

# Enterprise System Implementation from the Functional Consultants' Perspective

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**Abstract:** Although Enterprise System (ES) implementation (formerly Enterprise Resource Planning systems) literature is extremely broad, most of it takes the perspective of the implementing organisation and its employees, i.e., project managers, key users and users. The fact that it is both possible and popular to conduct such a complicated, time-consuming and expensive project using functional consultants is largely omitted. This study explores the Enterprise System implementation project from the perspective of the functional consultants and is based on the analysis of project documentation and interviews. The research questions answered by this study include the consultants' requirements from other project participants, which help them to accomplish the goals of each project phase, to complete the activities performed in each project phase, and to deliver the products that are requested of them.

**Keywords:** enterprise systems, ERP, implementation, project, consultants

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## 1. Introduction

Enterprise Systems (ESs) were formerly identified with Enterprise Resource Planning (ERP) applications (Davenport, 1998; Sedera and Gable, 2010). Rosemann (1999) defines an ERP system as 'a customizable, standard application software which includes integrated business solutions for the core processes (e.g., production planning and control, warehouse management) and the main administrative functions (e.g., accounting, human resource management) of an enterprise.' These systems have evolved into application suites that include ERP, CRM, Business Intelligence, workflow, content management and other functionalities required to support information and workflow in organisations. Generalising the above definition, an Enterprise System is a standard, customisable application suite that includes integrated business solutions for the major business processes of an enterprise, with the ERP system remaining the central component of this suite. Enterprise Systems are the backbones of most global manufacturing and service enterprises (Muscatello and Chen, 2008), and they continue to draw the attention of researchers. Even though ES is a popular piece of business software, its implementation failure rate is constantly high (Aloini et al., 2007; Wu et al., 2007; Poba-Nzao et al., 2008). This fact has resulted in much research on Enterprise Systems' implementation, as summarised in ERP literature reviews (e.g., Esteves and Bohorquez, 2007). The majority of this research takes the perspective of the organisation that adopts the new Enterprise System (Hasan et al. 2011; Sammon and Adam 2010, Soja 2011). Although this research provides very valuable results, which may improve organisations' preparedness for ES implementation in the future, the classic project setup involves three stakeholders: the adopting organisation, the system vendor and the consultants that perform the implementation (Haines and Goodhue 2003, Koch and Mitlöhner 2010, Lech 2011, Simon et al. 2010, Vilpola 2008, Wang and Chen 2006). Analysis of the ES project from the perspective of the stakeholders other than the adopting organisation is therefore a promising and not well-covered research direction. The purpose of this study is to analyse the ES project from the functional consultants' perspective.

## 2. The role of consultants in an Enterprise System implementation project – literature review

Enterprise Systems are often assigned to the commercial-off-the-shelf (COTS) category, which suggest a readiness to use immediately upon installation. However, an ES system can, in fact, be a simple application, offering limited functionality, and a small number of configuration options and is therefore ready-to-use on a 'take it or leave it' basis, or it can be a set of sophisticated application suites with (several) thousands of configuration parameters, offering high flexibility, but therefore not ready-to-use immediately upon installation (Lech 2012). The latter are a complicated component of business software, which affects most of a company's business processes and takes from half a year to several years to implement (Helo et al. 2008). Only these latter systems will be considered in this study.

The adjustment of a complex ES system to a company's needs may take the form of a configuration, i.e., setting the system parameters or choosing from existing options to alter the system functionality, or a customisation, i.e., changing or adding new programming code. Even if the system needs little or no customisation, a large amount of configuration parameters must be considered and chosen. Therefore, regardless whether the ES project consists of configuration only, or configuration and customisation, to successfully complete the implementation, a specialised knowledge of the system (product knowledge) is required (Bradshaw et al. 2013). Combined with company-specific knowledge (Chan and Rosemann 2001) and other knowledge types, it allows to obtain the final outcome of the implementation project, which is the system configured and customised according to the requirements of a specific organisation (Esteves et al. 2003). Because in-depth system knowledge highly specialised, it is usually provided by dedicated experts (Haines and Godhue 2003). These experts may originate from inside the organisation, if a specialised ES unit is part of the organisation, or may be hired for the project from a consulting enterprise, not necessarily the system vendor. A look at the web pages of the Tier 1 Enterprise Systems vendors SAP, Oracle and Microsoft reveals that all of these vendors maintain a partner network of independent consulting firms, offering expertise in implementing the Enterprise Systems that they sell. The role of these partners, as perceived by the vendors, is depicted in Table 1.

