2. Literature Review:

The literature review is made as the key conceptual findings and support to the work, while technical perspectives are only shortly addressed. These findings are discussed in the context of development of the semantic specification and formal specifications, framework for semantic interoperability. According to Sheth et. al (2001) a system and method for creating a database of metadata of different digital media content such television and radio contents published and delivered with the help of Internet. It is semantic based method for capturing and enhancement of specific metadata of digital media with meaningful and original data. The semantic specifications are supported by the World Model which includes subject domain knowledge, ontologies and set of rules relevant to original content. The Meta database is dynamic to keep the track of changes in contents of original data, live data and archival data specifically for television and radio programs. The research by Hinchey et. al (2010) is about the systems, methods and apparatus for translating informal specifications to the formal specifications. This research does not involve any human interaction for implementation process. The formal specifications are process based specifications. The formal specification is translated into high level computer programming language such as COBOL, PASCAL or C which is further complied into a set of executable instructions code recognized and executed by the computer. The syntax is verified and mapped to the process based specifications for verification of consistency and other problems at the processor level, system level are also verified. The lack of knowledge about the high level language is the drawback of the approach. The human spoken language conversation, identification and grammar and spelling corrections by Ross et. al (Jul 2002) is the conversation process performed by the conversation manager with the help of computer. The conversation manager verifies the semantics specification and analysis, formal specifications and syntax manager. The purpose of the syntax manager is to combine the ontology, lexicon and syntax definitions to generate grammatical specifications. The semantic module uses the grammatical specification and the domain model to develop a set of propositions from the set of frames of internal representation of the spoken utterance and development of a set of propositions from the set of frames. At the last stage the conversation manager uses the set of propositions for further processing to provide the reply to the spoken utterance as a valid utterance. The research by Amieth-Caprioglio et. al (2005) is about the invention of bit stream filtering as per user requirement and user specifications. The method uses the semantic description and syntactical description of the bit stream. The semantic description is scanned for selecting the elementary units to match to the user specifications. The time is required to match, map and linking mechanism between the semantic description and the syntactical description to locate the elements of the syntactical description that are to be rejected and removed with MPEG-7 standard.
A filtered syntactical description is generated by removing the located elements and filtered bit stream is generated. For semantic specification and syntactical description no specific markers are used as MPEG-7 description is used. The work published by Begue et. al (2010) is for generating a formal specification of trading partner agreements for sharing trading partners. It is related to at least two trading partners. The single formal specification is useful by the multiple trading partners. The trading partner agreement is established between two or more trading partners and each is analyzed. The set of contract terms set of protocols such as dealing and relationship and a set service level agreements associated with the trading partner agreements is identified and expressed a single formal specification that comprises the set of contracts, the set of protocols, and the set of service level agreement using markup language as HTML, XML. The type of e-commerce as business to business and business to consumer are mainly concerned for the specifications. The research work presented by Sagar and Jamal (2012) is the review article for Formal specification as a part of collection of techniques of Formal Methods. These are all based on mathematical representation and analysis of software. This is a technique for unambiguous specification of software. Here basically software requirement are laid out and then specified. Specification Analysis and Proof for consistency is checked which we cannot do with natural language processing. Transformational development: Each step in software development life cycle must have continuity. Program Verification is for checking what we make conforms to first step as in software development with an example that a Formal specification has its basis in discrete mathematics (set theory, Boolean logic, Predicate logic). It is one of the properties of formal specification. This provides a basis for formulating a number of requirements for formal specification to become a core software engineering activity in the future.

Formal specification forces an analysis of system requirement at an early stage. Correcting error at this stage is cheaper than modifying a delivered system. Software is increasingly invading many aspects of our life. We increasingly need high-quality software. Formal specifications offer a wide spectrum of possible paths towards that goal. Therefore they are receiving increasing attention in the academia and the industry. Still, there is a long way to go before formal specifications can be used by the average software engineer to provide reasonably fast and visible reward. Among the many challenges raised, the author believes that the critical success factors will be the provision of constructive assistance in specification development, analysis, and evolution; the vertical and horizontal integration of formal specifications within the software life cycle; higher-level abstractions for requirements specification and analysis; the availability of formal techniques for non-functional aspects; and lightweight interfaces for multi paradigm specification and analysis.

