Capgemini
CONSULTING.TECHNOLOGY.OUTSOURCING

Financial Services | the way we see it

A Productivity Comparison of Pegasystems Pega 7 versus Java Enterprise Edition Custom Build

People matter, results count.

Table of Contents

1. Foreword

As we continue to witness a torrid pace of technology innovation in today's market, we remain optimistic. We have witnessed these new products, tools, methods, components and frameworks ultimately translate into not only technical and broad IT benefits, but, more importantly, into legitimate and sustainable business value and impact. A recent comparative study of two very distinct and, at their core, appreciably different application development and delivery paradigms provides notable insights into a catalogue of material performance gains across the application development, deployment and change lifecycle. Yet more important and arguably more relevant than the performance gains demonstrated are the **business impacts and implications** to be drawn from this otherwise technology-centric study and its findings.

I encourage you to have a close look at the Pega 7 vs. Java Platform Enterprise Edition (Java EE) study that follows. It builds the case, step by step, for the power of model-based and model-driven development as a paradigm for developing, deploying, managing and evolving business applications.

Today's digital business climate demands speed, agility, scalability, and adaptability. Pegasystems' Built For Change® platform and solution reinforces, through this study, the magnitude of productivity gains available from re-thinking and re-defining the approach to and strategy for building and deploying the digital business applications of today and tomorrow.

From this, it is only a small step to appreciate the potentially profound benefits to enterprise business performance. If we can obtain a solid portion of the productivity gains demonstrated in the study, we, in turn, are able to deliver and change business applications in substantially less time and at lower cost to meet the demands of today's digital age. With this in hand, we equip the enterprise to become digital and profoundly alter its operational motion in six key ways:

- Reduction in the **time to market** for new or enhanced products and services;
- Acceleration in the **readiness** of multi-channel customer engagement;
- Improvement in the ability and **time to respond** to customer-driven demands, new market opportunities, or competitor actions in the market;
- Flexibility to **innovate** by way of more, faster, and less costly experimentation;

Lanny S. Cohen
Global Chief Technology Officer,
Capgemini

2. About the Study

This study set out to determine the productivity gains of using Pega 7 versus Java Platform Enterprise Edition (Java EE) to build a robust business application. The study examined the core capabilities and advantages of Pega 7, including:

- Case Lifecycle Management
- Omni-Channel UX
- Predictive and Adaptive Analytics
- Pega Live Data

The study set out to meet three key objectives:

- Evaluate the ease of building the application with Pega 7, versus custom build using Java EE
- Evaluate the effort required to make business changes to the application, and the ease of rolling back those changes
- Measure the time and effort required to:
  - Build the application and debug, test, and deploy
  - Change/update (maintain) the application once developed

For the purposes of the study, Capgemini built two teams for developing two identical auto insurance new business process applications—one team used Pega 7, the other team created a custom product using Java EE. The initial project specifications required that the application to guide users through the process of a quote and then create a test case for an appraiser and an underwriter to work on. The team was then started enabling the application for mobile functionality to allow a manager to work on cases, search for directions or assign work to his/her team from a mobile device.

About 80% through the development effort, a new requirement was specified: add functionality to allow the purchase of home insurance in addition to auto insurance. This was done to assess the nimbleness and adaptability of each technology for enduring a disruptive change with ease. Finally, the system was extended and localized to operate in the European market. For the purpose of this study it was localized for Germany.

3. Why Compare Pega 7 with Java Platform Enterprise Edition?

Java EE is a Java platform designed for large-scale computing typical of large enterprises. It includes many components of the Java Platform Standard Edition (Java SE) such as the Java Development Kit (JDK), which is included as the core language package.

Here's why Java EE lends itself well to a comparison with Pega 7:

- Java is a widespread and popular language, and is the language of choice for a several large, high-performance applications.
- Java EE Open and Standards-based platform supports everything from mobile devices to high-end servers.
- Java EE is a multi-tier enterprise computing model within a web environment.
- Java is supported on multiple platforms: Windows, Solaris, Linux, z/OS, HP-UX, AIX and others.
- Java is Pega's target language. More specifically, the various rule forms in Pega are translated into Java. The Pega 7 server engine runs in a JVM as a Java application. This helps us elucidate the productivity gains from the Pega 7 technology.
- Java EE's "Write Once, Run Anywhere" technology is similar to Pega's "Build Once, Deploy Anywhere" technology.
- Java EE's component and container model, in which container provides system services, is well-defined as an industry standard.
- Java EE provides portability of code because it is based on Java technology and standard-based Java programming APIs.

The Java EE platform uses containers to simplify development. Java EE containers provide for the separation of business logic from resource and lifecycle management, which means that developers can focus on writing business logic—their value add—rather than writing enterprise infrastructure. For example, the Enterprise JavaBeans (EJB) container (implemented by Java EE technology vendors) handles distributed communication, threading, scaling, transaction management, etc. This is similar to Pega 7, which also aims to enhance developer productivity.

4. Assumptions

In executing the project, we made the following assumptions:

- Developers are well-versed in both Pega 7 and Java EE.
- It is not necessary to consider time spent by resources on training, as training costs are not normally recovered over a single project. Therefore, this study does not include the time required to learn Pega 7 or Java in its productivity measurements.
- It is not necessary to consider time to install and configure the tools, since the associated times and costs are not recovered over a single project. Therefore, this study does not factor these times into developer productivity.
- It is not necessary to consider the time spent researching topics and solving problems related to development, as these are not recovered over a single project, and are part of the development team's learning process.
- Productivity measurements can be extrapolated to production applications.

5. Key Findings

5.1. Developing a Business Application is 6.4 Times Faster in Pega 7

The scenario chosen for the study simulated the entire lifecycle development process of building a complex business application. While the time it takes to build an end-to-end application will always be relative, the types of actions required to build a global enterprise application are well known. It is these concrete tasks and actions that are important and relevant to examine when considering building intelligent business applications.

Creating a global, feature-rich, mobile-enabled business application as defined by the specifications of this study took 60 hours in Pega 7 versus 382 hours in Java EE. Put another way: Pega 7 was 6.4 times more productive than Java EE.

Exhibit 1: Pega 7 and Java EE Development Times

Activity	Pega 7	Java EE
Analysis and Design	4.00	32.00
User Interface	14.17	76.08
Business Logic	12.67	57.75
Process Flow	6.17	28.25
Information Model	5.92	22.00
Integration	0.23	0.85
Reports	0.00	8.00
Mobile	0.50	20.00
Social	0.25	2.00
Localization	2.25	20.00
Reuse of Layers for New Line of Business	2.00	16.00
Build	0.75	2.00
Testing	9.62	94.37
Application Deployment	1.42	3.00
Total Effort in Hours	**60.00**	**382.00**
Productivity Factor		**6.4**

The productivity gain and the exact timings spent in each of the activities are based on the requirements of this study. These efforts may change based on the complexity of the type of application, integrations complexity, standards / guardrails defined, pre-defined frameworks in use, enterprise standards / limitations of the organization, number of systems involved in handling the specific processes and the methodology followed to deliver the functionality.

These productivity gains were accrued because Pega 7 comes with several out-of-box features to accelerate UI (User Interface) development, create process flows, enable mobile functionality, predictive analytics, social and localization capabilities that are table stakes for today's business applications yet require considerable coding efforts in Java EE.

The biggest time savers while building the application in Pega 7 were: testing, ease of use of UI generation, implementation of business logic, process flows and mobile enablement.

5.2. Pega Enables Quick Creation of Branded Portals and User Interface

Pega's model-driven development paradigm makes UI creation fast and efficient. Model-driven development is not new to Pega but Pega 7 offers several improvements, especially to UI capabilities.

With Pega 7, the HTML generation is more efficient by virtue of being HTML5 and CSS3 compliant. The result is a more responsive website with a better user experience.

To create UIs, developers specify form layouts and field formats, from which Pega generates the HTML to display the UIs. The Pega-generated UI separates form content (HTML) from layout and styling (CSS), allowing the UI to adapt to different screen sizes as well as mobile devices. This responsive UI approach means UIs only need to be designed once and the system automatically displays and functions based on whether a computer or a mobile device was used.

The approach allows developers to design a single screen for each piece of work. Pega 7 then finds the best way to present that to the user based on the device or computer they are using. With Pega's Omni Channel capabilities you build once and deploy anywhere.

Pega's Next Best Action capability can also factor in a user's device to determine the next best course of action for that user.

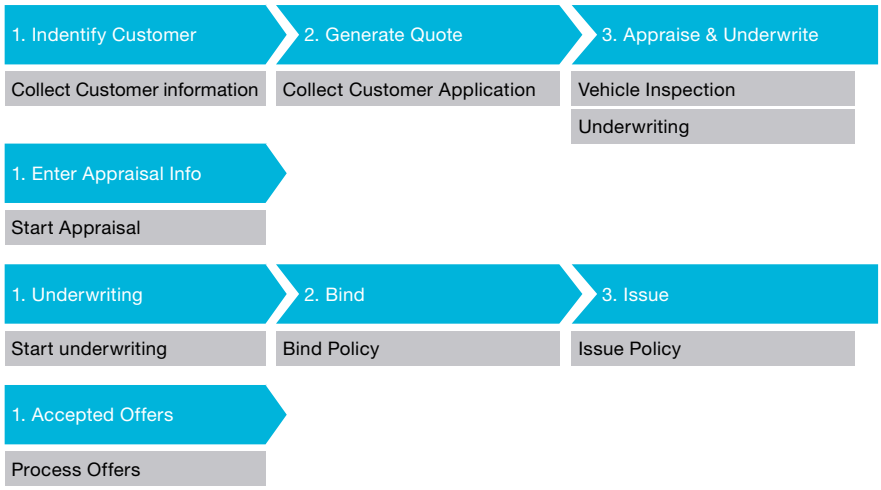
Pega separates content from laying out a screen by defining the styling and branding elements of the application in a skin. This gives developers freedom in defining the content of a screen without having to worry about the final appearance, which can be managed and controlled independent of the screen content.

5.3. Powerful Case Lifecycle Management

Pega 7's Case Lifecycle Management makes it easy for business stakeholders to design and develop a process flow. The high-level flow is easier to use than process modeling solutions such as Microsoft Visio, and doesn't require any coding knowledge or even knowledge of Pega's Flow shapes or any other process flow notation.

Pega 7's process flows are defined in a business context. Steps within each stage mirror the business goals of an organization, and display how a piece of work flows through that organization. In addition to simplifying the creation of a business process, this greatly helps in defining screens and sub-cases and gives developers a better understanding of how their piece fits into the overall business flow.

Exhibit 2: Application Case Definition



Once a business user creates the Case Lifecycle, the details of individual steps can be defined using business process modeling.

Case Lifecycle Management allows the business user to create case management flows with its new Stage Designer functionality. This new capability streamlines the creation of cases and sub cases. This represents an improvement from the earlier Pega Discovery Map, which provided a graphical representation of the flow but didn't allow creation of complex, dynamic case management.

5.4. Predictive Analytics

Pega 7 has evolved its Predictive Analytics capability to take advantage of big data to make decision management configurable and easy to use. Pega 7 makes it easy to both exploit the data that resides in the application, and build sophisticated rules that can be invoked from the process and cases.

One of the key uses of Predictive Analytics is to proactively understand and anticipate the needs of today's socially connected consumer across service channels and silos. Pega's Predictive Analytics performs this by implementing intelligent cross-selling capabilities. A rule-based scorecard dynamically generates relevant and contextual customer offers using parameters such as age, marital status, and gender.

This is easy to implement by specifying parameters, modeling a decision strategy, assigning weights to parameters and arriving at a score to determine which products to offer and display. Unlike alternative solutions, the Predictive Analytics capability is easy for the business user to modify and maintain.

5.5. Pega Pulse Social Collaboration

Social collaboration is built into Pega 7 with the introduction of Pega Pulse—a powerful tool that enables social collaboration and the transfer of work from one person to another. Pega Pulse allows users to communicate with their entire workgroup or to send private messages and tasks in the context of a case, all while seamlessly tracking relevant audit trail, case information and Service Level Agreements (SLAs). Implementation is as easy as specifying which sections of a screen should have social capabilities. No additional coding effort is required.

Users can respond to cases by replying to a Pulse message and creating and assigning a case as part of the reply. The system's work management tools treat and manage the action in the same manner as any other type of work generated using the system.

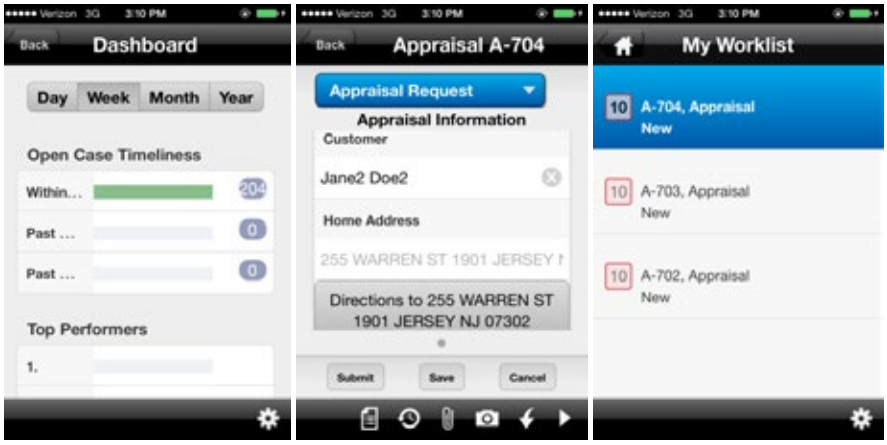
Users can also create and assign ad hoc tasks that are not part of the original process flow, assuring that work of all types (expected and unexpected) is tracked, managed, and monitored in one place.

5.6. Mobile Implementation

Creation of a mobile-friendly application was extremely easy, given Pega's "Design Once, and Access Anywhere" paradigm. Once the developer creates the UI, it can be accessed on any device, as Pega renders the UIs dynamically.

The Underwriter's case management portal is a powerful illustration of this concept: On the desktop, the case management portal displays specifics about the case and customer in the middle of the screen. Details such as Recent Items, Dashboard and Favorites are displayed on the left, with Pega Pulse Social Collaboration tools and other features displayed on the right.

Exhibit 3: Application mobile



When the application is accessed from a tablet, the screen dynamically resizes and shows only the most important information, and minimizes less critical information. When accessed from a mobile device, the screen adjusts to show just the case information, and a few key action items. Additionally, users can search for directions by taking advantage of the geo-tagging feature. The result is a seamless mobile experience that has the same feel as a native mobile app.

The developers didn't have to code for any of this as Pega renders the screen dynamically by responding to the environment that's being used to access it.

Creating the mobile functionality itself only required importing Pega mobile ruleset, which intelligently leverages all the UI components developed in the previous steps, requiring no additional UI development.

The mobile experience is impressive and reinforces the power of Pega's Omni Channel UI capabilities.

5.7. Advantages of Pega Cloud

For the purposes of this study the team used a cloud instance of Pega to build the application. Using an existing, optimized infrastructure helped to speed up the development process.

The benefits of Pega Cloud scale dramatically when the program size grows. Its elastic IT infrastructure can be used to meet an organization's business demands while reducing the total cost of ownership. Pega Cloud is a Software as a Service (SaaS) based version of the full Pega 7 platform and can be used to design, build and deploy full-scale BPM applications.

An organization using Pega for the first time will benefit from avoiding investments in infrastructure to support hardware and software. Even after the initial implementation, the responsibility of managing the hardware resides with Pega. Funds that had been tied up in managing and maintaining infrastructure are freed up for building applications that deliver business value. Additionally, Pega provides 24x7 monitoring, support and administration, and delivers a 99.5% SLA (service level agreement). With the Pega Cloud, businesses can rely on Pega's sophisticated disaster recovery mechanism rather than having to build their own complex disaster recovery plans.

Pega 7 also provides application portability to offer a choice between running solutions on the cloud or on site throughout the application lifecycle. Pega Cloud made our application development process more collaborative as the application was accessible to our team members wherever they were. In addition, application demos and walkthroughs were more straightforward due to the availability and accessibility of Pega Cloud.

5.8. Pega Live Data

The introduction of Pega Live Data has made data management strikingly simpler in Pega 7 as data pages are now sensitive to the context in which they are used.

Pega Live Data is implemented with help of a new rule type called Data Page. Data pages are a reusable object, with the additional ability to pass parameter and fetch data (either from internal/external database or applications accessed via SOAP, REST, MQ, etc.).

As a result, developers define the data connection elements independently from where they can be used in the application. Traditionally, data integrations had to be built specific to the screens where the data was used. But with Live Data, developers define pages with the source data and the system intelligently references these data pages to retrieve the right information to display to the customer in the context of the functionality that's being accessed. Data pages enable developers to externalize data from application functionality, and eliminate the need to code for data retrieval as part of the application flow. The developers can now store data independent of the process flow and retrieve it at various points in the process without any code changes.

System performance is also improved with this feature due to intelligent caching. If the user refers to a data entity that is already available on the Data page, then no processing is required to fetch the data or to check if the data already exists on data page. Alternatively, in procedural development it is required to check if the data is already available, which results in unnecessary coding and maintenance.

5.9. Pega Adapted to Changes 8 Times Faster

In this section the team put Pega's "Build for Change" claim to the test. It was impressive to note that the reuse of layers for the new line of business showed an 8X productivity gain.

This was because there was no need to create a new process flow, as the home insurance, appraisal, underwriter, premium summary and offer screens were circumstanced and were made immediately available for reuse. Any functionality that needed to be altered benefited from Pega's model-driven development environment, which allowed for quick and easy customizations.

Additionally, the same tables were used to store coverages and offers for both auto Insurance and home insurance. A filter added to these tables distinguished home and auto coverages, and eliminated the need to write extra logic to retrieve home insurance-related data, as is typically required in competing products.

6. Team Composition

The development team was comprised of members across locations and time zones. This was done to mimic the onsite/offshore delivery model and to factor in the realities of the current development and delivery paradigm, which include:

- The difficulties in translating requirements from onsite to offshore
- The difficulties in managing the project from the U.S. when the development team is based in India
- The time lag introduced in clarifying technical issues with the project manager and process architect in the U.S.

Not all factors mentioned above directly affected productivity, nevertheless we attempted to factor these real-life issues into this study.

Project management and coordination was done from Chicago, Illinois. A project manager in Chicago facilitated interaction with key U.S. stakeholders at the client organization (Pegasystems Inc., in this case). The project manager worked with both the Java EE and Pega 7 teams, which were based out of various Capgemini locations across the U.S.

There were two developers on both the Pega 7 and Java EE teams, and two business analysts shared by both teams who documented functional specifications, clarified requirement questions, and helped with project coordination.

7. Measuring Productivity

We divided the development activities required into broad categories typical of any business application, and measured the time it took each team to implement those features. Most Pega 7 activities had a straightforward comparison with those in the Java EE stream except for the Mobile and Social capabilities, which require additional comparison frameworks.

Thanks to Pega 7's powerful Mobile implementation, simply importing the ruleset satisfied the specified requirements and provided some additional capabilities as well. Similarly, Pega Pulse provided additional social capabilities above and beyond those required. For the Java EE piece the team only built specific features to satisfy the listed requirements.

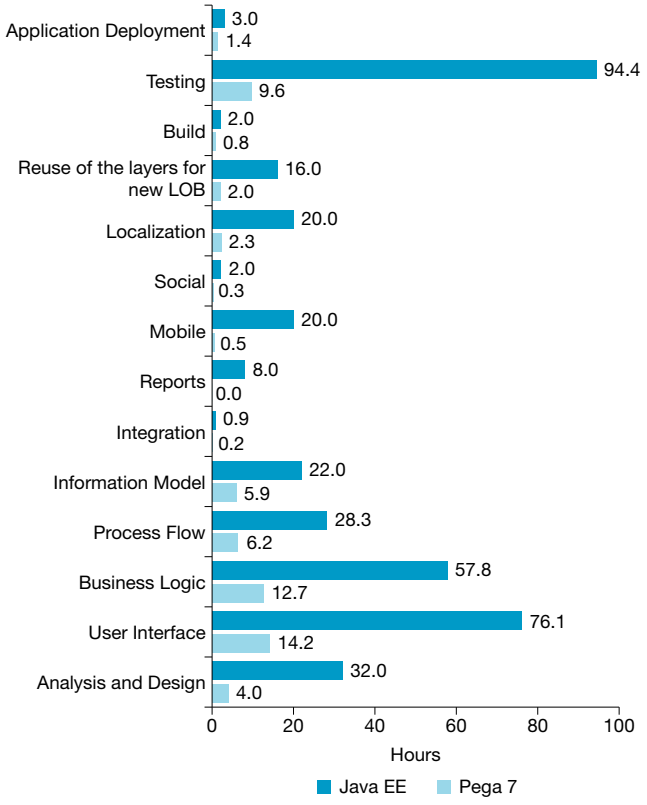
We classified the activities into the following broad categories:

- Analysis and Design
- Develop UI
- Business Logic
- Process Flow
- Information Model
- Integration
- Build
- Testing
- Application Deployment
- Disruptive Change
- Mobile
- Social
- Localization

For each category, we measured the time the two teams took to implement a given application functionality. We then rolled up the time taken for each task into an overall time for each category.

7.1. Productivity Metrics Comparison and Interpretation

Exhibit 4: Comparison of Productivity Metrics



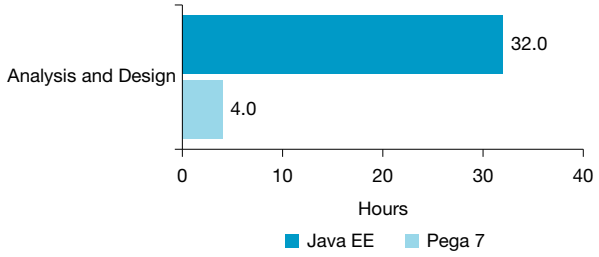
- The study has demonstrated that the entire application-development cycle was 6.4 times faster with Pega 7 than with Java EE
- The analysis and design phase was 8 times faster with Pega 7 than with Java EE.
- Developing the UI, business logic and process flows was 5 times faster in Pega 7 than in Java EE and the new Designer Studio has a big role to play in speeding up the development time. It is much improved over the previous version in the following ways:
  - It gives developers visibility into the core elements of the solution. Charts display the guardrail report right on the developer's home page, which helps track guardrail warnings and flag corrective action.
  - It brings visibility on how the application has been constructed: the work types, data elements, screens, users and security elements.
  - A Recent Items list on the left of the screen that gives developers access to their work quickly.
  - Developers can create a To Do list that contains tasks for themselves as well as tasks that they want to assign to others.

- The mobile development phase has shown 40 times productivity gain, and is a testament to the powerful and simple mobile enablement that comes out of the box with Pega 7.
- Developing the information model with Pega 7 was 4 times faster than with Java EE.
- Integration activities showed that Pega 7 was 4 times faster than Java EE.
- Testing the application using Pega 7 was 10 times faster than with Java EE IDE.

7.2. Analysis and Design

Both teams analyzed the requirements in this phase and devised the best approach to design the solution in their respective technologies. The Pega 7 team used the DCO session as compared to traditional requirements walk through for Java EE.

Exhibit 5: Comparison of Productivity Metrics: Analysis and Design



The analysis and design took 8 times longer in Java than in Pega 7 due to the following factors:

- Pega 7 design guardrails and best practices offer direction that architects can follow to speed up the design process.
- Standard Pega features such as Stage Designer to design process flows, and Decision rules to develop business logic, accelerate application design and reduce development efforts.
- Pega's out-of-the-box features for mobile, local and social requirements are easily developed by including rulesets and require minimum configuration or design time.
- Pega's model-driven development environment auto-generates documentation based on business user and developer input, saving several hours creating, maintaining and managing specification documentation.
- Pega's design methodology is easily extensible. Design time is not adversely affected even when a disruptive change is added.

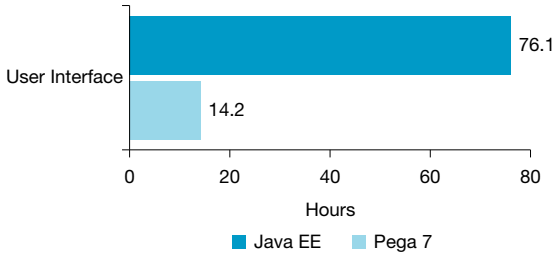
7.3. Development

To facilitate analysis, the development phase of the project was broken into three sub-phases: building the user interface, business logic, and process flows.