**Table 1:** The role of the consulting partners according to the corresponding ES vendors

SAP	Oracle	Microsoft
Source page: <a href="http://www.sap.com/our-partners/index.epx">http://www.sap.com/our-partners/index.epx</a>	Source page: <a href="http://www.oracle.com/us/solutions/midsize/partners/index.html">http://www.oracle.com/us/solutions/midsize/partners/index.html</a>	Source page: <a href="http://dynamics.pinpoint.microsoft.com/en-US/home">http://dynamics.pinpoint.microsoft.com/en-US/home</a>
"SAP partners play a critical role in helping organizations of all sizes identify, purchase and implement the ideal solution to address their unique business needs. [...] SAP partners deliver the exceptional value, purchasing choice, consultation and implementation services [...]"	"Together, Oracle and our network of more than 19,000 partners provide customers around the world with industry-leading solutions and services that address the needs of fast-growing companies and government entities with limited budgets."	"The Microsoft Dynamics Marketplace helps you discover innovative applications and professional services from Microsoft partners worldwide."

The data in Table 1 show that, for the systems in the table, the solution/service provider and the system provider tend to be two independent entities. Therefore, for Tier 1 Enterprise Systems, the typical project landscape consists of three parties (Haines and Godhue 2003; Ko et al. 2005), the adopting organisation (implementer, client), the system vendor and the consulting enterprise (consultant) that helps the adopting organisation successfully implement the system. There may be variations from this model, e.g., when the consulting services are delivered either by the internal IT department of the adopting organisation or by the vendor itself. In an independent setting however, the system vendor provides the 'vanilla' system, and the implementation project is run by the adopting organisation and the consulting enterprise. Haines and Godhue (2003) describe the interrelations between the three parties in the following way:

'Each of these three parties contributes in different ways to the project. The implementer has the detailed knowledge of its own particular business processes, organizational context, and competitive situation, which is essential for successful implementation. The vendors provide the implementer with hardware and software and offer training programs in connection with their products. The consultants are brought into ERP implementation projects to provide additional skills, knowledge, or simply manpower that is not available at the implementer or the vendor, or is too expensive if procured from the vendor.'

Surprisingly, the involvement of consultants in an Enterprise System implementation project is emphasised only by a small number of authors and omitted by others.

Haines and Godhue (2003) state that a large portion of a project cost is attributed to the consulting fees. Consultants are hired because the implementing organisation does not have the internal knowledge and skills to implement the system successfully. They mention three main roles the consultant may play in a project: a project manager, a mentor/trainer and a technical implementation assistant. The consultant's role as a knowledge source is also stressed by Chan and Rosemann (2001). Chang et al. (2013) highlight the importance

of consultants in the implementation because of the breadth and complexity of the system and the one-time nature of the project that limits the desire of the organisation to invest in a permanent workforce with the necessary knowledge. They state that 'consultants provide technical and business expertise, reduce the learning burden of clients, configure appropriate ERP systems, and train users to fully exploit the technology.' Their research concentrates on the control mechanisms imposed on consultants due to possible agency problems. The outcome controls were identified as the main control mechanism used by the client organisation because the organisation lacks the knowledge of the implementation process to be able to apply behaviour controls, while both outcome and behaviour controls were applied by the consulting enterprises to control their consultants. Ko et al. (2005), Lech (2011), Wachnik (2013), and Xu and Ma (2008) study the knowledge transfer between the consultants and the users. Helo et al. (2008) provide general information on ES benefits and discuss implementation problems from the perspective of consultants and system vendors. The main problems identified in their research are related to the difficulties in matching the requirements of the organisation to the system functionality (vanilla versus custom implementation) and the complexity of the ES implementation project. Metrejean and Stocks (2011), based on a survey research, conclude that consultants are perceived as the most productive in the configuration phase of the project.