Formal development methods were the best way to improve software quality. In future there is a scope to develop a formal method tool which will consist of User Interface: integrates tool
components, manages input and output, and means we can connect it with automata and computation. It can have Parser which checks specifications for syntactic consistency and builds an internal representation used by other components of the system. It can have Pretty printer or unparsed which translates the internal representation of the specification into a standard format for user display and output. It can have Type checker which checks specifications for semantic consistency, possibly adding semantic information to the internal representation built by the parser. It can have Proven (proof checker) which performs proofs over a syntactically and semantically correct specification. According to Evered (2012) the access specification language RASP which extends traditional role-based access control (RBAC) concepts to provide greater expressive power often required for fine-grained access control in sensitive information systems. Existing formal models of RBAC are not sufficient to describe these extensions. In the research paper, the author define a new model for RBAC which formalizes the RASP concepts of controlled role appointment and transitions, object attributes analogous to subject roles and a transitive role/attribute derivation relationship. The author has defined an access control specification language called RASP (Role and Attribute-based Specification of Protection) which is based on both roles of subjects and attributes of objects and which gives fine-grained control over initial role and attribute acquisition as well as subsequent transitions. In this paper a formal definition for an access control model which supports the RASP extensions to RBAC is given. In particular, it supports: Subject roles, Object attributes, Control over appointment to roles, Control over labeling of objects with attributes, Control over dynamic acquisition of further roles and attributes. The model uses a transitive approach which supports role hierarchies, appointment based on external certificates and role and attribute revocation. No existing RBAC model has the expressive power to support these requirements. The case used shows that information systems often require a degree of access control which cannot be expressed simply as a static mapping from subjects to roles and from roles to operations on objects.

In this paper, formally defined a role-based access control model which has a much greater expressive power and which, in particular, can be used to formally describe the semantics of the RASP access specification language. The model supports controlled dynamic acquisition of new roles, transitions from one role to another and role revocation. It also supports labeling of objects with attributes in a way analogous to appointing subjects to roles and defines permissions in terms of roles and attribute sets. The defined the access control model in two parts. The first represents the rules for role appointment and attribute labeling as well as role and attribute transitions and access permissions. The second part of the model represents the instantaneous state of the access system in terms of a set of appointment certificates and a set of labeling certificates. The author has defined four functions for updating these sets. A significant aspect of the model is the use of transitive relationships whereby a
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The certificate represents the fact that the possession of a role or attribute may be conditional on the possession of another role or relationship. This allows the model to support role and attribute specialization hierarchies, controlled revocation of derived roles/attributes and flexibility in the addition of roles. No existing formal model for role-based access control supports all the concepts captured in said model. The research work by Mosses and Watt (1986) is based on the current standards for programming languages used for informal descriptions rather than the semantic descriptions and formal descriptions. The action semantics of semantics descriptions are used which are developed from denotation semantics and abstract semantic algebras for attractive purpose. Some realistic examples are provided by the author to support the action semantics for patterns in actions in PASCAL. The paper is based on the basic features of static and dynamic actions of PASCAL. In today’s world El-Diraby et. al (2005) the product models very suitable for data exchange between software systems. They have less effectiveness when it comes to exchange of information in a semantic web environment. Users need to have the ability to use industry terminology and standard vocabulary. Ontologies have been used by industries to establish effective semantic web environment for e-business and the exchange of information. Mapping product data models and classification systems into ontologies is a meaningful decision. This will allow the use of industry standards and terminology. This paper compares different strategies that have been used for incorporating IFC (Industry Foundation Classes) into semantic web technologies. It also proposes an agent-based distributed architecture for dynamically managing ontology mapping in the construction industry. This paper presented a comparative analysis for three strategies to incorporate existing data structures and classification systems into semantic e-supply chain. The strategies included: static mapping, dynamic mapping and ontology fusion. The strategies were analyzed against a set of criteria to test its applicability. Each strategy has been shown to be applicable to one or more situation depending on industry situation, intended uses and extent of use. Streamlining of all these is very crucial stage. According to Savarimuthu et. al (2006) organizations and their services are available on the Internet through Web Services and also use of other services that are available on the corporate Intranet. Workflow systems and freely available Web Services and the proprietary intranet-based services should be integrated into individual businesses for their day-to-day workflows. Businesses that use Web Services not only provide the services to their customers but can also use Web Services to customize their internal processing, such as online order placement for raw materials. In this paper we describe the architecture of our agent-based workflow system that can be used for Web Service composition. In the context of an example from the apparel manufacturing industry, we demonstrate how Web Services can be composed and used. Most of the commercially available workflow
management systems do not offer sufficient flexibility for distributed organizations that participate in the global market.