User Interface

Pega 7's out-of-box portals, layouts, and controls allow for much faster UI creation in Pega than in Java EE. The UIs were generated in Pega in a fifth of the time it took Java EE.

Exhibit 6: Comparison of Productivity Metrics: User Interface



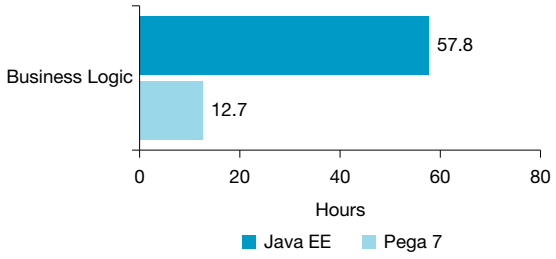
Pega's Model-driven development environment was a big factor in the UI development speed. Four factors, in particular, enabled the speed:

- Pega 7 comes with several out-of-box layouts that were used to setup the basic UI framework very quickly. Several out-of-the box UI features were used with minimum configuration to generate Omni channel user interfaces, and the team used an out-of-the-box screen layout to quickly and easily create the customer branded portal.
- Since the developers specify the sections and controls to be displayed within each section, and Pega generates the HTML to create the user interface, the UI was developed only once, and the system deployed it to multiple platforms automatically, including to mobile. Pega's responsive layouts ensure that the system dynamically adjusts the UI to the user's screen size and range.
- Out-of-the-box controls, such as list views, were used to display assignments. Since these are highly reusable and configurable by simply passing parameters, each additional screen took a lot less time to develop.
- The application had several screens where a user was required to perform some type of action. Out of the box, the system provides a number of preconfigured screens to accelerate development. In addition, any new UI functionality built from scratch can seamlessly be reused.

Business Logic

In this phase, the teams built the business rules and process logic of the application. This was considerably faster in Pega 7 and was also easy for a business user to both change and maintain.

Exhibit 7: Comparison of Productivity Metrics: Business Logic



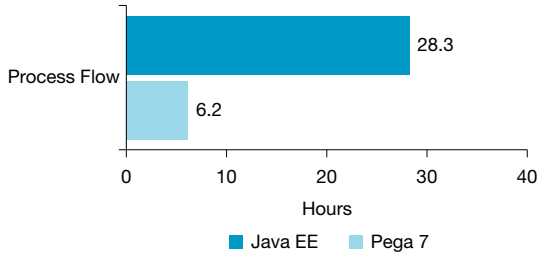
Pega 7's efficiency can be attributed to these specific features:

- Complex rules determining what products to offer as part of the cross–selling functionality were easily implemented using Pega 7's Scorecard-driven Predictive Analytics feature.
- Predictive Analytics allowed analysis of all the data available in the application to determine the next best action for the customer.
- Predictive Analytics is easy to configure and manage, and allows developers to code powerful and sophisticated business logic in an intuitive graphical interface. All the rules were developed using out-of-the-box functionality that can be easily developed using the wizard-driven, form-based approach designed for a business stakeholder to author.
- Several When/Conditional Rules were created which were referenced throughout the application development to evaluate binary conditions.
- Decision Tables and Declarative expressions were also used to develop business logic, especially functionality which required evaluation of coverage eligibility.

7.4. Process Flow

In this stage, Pega was found to be 5 times more efficient than Java EE in building process flows.

Exhibit 8: Comparison of Productivity Metrics: Process Flow



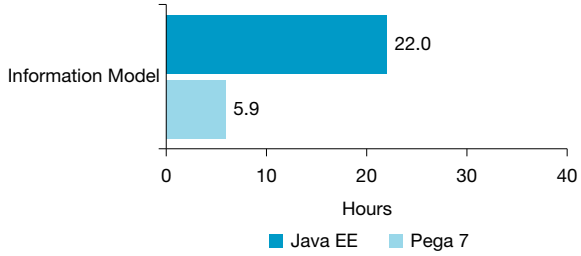
These key features of Pega 7's Case Management's Stage Designer are responsible for this enhanced performance:

- Easy-to-use graphical interface
- Intuitive to use, requiring no knowledge of Pega shapes. Creating the process flow is quick and, once created, it automatically allows for case creation and managing the case lifecycle without any additional effort.
- Provides context as to where a developer's individual piece fits in the overall application. This helps the developer understand the entire business functionality, which in turn allows for adapting to changing requirements with speed and accuracy.

7.5. Information Model

In this activity, the teams defined the entities, their properties, and the relationships between them. They also designed the class structures and table structures for the data and properties that the application required.

Exhibit 9: Comparison of Productivity Metrics: Information Model



Creating the information model was about 4 times faster in Pega 7 as in Java EE due to:

- Easy-to-use graphical interface speeds up the creation of the class structure, as well as definition of new properties
- Provides a single, connected model that improves communication within the design and development
- Parametric elements of the model create a robust database
- Ability to store data independent of the process flow and retrieve it at any point in the process when needed without any code change required
- Data can be referenced as and when it is needed instead of having to store it in the memory
- Ability to simulate data during development if the data sources such as web services are unavailable
- Ease of copying or referring to data from a case or other object into a page to support complex/embedded pages

7.6. Integration

Pega 7 provides wizards for creating web services. Web service integrations can be done in a few simple steps. Integrations built in the application.

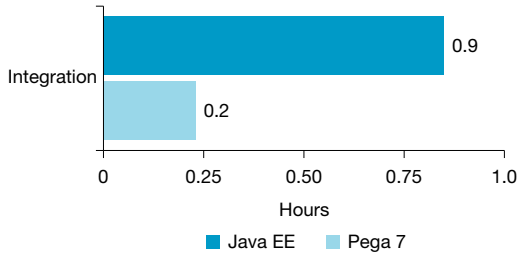
SOAP integrations:

- Retrieve driver information
- Connect to 3rd party services like MVR and CLUE

Database Integrations:

- Retrieve list of drivers

Exhibit 10: Comparison of Productivity Metrics: Integration



In addition, Pega 7 provides numerous features to make the integrations flexible for developing the applications, including:

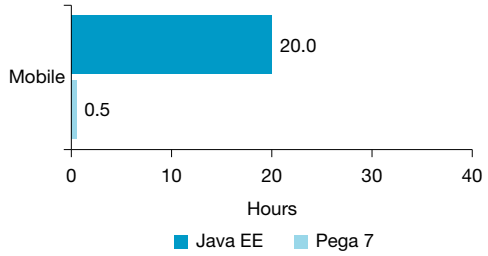
- Open standards to enable easy integration with existing systems
- Service and connector types include JCA, JDBC, Java, EJP, JMS, MQ, .NET, SOAP, and others
- Powerful and easy-to-use business process mapping and business process modeling wizards
- Various dashboards to provide view of operations across the enterprise
- Execution of integrated business processes across disparate enterprise systems with standards to meet enterprise SOA
- Rule-driven business process integration capabilities, in which service requestor and service provider make the right connection for each usage, based on the situation

7.7. Mobile

In this phase of the project, the application was extended for use in mobile devices. This was one of the most impressive demonstrations of Pega 7 capabilities.

Enabling the application for mobile use was 40 times faster in Pega 7 than in Java EE. This efficiency accrued due to the simplicity with which Pega 7 allows the creation of a mobile-friendly application.

Exhibit 11: Comparison of Productivity Metrics: Mobile



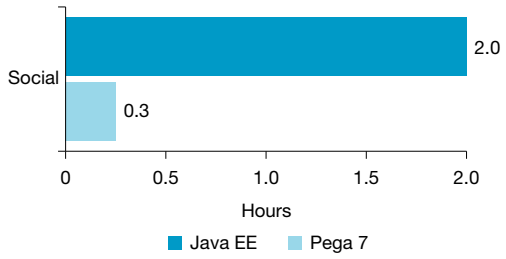
The efficiency gain in developing the mobile capability can be attributed to the following features:

- Importing the Pega mobile ruleset allows mobile enablement and the creation of a feature-rich application
- Users are able to access and use their worklist from a mobile device
- Users can find directions using geo tagging, and can both create and resolve assignments
- The system dynamically renders the screen display based on the end user's device at run time for native devices such Apple's iOS, Google's Android, etc.
- Provides pre-defined UI templates for faster development
- User portal configuration for use with applications that are mobile-only or that are accessed from both a mobile device and the desktop

7.8. Social

In this phase we assessed the team's capabilities to enable social collaboration using their respective technologies, and evaluated to what degree Pega 7 allows collaboration between team members vis-à-vis Java EE.