Summarising, consultants are considered to be a necessary component in an Enterprise System implementation project because implementing organisations usually lack knowledge about the system to be implemented and have limited incentive to gain this knowledge internally because of the non-repetitive character of the project. The main role of the consultant is to supply the client with the necessary system knowledge and perform the tasks necessary to configure and customise the system, according to the business needs of the customer; but they may also play the role of a project manager or mentor/trainer. None of the papers cited above has, however, aimed to present the ES implementation project execution, in a detailed way, phase by phase, from the consultants' perspective and therefore, this study aims to fill this gap.

### **3. Methodology**

#### **3.1 Research questions**

The research questions posed in this study are the following:

RQ1: What activities do consultants perform in each of the ES implementation project phases?

RQ2: What do the consultants need in each project phase to perform the requested tasks?

RQ3: What is the outcome/product of the consultants' work in each of the project phases?

The qualitative research approach, basing on multiple data sources was used to answer these research questions.

#### **3.2 Data sources and research procedure**

The following data sources were used:

1. Project documentation from five ES projects, determining the task list: appendixes to the contracts and the Project Charters;
2. E-mail interviews with ten ES consultants, during which they were asked what problems they face during projects and what they expect from other actors to accomplish their tasks;
3. In-depth interviews with one consultant project manager and one other consultant, regarding project procedures and products; and
4. Full documentation of two projects, including the products of all phases.

The results were analysed by project phase. Although there are many models of the Enterprise System lifecycle available in the literature (Soja and Paliwoda-Pękosz 2013; Themistocleous, Soja and da Cunha 2011), all the enterprises used in the study used the phase definition according to the SAP ASAP methodology. Therefore, the phases from the ASAP methodology were used as a framework for the results' presentation.

The data from all the above sources were coded with the use of the MAXQDA software.

Project documentation from five ES projects was used to determine the activities performed by the consultants in each project phase (RQ1). The results were triangulated using in-depth interviews.

E-mail interviews as well as the in-depth interviews were used to determine consultants' expectations regarding input for each of the project phases (RQ2). A coding procedure was used to systematise and unify the nomenclature used by different interviewees.

The products (RQ3) were determined based on the analysis of the Project Charters, the full documentation from two projects, and the interviews with the consultants.

## **4. Research results**

### **4.1 Project preparation phase**

#### **Phase description**

Project preparation comprises the final confirmation of project scope, budget and schedule (which are usually defined in the pre-implementation/contracting phase) and the definition of the project plan, organisation, and procedures. The project methodology is also agreed upon at this time and teams are brought on board.

#### **Consultants' activities**

According to the respondents, most of the workload during the project preparation phase is imposed on the project managers. The project manager from the consulting enterprise (consultant PM) cooperates with the project manager nominated by the adopting organisation (client PM) to establish the project plan, organisation, and procedures. The activities, performed by the consultant PM, which emerge from the analysis of the documentation, include the following:

1. Preparation of the project plan, including the following:
  - a. The project scope and the budget (repeated from the contract);
  - b. The project phases and their descriptions;
  - c. The definition of products for each project phase;
  - d. The definition of project milestones; and
  - e. A detailed project schedule.
2. A definition of the project organisational structure, including the following:
  - a. A definition of project roles and responsibilities; and
  - b. The assignment of consultants to their respective roles;
3. The preparation of project procedures regarding the following:
  - a. Communication, i.e., communication means, frequency, and communication paths;
  - b. Documentation, i.e., project repository and document templates;
  - c. Risk management, i.e., risk identification, reporting, mitigation, and escalation;
  - d. Change management, i.e., change identification, reporting, approval, and escalation;
  - e. Open items management, i.e., open item identification, reporting, management, and escalation;
  - f. Status reporting, i.e., status meetings frequency, status meetings logistics (physical meeting or teleconference), and status reporting document templates; and
  - g. Quality management, i.e., quality check points and criteria.
4. Initial training of key users regarding system functionality and configuration possibilities.

The documentation (appendixes to the contracts) indicates that some of the above steps are performed by the consultant and the client together or by the client only. However, the interviews with the consultants contradict that evidence. Consultants claim that because the documentation is prepared before the project begins, it does not reflect the real situation. From their experience, the client does not have sufficient knowledge about the project domain and methodology (related to this domain) and therefore is unable to prepare the above elements. They are prepared and suggested by the consultant PM and approved by the client, with possible subsequent alterations from client specificity.