These systems have rigid, centralized architectures that do not operate across multiple platforms. Employing a distributed network of autonomous software agents that can adapt to changing circumstances would result in an improved workflow management system (WFMS). The research uses well-defined activities, such as manufacturing, where the processes tend to be more established and stable. But in the current climate WFMS may be used for more fluid business processes, or in processes involving human interactions, such as the software development process. In such situations, it is not always possible to predict in advance all the parameters. In this paper the architecture of integration of Web Services with said workflow system and also, using an example from the supply chain management perspective is explained. Supply chain management is one of the key areas in production workflows and we believe that Web Services can be used to improve the turnaround time. In this paper the two types of Web Service composition mechanisms, static and dynamic composition and how these mechanisms are implemented in multi-agent based workflow framework and in particular is discussed with how dynamic Web Service composition can be achieved and used in an apparel manufacturing industry that deals with supply-chain management. Towards supporting complex data types in WSDL for dynamic composition in said framework and also working on validating the composition framework by using examples drawn from different workflow domains are discussed with limited data. From last four years the research in the software engineering field has grown presented by Pandey et. al (2011). The requirement engineering plays an important role in producing quality software products. In recent past years, some approaches of requirement framework have been designed to provide an end-to-end solution for system development life cycle. Textual requirements specifications are difficult to learn, design, understand, review, and maintain whereas pictorial modeling is widely recognized as an effective requirement analysis tool. In this paper, the present a requirement modeling framework with the analysis of modern requirements modeling techniques are presented. The research also discuss about various domains of requirement engineering with the help of modeling elements such as semantic map of business concepts, lifecycles of business objects, business processes, business rules, system context diagram, use cases and their scenarios, constraints, and user interface prototypes. The proposed framework will be illustrated with the case study of inventory management system. Detailed discussion on the major requirements artifacts described in requirements engineering literature can easily be mapped to elements of UML and depicted a conceptual framework for requirements modeling for inventory control and management system. Research work does not focus on more detailed management for requirements modeling framework. The programming tools such as SNL2Z is in the area of software engineering and there have been very
few efforts to automate the translation from specifications written in natural language to the formal specification languages according to Sullabi et. al (2008). Writing of the specifications in natural language is always depending on context and it is commonly very difficult; this represents the major reasons of the challenge. This paper discusses the design of a tool for translating a software specification written in natural language into a formal specification. The author has applied controlled natural language that limits the syntax and semantics when the natural language statements been written by proposing structured natural language (SNL) to avoid the ambiguity problem. The tool uses basic information about the operation schemas and statements describing the specification of the system written by a group of user collaboratively as input. The output of the tool is a translation and interpreting of the specification statements into equivalent statements in LATEX form, which are compiled to produce an equivalent statement in Z. This is why there have been very few attempts to automate the conversion from requirements documentation to a formal specification language. To handle this ambiguity problem of natural language, some have argued that the requirements document has to be written in a particular way to reduce ambiguity in the document. A possible solution to this problem is by providing software developers with a tool that can help in writing structured natural language statements (SNLS), then translating these statements into mathematical statements. This paper discusses the design and implementation of tool that can help software developers in writing a semi-formal natural language specification describing the operation schemas of the software, then these specifications will be translated automatically into Z formal specifications in LATEX form. The research paper presented a technique of writing a structured natural language specification (SNL) used by our SNL2Z system and the method of translating these specifications in which the sentences have implicitly specified parameters into an algebraic specification and shows that it is capable to translate the input specifications into formal LATEX sentences. The part of work remaining is the process of improving the design of the tool by extending the rules and range of the natural language statement that is accepted by the tool. The research study Sullabi (2008) about the main concerned with how a group of rectifiers can be worked on preparing and producing correct formal software specification and how can they communicate with each other. To address these subjects, we come into view of two different issues, collaborative issues and formal specification issues. Each of these issues is taken into consideration when we propose the solution of the subject that is a web-based model of Computer Supported Cooperative Work (CSCW) for Z specification document. This model provides software developers with web environment that supports them to collaborate and to help them to produce correct software formal specifications. A web-based prototype application system based on this model has been developed. The work presented in this study investigates how can a group of people work together to prepare and write formal specification document through the internet and what the issues