Exhibit 12: Comparison of Productivity Metrics: Social



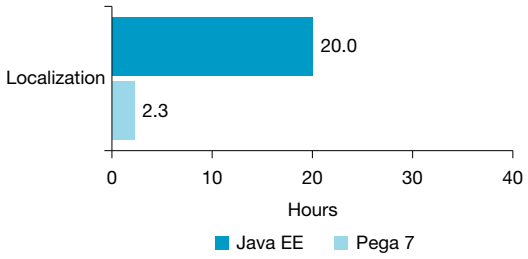
Pega 7 was 8 times more productive than Java EE due to the following factors:

- Pega Pulse was used to enable social collaboration. Implementing Pega Pulse is as easy as including a section in a harness without any extra coding effort.
- Pega Pulse allows users to communicate with their entire workgroup by sending private and public messages.
- Pega Pulse allows users to transfer work along with the entire relevant audit trail and also create and assign new cases.
- Pega Pulse allows the users to create and assign a task with all the associated SLAs and audit trails in the context of the case.

7.9. Localization

In this phase the application was localized for the Germany region and Pega 7 proved to be 9 times faster than Java EE.

Exhibit 13: Comparison of Productivity Metrics: Localization



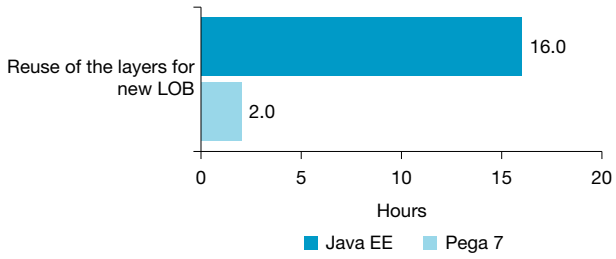
These Pega 7 features influenced the ease of development towards the localization:

- Localization wizard identifies various text strings and field values in the application user interface rules and then guides the developers through the localization process to render the application in the desired local language.
- Auto detects initial language from a browser setting.
- Standard control rules to support input and output of locale specific formats.
- Implementation of Unicode CLDR 1.3 standards for date and time for internationalization.
- Language specific user forms and portals.
- Language specific rulesets.
- Localization wizard provides a step-by-step facility to identify text elements that need translation.

7.10. Reuse of Layers for New Line of Business

In this phase we added a new requirement: extend the auto insurance application to include a homeowner insurance functionality. We did this to test the ability of the two teams to adapt to change and re-use existing code.

Exhibit 14: Comparison of Productivity Metrics: Reuse of Layers for New Line of Business



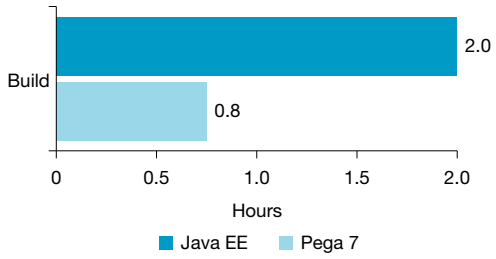
The time it took in Pega 7 to address the disruptive change was only an eighth of what it took in Java EE. Here's why:

- The home insurance, appraisal, underwriter, premium summary and offers screens were circumstanced and made immediately available for reuse.
- There was no need to create a new process flow, as the existing flow for auto insurance was used in home insurance via the Circumstance feature.
- Functionality that needed altering benefited from Pega's model-driven development environment for quick customizations.
- Additionally, same tables were used to store coverages and offers for both auto insurance and home insurance. A filter was added to these tables to distinguish between Home and Auto coverages, thus eliminating the need to write extra logic to retrieve home insurance-related data.

7.11. Build

We used the automation of build process for Pega 7 as well as Java EE with ANT script feature for generating the respective build archive files for deployment.

Exhibit 15: Comparison of Productivity Metrics: Build



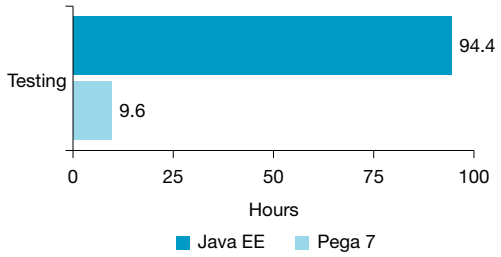
Here's why the build in Pega 7 was 3 times faster than in Java EE:

- Automatic recognition of the change
- No need for separate build process/scripting
- Change takes immediate effect for testing
- Parallel development flexibility with local rulesets and merge process

7.12. Testing

In this phase, all the functionality built in the application was system tested. The features of AUT from Pega 7 and JUnit for Java EE was used to compare the productivity gain.

Exhibit 16: Comparison of Productivity Metrics: Testing



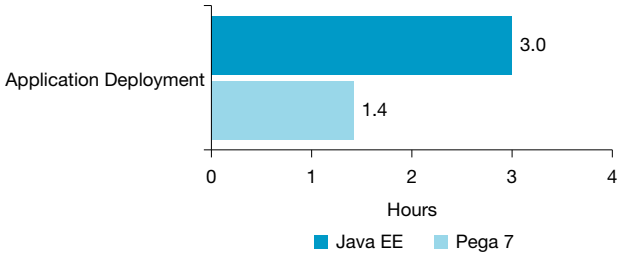
Pega 7 was 10 times faster than Java EE for testing and debugging the application. These factors contributed to that efficiency:

- Tracer makes it easy to debug the code, as it pinpoints to the exact point of failure, saving significant time and developer frustration.
- Clipboard and the Performance tool (PAL) provide an efficient way to analyze and improve system performance.
- Every rule, process, UI, flow, decision, activity, etc. is created within a runtime model empowering the developer to test the application at any point and conduct on-demand debugging to any component of the application. This empowers developers to do on-demand testing to assure snippets of functionality work as expected on an immediate basis.
- UI Inspector shows developers each element of the UI just by hovering over a control, allowing them to see the context and configuration of the build. This feature gives developers a quick understanding of how any changes will impact the screens.

7.13. Deployment

Ruleset versioning is an easy technique with which to test the newly deployed applications. During our tests, we granted a group of pilot users access to the new application by defining the ruleset name and application to which they were to have access. When these users next logged onto the Pega 7 system, they were able to run the newly deployed application. There was no need to take down the Pega 7 system to develop the new application.

Exhibit 17: Comparaison des mesures de productivité : déploiement de l'application



Pega 7 provides various methods to export complete applications from the system, and then import them into another Pega system. Key reasons for this deployment efficiency gain are:

- Easy to use ANT Script Command line utility for build automations
- Report to identify rule Conflicts
- Automation build from one environment to another

8. Conclusion

The result of our comparative study shows conclusively that using Pega 7 was 6.4 times faster than Java EE for developing a robust business application.

- Gain in productivity during the analysis & design phase using Pega 7 DCO sessions: 8X faster
- Create branded UI and screens: 5X faster
- Accelerate business logic development: 5X faster
- Build the localization for an existing application: 9X faster
- Build, reuse, and specialize: 8X faster

The productivity gains were accrued in each phase of application development and testing, and the model-driven development model of Pega 7 not only makes it easy to build an application, but also enables for quicker changes. The mobile implementation was very impressive, with Pega 7 rendering a fully capable mobile application simply by importing the mobile ruleset with minimum configuration.

Pega 7 clearly stands out as the better solution over custom development. It delivers greater agility and accuracy by giving business users more control of process execution. We recognize that actual production applications and scenarios will be far more complex than the one developed for our evaluation purposes. It is our professional opinion that the results of this study can be extrapolated to actual production applications.

Organizations using Pega 7 to implement their business processes will reap significant productivity gains, and these will continue to increase when they implement frequent changes—an inevitable part of today's operating environment.

Appendix A: Effort Comparison

Exhibit 18 : Effort Distribution

Activity	Pega 7	Java EE
Analysis and Design	4.00	32.00
User Interface	14.17	76.08
Business Logic	12.67	57.75
Process Flow	6.17	28.25
Information Model	5.92	22.00
Integration	0.23	0.85
Reports	0.00	8.00
Mobile	0.50	20.00
Social	0.25	2.00
Localization	2.25	20.00
Reuse of Layers for New Line of Business	2.00	16.00
Build	0.75	2.00
Testing	9.62	94.37
Application Deployment	1.42	3.00
Total Effort in Hours	**60.00**	**382.00**
Productivity Factor		**6.4**

Exhibit 19: Pega 7 Stream Effort Distribution

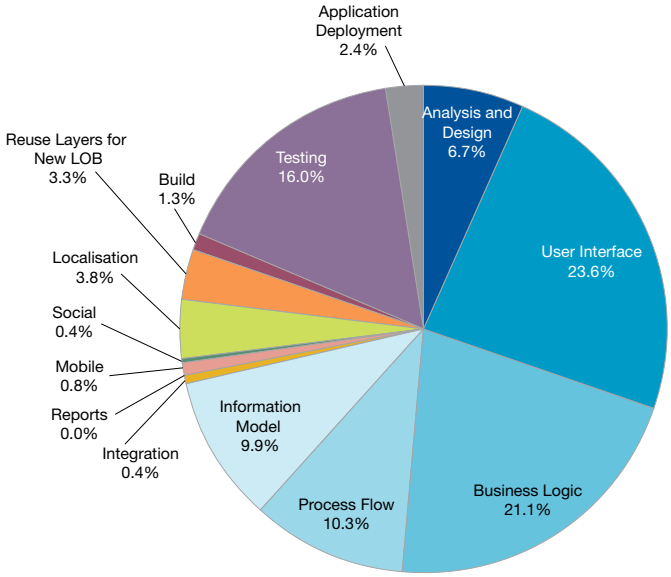
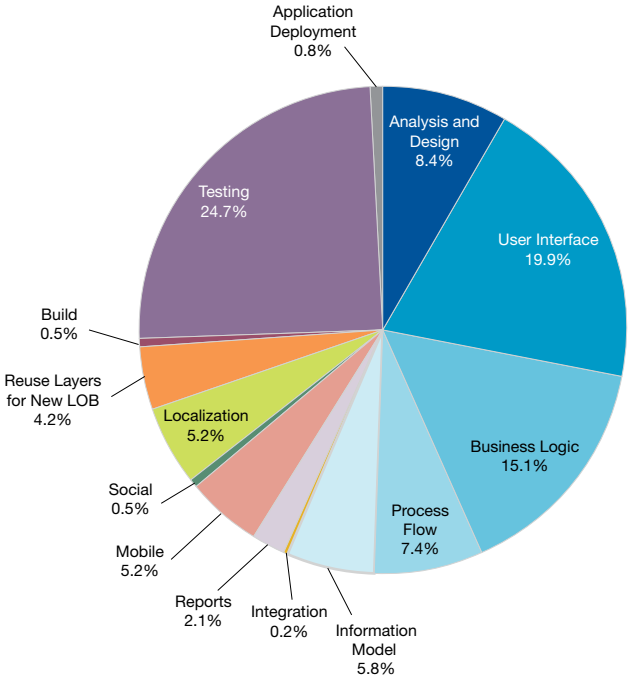


Exhibit 20: Java EE Stream Effort Distribution



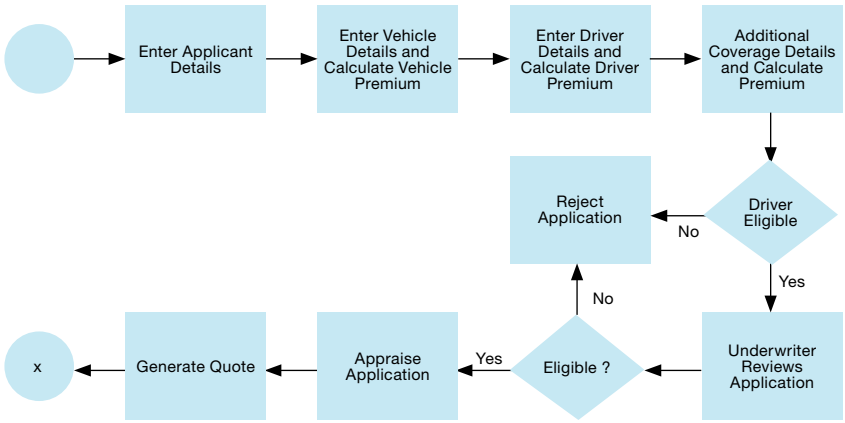
Appendix B: Applications Developed

This section describes the requirements for the application that was developed as part of this study.

Vehicle-Insurance Quote Generation

- Provide applicant information on a screen, and retrieve the relationship and balance history from the database.
- Provide Vehicle Details for which quotes are to be generated. The application calculates the premium based on the business rules associated with each vehicle.
- Provide required details of the Driver(s). The application calculates the driver premium, again in accordance with the defined business rules.
- Provide details for Uninsured Motorist Coverage and Bodily Injury Coverage. Based on the coverage amounts entered, the application calculates the appropriate premium amounts for the additional coverage.
- Review the premium amount calculated by the system using the business rules defined. The application calculates the policy decision and displays it on the Review Premium screen.

Exhibit 21: Process Flow for Vehicle-Insurance Quote Generation



- If the Policy Decision is Eligible, the operator generates the quote and a letter, with the premium quote, is mailed to the applicant's email ID in PDF format.
- If the policy decision is Not Eligible, the operator assigns the application to Underwriter for review.
- The underwriter reviews the quote and either rejects it, in which case the rejection note is sent to the applicant, or approves it, in which case the quote in PDF format is sent to the applicant's email ID.

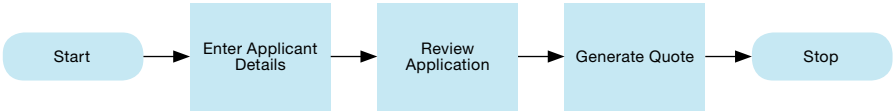
Homeowner-Quote Application

This application simulates a simple process flow in which the operator creates a quote request for a homeowner in the application. The request is then assigned to another operator, who picks the item from his or her work queue and resolves or completes it.

The application can also be accessed using a tablet or mobile device:

- Based on the tablet or mobile device used, the system dynamically presents the screens
- From the work order the appraiser can click on Get Directions and the system gives direction automatically based on the user's current location
- For the tablet/mobile functionality the application is designed to implement using a native application such as iOS and Android platform.