The exception from that rule is when the client has its own project methodology (which is the case for large and very large companies, with their own Project Management Office and/or internal consulting department). Then, all the procedures are imposed by the client organisation and the role of the consultant in this project phase is to learn and understand the client's methodology.

#### **Consultants' requirements**

According to the respondents, the most important prerequisites in this phase are the following:

1. A realistic budget and schedule, thus permitting the completion of the desired project scope;
2. A client PM with knowledge of the company power structure and with a strong position in the organisation;
3. Support from the top management and the assignment of staff with positive attitudes and decision-making capabilities to the steering committee; and
4. Key users with knowledge about company-specific needs and with decision-making capabilities.

As the list above shows, three of the four requirements mentioned by the consultants as important for the success of the project that emerge at the project preparation phase refer to the proper selection of the project participants from the client organisation. All project members, steering committee members, project manager and key users, should have positive attitudes towards the project. They should also have decision-making capabilities, to be able to choose from possible configuration options presented by the consultants. They should also be able to decide on organisational changes if the organisation has to be adjusted to the system. The client PM should understand the client organisation and its power structure to promote the project in the organisation, assign the right people to the project and solve emerging issues and conflicts during the project. Key users should have knowledge about the company's business processes as well as decision-making capabilities because waiting for every decision jeopardises the project schedule. Consultants also require a realistic budget and schedule which, according to them, are very often too tight because of the overly aggressive competition between consulting enterprises.

#### **Products**

The products of the project preparation phase are the project plan and the Project Charter documents. They contain all the information about the project organisation that is known before the start of the project. These documents form a guide to all project participants in the subsequent phases of the project.

## **4.2 Business Blueprint phase**

### **Phase description**

During the Business Blueprint phase, a detailed analysis of the business processes and requirements is performed, followed by the design of how these requirements will be reflected in the system.

### **Consultants' activities**

According to interviewees, the Business Blueprint phase requires tight cooperation between the key users and the consultants. They must work together, in the form of workshops, to determine the system design. Key users supply the organisational knowledge: requirements regarding business processes, master data, interfaces, reports, printouts and authorisation systems, and consultants translate these requirements into the system configuration design, with the specification of all necessary extensions. The analysis of the documentation shows that the following specific activities are performed by the consultants in the Business Blueprint phase:

1. Installation of the system development and test environments (only if the system is not installed before or by the system vendor). During the typical SAP implementation, the environment consists of three independent systems: the development system (DEV), the test/quality assurance system (TST or

QAS), and the production system (PRD). The configuration and development is performed on the development system. Then, the configuration is moved with “transports” to the test system, where it is tested. Changes are made to the development system, if required, and sent to the test system for re-testing. Once the configuration and developments are approved, they are sent (using transports) to the production system. For a more comprehensive description, see Auksztol and Chomuszko (2013);

2. Preparation of the system administration procedures (only if the system is not previously installed and managed by the internal IT department); and
3. Preparation of the Business Blueprint document, which includes the following:
  - a. A description of the company structure as implemented in the system;
  - b. master data specification in the system (master data groups, number ranges, required fields and their meaning, and related configurations);
  - c. The system configuration details (reflecting the client’s business processes);
  - d. The RICEF specification, which includes the following:
    - i. Reports;
    - ii. Interfaces;
    - iii. Conversions (master data mapping from legacy systems and data migration tools);
    - iv. Enhancements (additional programming needed to fulfil requirements not available through the original configuration); and
    - v. Forms (document printouts); and
  - e. The authorisation concept.

Because the consultants possess the knowledge about the system, their role in the blueprint phase is to use this knowledge to transform the client’s requirements into the system design. They have to collect these requirements at the beginning of the blueprint phase in the form of workshops with the key users. They also start the knowledge transfer to the key users in this phase by explaining to them how their requirements will be reflected in the system.

#### **Consultant’s requirements**

According to the interviews, the most important factors influencing the possibility of successful accomplishment of this phase are as follows:

1. Involvement of key users: This is the most important factor, according to the consultants. Key-user involvement is especially important during the Business Blueprint phase because, during this phase, the detailed requirements are gathered and transformed into the system design. If the key users do not put enough effort towards the system design, the project will face changes in scope during subsequent phases, which are very time- consuming and expensive, and may jeopardise the project.
2. Stable scope: During the Business Blueprint phase, general requirements, gathered during the contracting, are detailed and transformed to the system design. Thus, there is a temptation to include more functionality than initially planned in the project scope. This tendency must be controlled and managed by the project management team such that the project scope does not expand.
3. Change management: Consultants require the project management team to manage both organisational and scope change. They expect the client PM to force the necessary organisational

changes and the consultant PM to either block changes of scope or provide additional budget and time for the new requirements.

4. Good communication: According to the consultants, good communication both between the key users and the consultants, and within the key users/consultants teams is crucial for the success of this phase. PM's should facilitate this communication and manage communication breakdowns if they occur.

Summarising, the main factors enabling successful completion of the Business Blueprint phase are a stable scope with proper change management and good communication between all participants. The participants should also show adequate involvement in the project.

#### **Products**

The main outcome of this phase is the Business Blueprint, which includes the definition of the system configuration and the RICEF (reports, interfaces, conversions, extensions and forms).

### **4.3 Realisation**

#### **Realisation phase description**

During the realisation phase, the system is configured according to the design from the Business Blueprint. The RICEF are developed by the programmers and the entire solution is tested.

#### **Consultants' activities**

The activities performed by the consultants in the realisation phase include:

1. The configuration of the system according to the Business Blueprint: This is the primary activity in the realisation phase. Consultants must configure the system according to the design that was decided and described in the Business Blueprint.
2. The development of the RICEF (system customisation): This activity is performed by the programmers, under supervision of the consultants. Programmers develop all the necessary extensions, based on the specifications prepared by the consultants in the Business Blueprint phase, and under their supervision. Consultants perform unit tests of the developments before they are tested by the key users.
3. The preparation of the master data migration tools: The master data must be migrated from the legacy systems to the new system. This is done via data migration tools, prepared by the consultants, programmers or specialised data migration staff.
4. The implementation of authorisations in the system: The authorisation system defined in the Business Blueprint must be implemented in the system. After it is tested, users are assigned authorisation profiles.
5. The preparation and supervision of system testing: The tests are performed by the key users under the supervision of the consultants. This is also a part of the knowledge transfer procedure because the key users operate the system during the tests.
6. System documentation: The consultants prepare the configuration documentation and collaborate with the programmers to prepare the RICEF documentation. User manuals are prepared either by the key users or the consultants.

In the interviews, the consultants claim that they perform the configuration and documentation independently. The role of key users in this phase, except for the tests, is very limited. However, they report cases in which the key users actively participated in the configuration activities. According to the interviewees, this is not crucial for the success of the project, but it increases the quality of the knowledge transferred to the key users.

#### **Consultant's requirements**

The prerequisites for successful accomplishment of the realisation phase include:

1. **Change management:** The less involvement the key users show during the preceding phases, the greater is the possibility that they will want substantial changes to the system functionality in the testing phase. Consultants perceive it as a great risk to the project success because at this stage, the changes mean re-working the entire solution. Therefore, they expect the consultant PM to defend the project against such changes.
2. **Good communication:** During this phase, most of the consultants' work is performed independently or with the programmers. Good communication between the consultants and between the consultants and the programmers on the integration/cross-module topics is the key to the success of this project phase.

### **Products**

The product of the realisation phase is the configured and tested system, including the RICEF. An additional product of this phase is the system documentation, including the configuration documentation, the RICEF documentation and the user manuals.

## **4.4 Go-live preparation**

### **Phase description**

During the go-live preparation phase, the entire configuration is moved from the development/test environments to the production environment. Master data, as well as the necessary transactional data (opening balances and open items) are loaded into the system and authorisations are assigned to users' logins. The end users are trained and final adjustments are made to the production system so that it is ready for real-life work.