that are playing and using in the collaboration should be introduced. To address these issues, a web-based model that eases the process of producing software formal specifications, to guarantee the quality and to diminish the time consuming to write these specifications is proposed. The system has been developed depending on the proposed model presented in this study. The WBCS not yet formally evaluated, but it has been experimented by users in FTSM Postgraduate lab to test the functionality and the usability and to examine the facilities that the system provides for the users tom collaborate to prepare and write a correct formal software specification document. The test results were very encouraging us to start the official evaluation test. The method of translating natural language specifications in which the sentences have implicitly specified parameters into an algebraic specification has been tested. Writing a correct specification is very difficult, but by applying such a model that melts away the difficulties which prevent software developers from having formal specification, it encourages them to collaborate to write, rectify and produce correct formal software specification. The research study by Baharom and Shukur (2008) is about the Software testing plays an important role to assure the quality of software and can be highly effective if performed rigorously. Studies found that testing can benefit from formal specification as it provides precise description of expected software behavior and most importantly, it is in a form that it can be manipulated easily for automation purpose. Grey-box testing approach usually based on knowledge obtains from specification and source code while seldom the design specification is concerned. In this study, an approach was described with an example of circular queue for testing a module with internal memory from its formal specification based on grey-box approach. However, in this research, the proposed a grey-box testing approaches that use the knowledge of design specification instead of source code. Formal specifications that were documented using Module Documentation (MD) method is to generate test oracle and to execute the test. The MD provides the information of external and internal view of a module that is useful in the testing approach. The use of mathematical development techniques which is also so-called formal methods can provide high assurance of correctness as mathematics has the ability to give precise definition of problems. Thus, ambiguity and inconsistency can be eliminated early in software development process. The use of formal specifications provides significant opportunity to develop effective testing techniques. This research addresses the problem of improving the effectiveness of fault detection where the focus of the work is on unit/module testing where each module may consist of several programs. This research contributes to the effectiveness of software testing by improving the effectiveness of test execution process by automated means. The proposed grey-box approach is for testing a module with internal memory. The idea of this research is to use the knowledge of data structure instead of program structure. The grey-box testing gives better coverage for black box testing with memory and can avoid some duplication in test cases by detecting return to
the same state. Furthermore, the use of precise design documents proposed by, in particular the use of abstraction relation offers significant opportunity toward the effectiveness of fault detection. In present days the software engineering domain is well known and popular field for research as per research work by Chakraborty (2012). The research study is based on the initial stages of software engineering. The Requirement Engineering (RE) is the most important phase of the software development life cycle (SDLC). This phase is used to translate the imprecise, incomplete needs and wishes of the potential users of software into complete, precise and formal specifications. The specifications act as the contract between the software users and the developers. Therefore the importance of Requirement Engineering is enormous to develop effective software and in reducing software errors at the early stage of the development of software. Since Requirement Engineering (RE) has great role in different stages of the SDLC, its consideration in software development is crucial. There exist a number of approaches for requirement engineering. Among the approaches, object-based and problem domain-based approaches are widely used. An effective analysis of methods is essential for the appropriate capturing of requirements. Taking the above viewpoint into account, this paper demonstrates an effective method of requirement engineering, which plays an important role in different phases of the SDLC. Hospital can be seen as an example of a complex system. Therefore, the paper considers Hospital as a case study for which a software system has been developed taking the mentioned approach into account.