New Century Wellness Group:

System Proposal Document

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New Century Wellness Group is a holistic and traditional healthcare provider focusing on preventive medicine and fitness while also providing traditional medical care services. Doctor Timothy Jones and Doctor Dolores Garcia, the founders of New Century Wellness Group, have requested help in developing a new information system to update their current system infrastructure to support current operations and future growth (Tilley & Rosenblatt, 2017, pp. 42-43).

**Background**:

Founded ten years ago, New Century Wellness Group has grown into a medical practice that now includes “four primary care physicians, one nurse practitioner, four physical therapists, one registered nutritionist, eight nurses, and eight support staff people. The clinic currently has a patient base of 8,000 patients from 325 different employers, many of which provide insurance coverage for employee wellness and health maintenance. Currently, New Century accepts insurance plans from 25 licensed health insurance providers. New Century is also considering opening another location, near a new medical center” (Tilley & Rosenblatt, 2017, pp. 42-43).

Currently, the practice uses a mix of paper-based and fragmented computer systems to track its many different departmental areas. The different areas the company has are: Human resources and employee benefits, Payroll, Tax Reporting, Profit Distribution among associates, Patient Medical Records, Account Receivables, Insurance Billing, Appointment scheduling and management, and lastly, Office and Medical inventory management. While not explicitly stated, it is assumed these different departments all operate on different systems mixing paper records and some computer systems where necessary such as ordering inventory and tracking financials. These systems do not connect to one another and do not communicate to facilitate interdependency and streamline processes throughout the practice.

**Problem Statement**:

Doctor Jones and Doctor Garcia have requested a new information system to maintain and track all aspects of the practice. To do this, a business support system to manage scheduling, billing, accounting and payroll functions of the practice and a clinical system to “support the clinical applications of Electronic Medical Records (EMR), Computerized Provider Order Entry (CPOE), and a Clinical Decision Support System (CDSS)” (Tilley & Rosenblatt, 2017, p. 83), will be recommended and developed.

This system will impact the practice by combining the multiple different rolls that coincide with one another into a system that draw the information when needed to perform the necessary tasks. Since many of the tasks performed by one system are reliant on information from another, such as the ordering or medical supplies depends on what is used when providing care for a patient, the systems can talk to one another to be able to deliver information on demand and as needed to track and aid in the jobs of the employees. Utilizing a system like this replaces the outdated method of keeping everything separate and can prevent mishaps from occurring such as necessities being overlooked or improper billing for services rendered.

The goal of the system is to meet the needs of what the Doctors are looking for as provided by the example they described. This example was as follows: “Lisa Sung schedules a patient’s appointment and the patient comes into the office for the first time. On this appointment, an EMR is started for the patient that includes the patient’s demographic information, medical history, and insurance information. A patient may be coming in to see any one of the healthcare providers, including a physician, nurse practitioner, physical therapists, or the nutritionist. These providers would enter any orders or prescriptions into the EMR with the CPOE system. The Providers who use the EMR and CPOE system are supported by the CDSS. Patients often schedule a follow-up appointment before leaving the practice office. After a patient’s visit, Susan Gifford, who maintains the patient medical records, reviews the records to ensure they are complete. Carla Herrera orders any supplies needed to replace items used by the patient. Tammy Alipio begins billing the patient’s insurance provider for services that were rendered to the patient. Tom Capaletti follows up on the billing to ensure the practice is getting paid for all claims. Dr. Jones also tells you that the system should also include modules to support Fred Brown and Corinne Summers in HR and payroll” (Tilley & Rosenblatt, 2017, p. 83).

**Audience**:

The core audience for this business proposal is Doctor Jones and Doctor Garcia, who are the managing partners of the practice and are the ones who requested this new information system. This will be communicated in written form with supporting visuals analyzing necessary requirements and implementation processes. The overall system outline and process will be delivered to Dr. Jones who is the main point of contact for what the practice is looking for out of the new information system.

**System Requirements**:

The practice is currently using a mixed system of paper-based and fragmented computer systems to track its many different departmental areas. The new system will merge all these systems and processes into one system for the entire practice. The system will combine inputs, outputs, processes, performances, and controls to fulfil its task.

Inputs:

1. Personal Information of patients such as name, address, date of birth, phone number, insurance plan information, current medications, and medical history.
2. Data is entered by clinic staff after receiving from patients.
3. Services rendered are entered by clinic staff at the conclusion of an appointment.

Outputs:

1. Patient reports are generated and sent to make insurance claims and bill patients.
2. