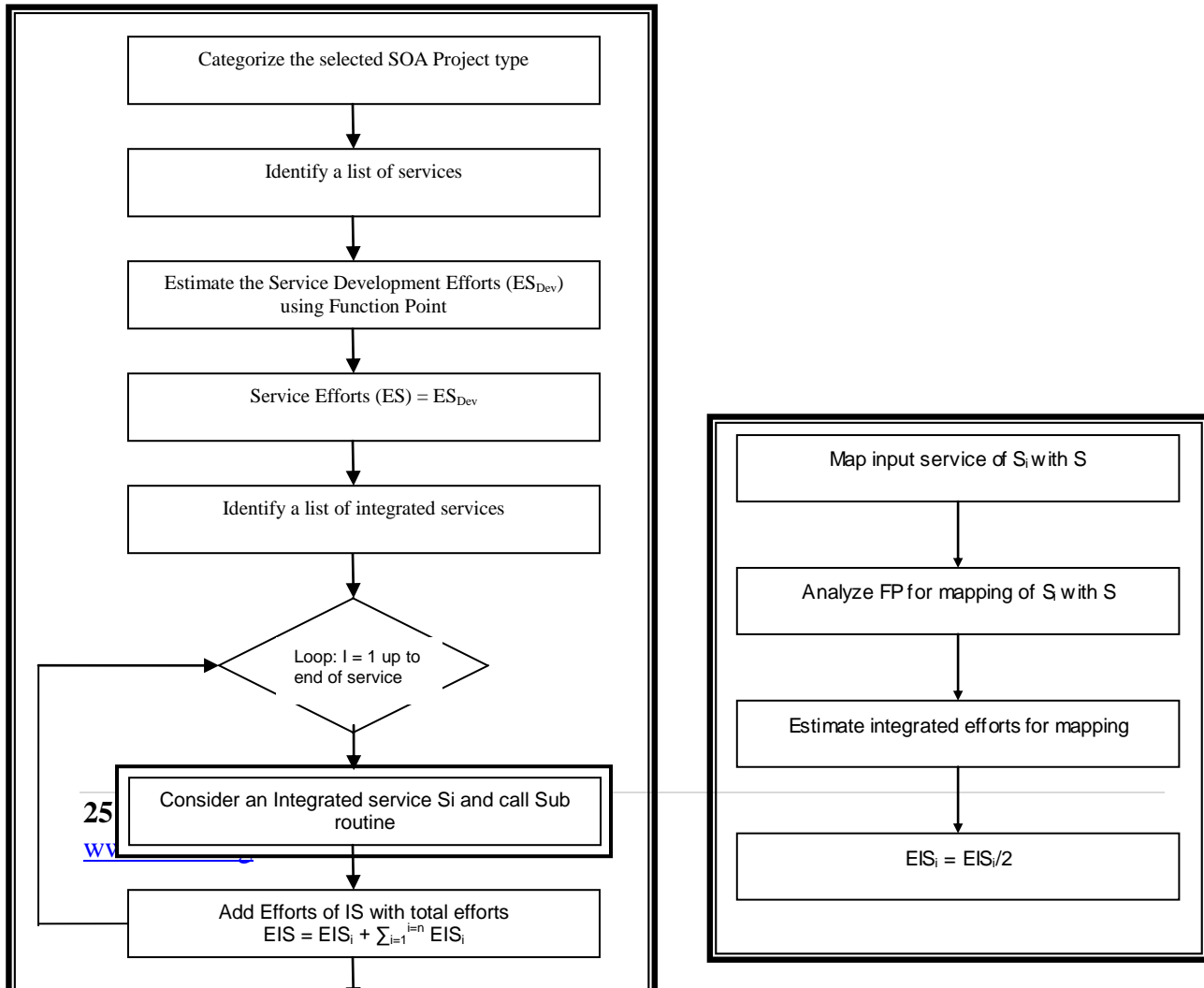
2.1. Function Points

Instead of measuring size, function points measure the functionality offered by a system. Function points were invented by "Dr. Allan Albrecht" in 1979 (Ifpug 1999) while he was working at IBM as a successor to tradition LOC matrix; Initially function point counting method consist of four basic components and ten "general system characteristics", in 1983 modification to function point to increase the basic components to five with the total of fourteen "general system characteristics" instead of ten. In 1984 an organization namely "International Function Point User Group (IFPUG)" (David 2002) was established to uniform the counting standards and advancement in the function points. A number of variations to the actual function points have been made by some practitioners and Mark-II function points majorly used in Britain, 3D functions points developed by Boeing, COSMIC full function points, De-Marco function points and feature function points have been developed (Christopher 2005). But function points developed by Albrecht are used today and according to "International Software Bench Mark Standards Group" (ISBSG) completed project database almost 90% projects are measured through function points (Zdravko 2009).

3. Integration efforts estimation Proposed Work Flow Model:

"SOA is an architectural paradigm and discipline to develop distributed services to meets the business processes and user needs (Michael 2008). In SOA development process, mostly developers try to overcome the overall effort estimates of SOA applications but in certain cases they ignore to estimate the Integration efforts. The main reason behind this overlook is, due to "Loose coupling" in SOA applications (Informatica 2006). So developers may ignore the service integration efforts, which lead to incorrect software development estimation. In order to estimate efforts for SOA application, the SOA service development efforts as well as Service Integration efforts are also estimated, as one service is integrated to a number of services".

Proposed Work Flow Model

The Proposed Model workflow model for effort estimation is as under.

Categorize the selected SOA Project type

Identify a list of services

Estimate the Service Development Efforts (ES_{Dev}) using Function Point

Service Efforts (ES) = ES_{Dev}

Identify a list of integrated services

Loop: I = 1 up to end of service

Map input service of S_i with S

Analyze FP for mapping of S_i with S

Estimate integrated efforts for mapping

$EIS_i = EIS_i/2$

Consider an Integrated service Si and call Sub routine

Add Efforts of IS with total efforts
$EIS = EIS_i + \sum_{i=1}^{i=n} EIS_i$

3.1 Illustration of the Proposed Work Flow Model

Figure 3.1 Proposed Work Flow Model for data
The above figure illustrates that the process starts by categorizing the SOA project as Organic, Semi detached or embedded. Services are identified for the selected projects and a list of necessary services is produced. Development Efforts are estimated for the particular service through Function Point Analysis. As in SOA architecture a network of services are established, so the developer identify the set of integrated services for current service, and estimate service development efforts as well as Service integration efforts for the current service. This estimation process continues until all Services needed for current services are integrated. Finally total efforts are calculated by adding the development efforts with the integration efforts.

3.2 Algorithm for Proposed Work Flow Model.

a. *Categorize the type of selected SOA project*
b. *Identify the list of services for selected project.*
c. *Estimate the development efforts through Function Point analysis for individual service.*
d. *Identify the list of integrated services for current service.*
e. *Repeat step 6 through step 7 until all services of current service have been integrated.*
f. *Estimate the service integration efforts of current service for selected developed service.*
g. *Accumulate the efforts for integrated services efforts using Function Point analysis.*
h. *Estimate the total efforts for selected service (i.e. efforts for development and Integration of service).*

4. Conclusion:

Service oriented Architecture (SOA) is a promising new area of software engineering, where services are combined together to form a design structure, which not only fulfills the requirements of users but also support the business processes to compete with its competitors. On the other hand Function Point estimation technique is recognized as an accurate estimation technique amongst its competitors, and consideration of Integration efforts shows improvement in its estimation accuracy.

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