Exhibit 22: Process Flow for Homeowner-Quote Application



Appendix C: Sample Application Screens

Exhibit 23: Customer Info

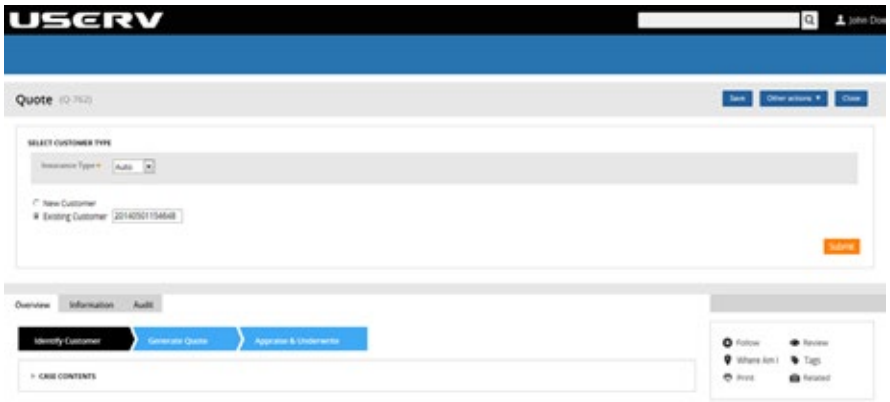


Exhibit 24: Vehicles

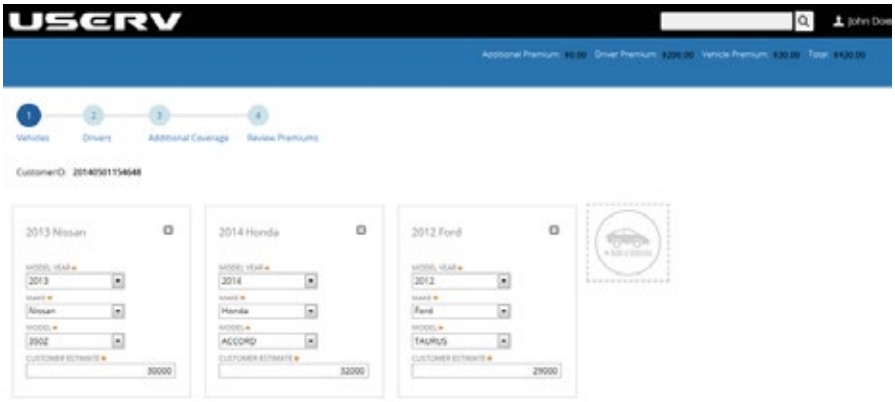


Exhibit 25: Drivers

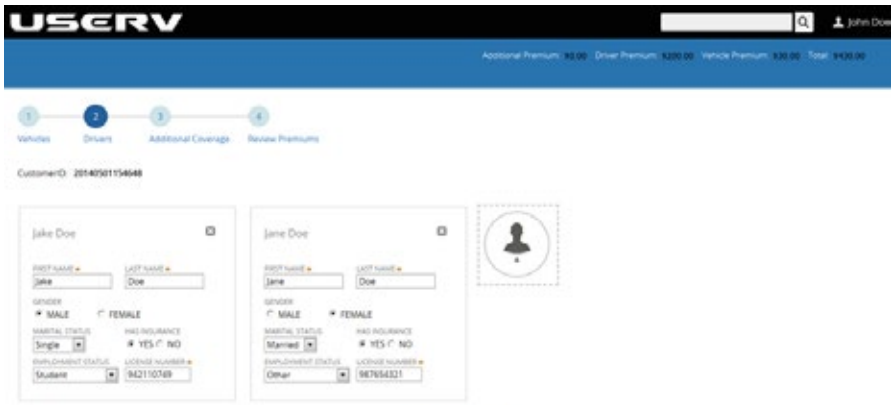


Exhibit 26: Vehicle Additional Coverage

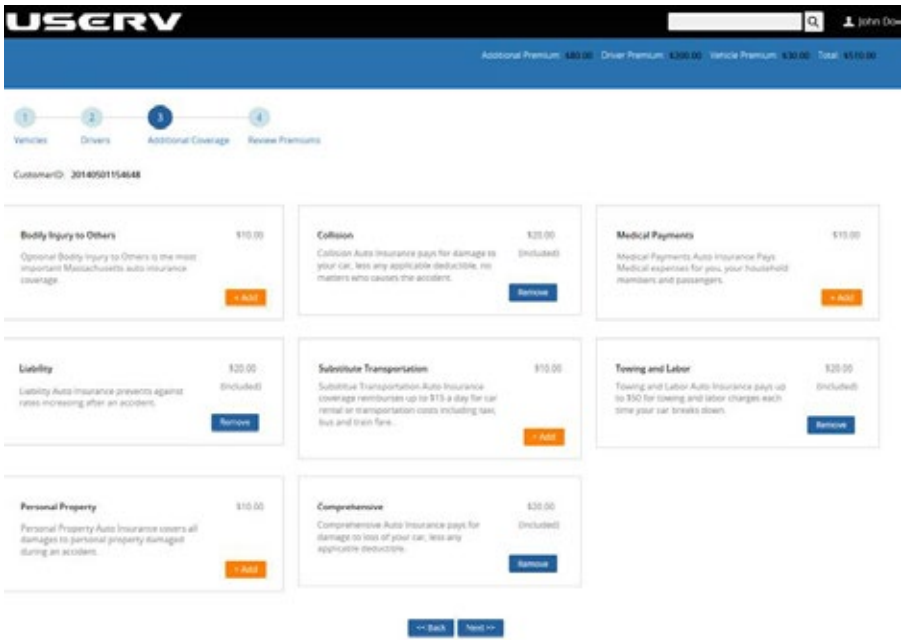


Exhibit 27: Review Premiums

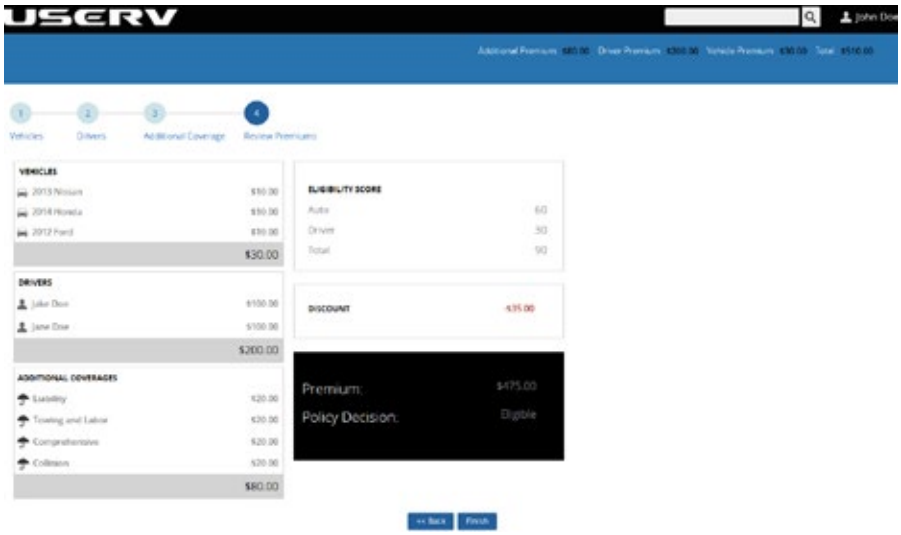


Exhibit 28: Quote Submission

Exhibit 29: My Cases

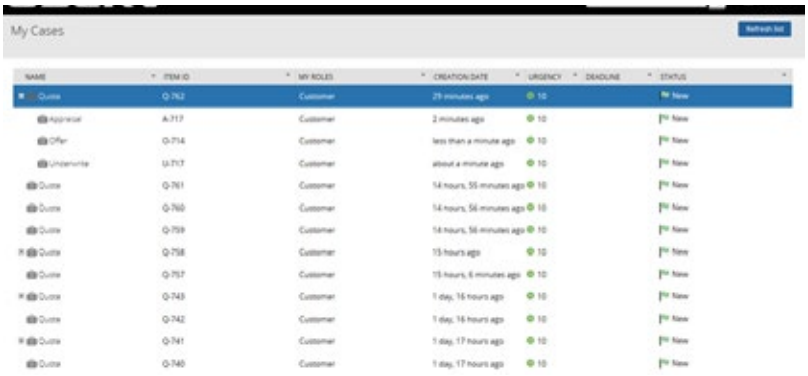


Exhibit 30: My Worklist

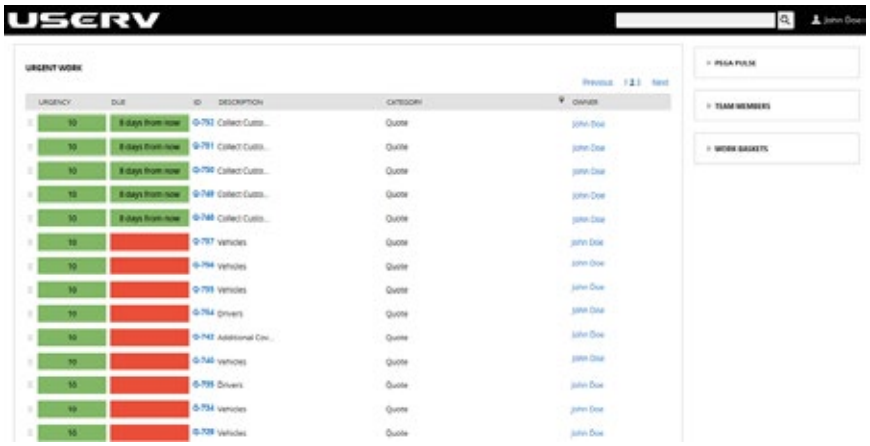


Exhibit 31: Appraiser

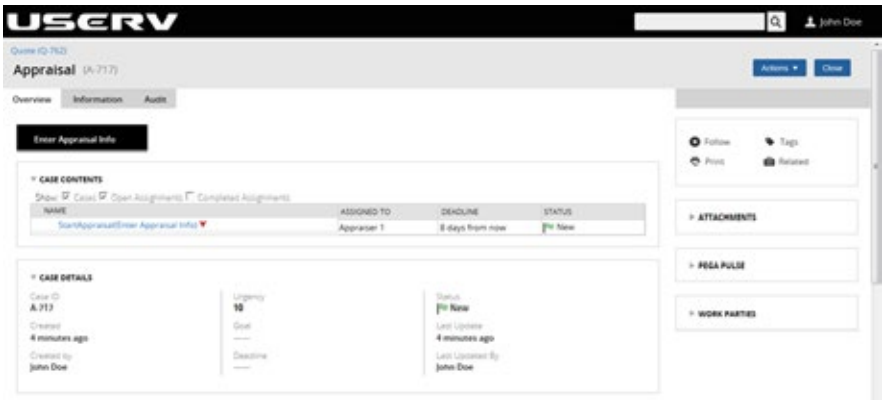


Exhibit 32: Underwriting - Task

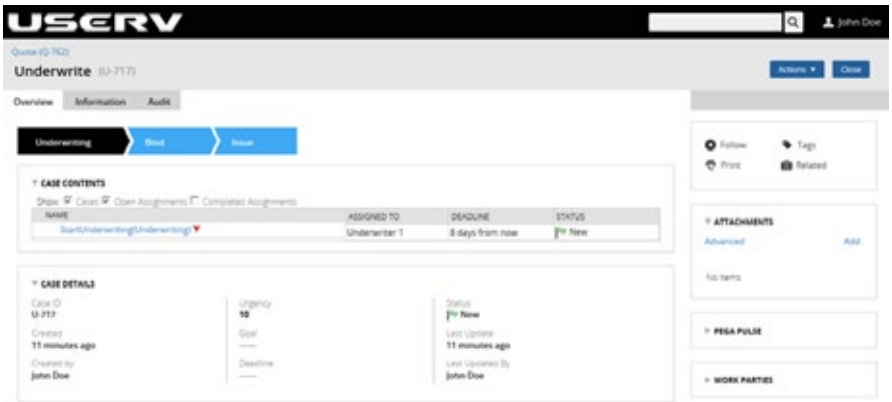


Exhibit 33: Underwriting

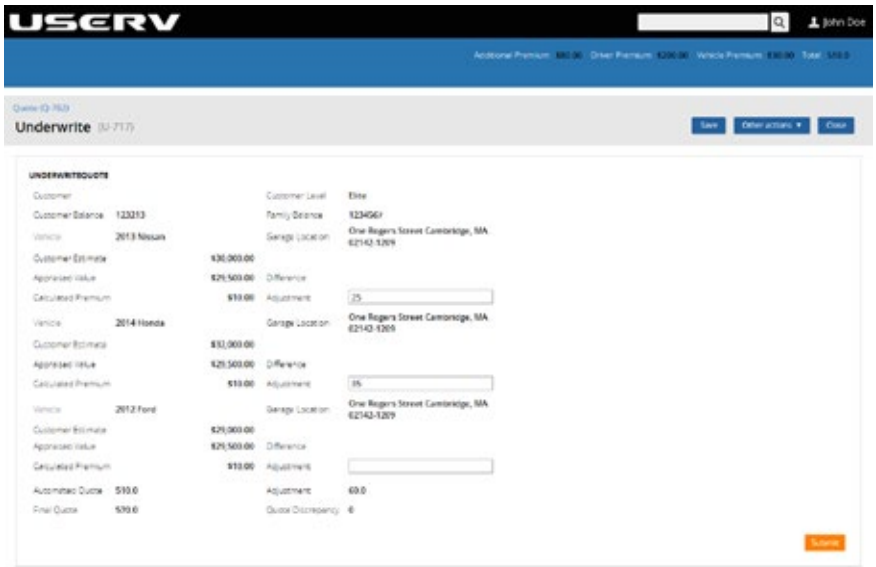


Exhibit 34: Underwriting – Bind

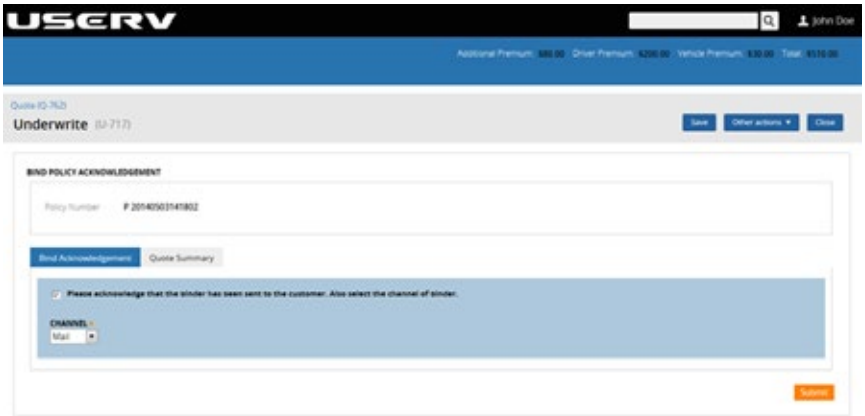


Exhibit 35: Underwriting – Issue

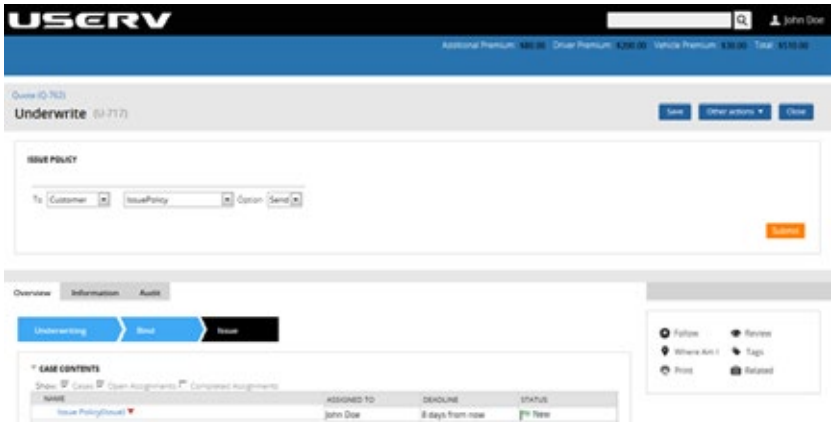
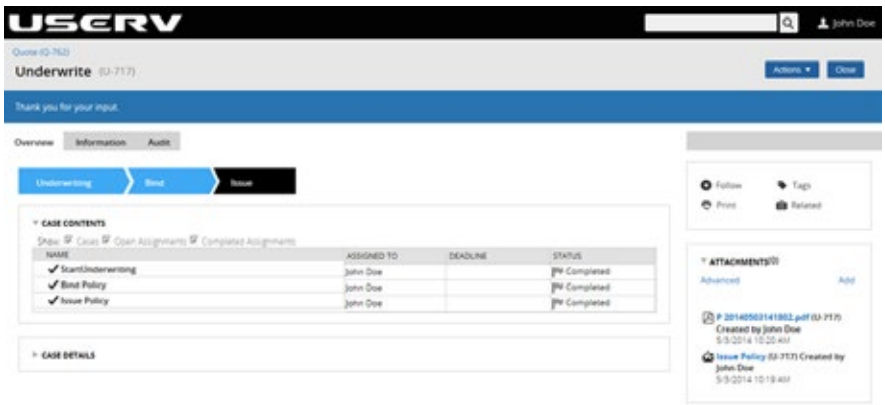


Exhibit 36: Policy Correspondence



Capgemini
CONSULTING.TECHNOLOGY.OUTSOURCING

About Capgemini

With almost 145,000 people in over 40 countries, Capgemini is one of the world's foremost providers of consulting, technology and outsourcing services. The Group reported 2014 global revenues of EUR 10.573 billion.

Together with its clients, Capgemini creates and delivers business and technology solutions that fit their needs and drive the results they want.

A deeply multicultural organization, Capgemini has developed its own way of working, the Collaborative Business Experience™, and draws on Rightshore®, its worldwide delivery model.

Learn more about us at
www.capgemini.com

For more information, contact us at: **financialservices@capgemini.com**
or visit: **www.capgemini.com/financialservices**