### **Consultants' activities**

The consultants' activities in the go-live preparation phase include:

1. **Preparation of the production start plan:** The production start plan includes all the steps needed to migrate from the legacy systems to the new environment, the schedule for migration and the staff responsible for migration. The plan is developed by the consultant PM in cooperation with the client PM.
2. **Production system preparation:** Preparation of the production system includes the preparation of the configuration transports to the production system, the supervision of the transport process, and any needed manual configurations of the production system.
3. **Master data and transactional data migration to the production system:** Master data and transactional data (opening balances and open items), after preparation by the client organisation, must be migrated to the new system. This is usually performed by the consulting enterprise, i.e., the consultants themselves, the programmers or a dedicated data migration team;
4. **Preparation of the support plan:** After the system goes-live, it needs smoothing, possible errors must be corrected, and users usually need supervision and help in the first few weeks of system usage. This may be covered in the maintenance/support agreement, includes the support plan. The support plan includes service levels, response times, communication channels, ticketing system introduction, and the assignment of responsible staff on both sides.
5. **End-user training:** In some cases, end-user training is performed by the key users (on a train-the-trainer basis). Key users, by participating in the project and preparing the user manuals, have gained the knowledge necessary to train the end users. This approach is considered to be optimal from the knowledge retention perspective in the client organisation. However, if the key users are not adequately involved in the implementation process, they may be unable to perform the training, which is then done by the consultants (Lech, 2013).

#### **Consultants' requirements**

The only requirement for the go-live preparation phase is the timely preparation of good quality data for migration by the client organisation. According to consultants, clients often underestimate the workload needed for master data cleansing and mapping. This results in delays and poor data quality (repeated records and wrong entries) which cannot be uploaded to the new system.

#### **Products**

The go-live preparation phase primary products are the system, ready for productive start, and users, trained and ready to work with the new system.

### **4.5 Go live and support**

#### **Phase description**

In the last phase of the implementation project, the system is launched. All the users start working with the system, and the role of the consultants is to support the daily activities of the users who may still lack knowledge regarding the new system and to solve problems reported by the users.

#### **Consultants' activities**

After the launch, consultants supervise the users in their daily work, correcting errors not detected during testing.

#### **Consultant's requirements**

No special requirements were reported for the go live and support phase.

#### **Products**

The products of the last phase are the system in full operation and the users operating it.

### **4.6 Cross-phase activities**

In addition to the above, some activities were performed repeatedly in each phase. These include project management activities as follows:

- Status meetings, during which the teams, consisting of key users and consultants, report on progress to the project management;
- Integration meetings, during which the teams, consisting of key users and consultants, discuss the issues that affect multiple functional areas;
- Change and risk management activities, performed jointly by the consultant PM and the client PM;
- Steering committee meetings, during which both PM's report the project status to the steering committee members;
- Project reviews by the project managers; and
- Problem solving by the project managers.

These activities were performed and moderated by both the client PM and the consultant PM.

## **5. Conclusions**

The role of the consulting company is to supply the project methodology and knowledge from previous projects, codified in the form of a project plan, organisational structure, and procedures, and to deliver the initial knowledge about the system to the key users. Then, the consultants absorb enough company-specific knowledge to combine it with the system knowledge and deliver the project design in the Business Blueprint phase. The realisation phase includes the system configuration, the RICEF development, the system documentation and preparation, and the test preparation and supervision. Then, the consultants prepare the system for production start, migrate the master data provided by the clients and supervise the daily work of the users, resolving emerging issues at the same time.

What they need to successfully accomplish their tasks is a stable and realistic scope, budget and schedule, followed by proper change management during the entire project. They also require a dedicated and

knowledgeable team from the client company, from the steering committee members, who should have power in the organisation and a positive attitude to the project, to the client PM, with a strong position in the company, good communication skills and knowledge about company power structure, knowledge resources, and people, to the key users, who should have knowledge about the company specificity in their respective areas, have good communication skills and show involvement in the project activities.

Regarding the primary products that the consultants deliver, they include the Project Charter, including the project methodology; the Business Blueprint, which is the main design document; the system itself, configured and customised according to the Business Blueprint; and system documentation, including all configuration and customisation performed during the project, as well as tailored user manuals.

In summary, the role of the consulting enterprise is to

- supply the knowledge regarding the project methodology and Enterprise System itself;
- transform client requirements into the system design;
- configure and customise the system according to this design;
- transfer the knowledge about the new solution to the client in the form of documentation, user manuals, workshops during the project, and training;
- cooperate in the project management activities; and
- support the system and its users after its implementation.

The research presented in this paper is related to a large and highly configurable Enterprise System. The specialised knowledge needed to implement such a system is broad, as well as time-consuming to acquire, and therefore has to be delivered by the dedicated specialists who, as it is shown in this research, perform a leading and crucial role in the entire project.

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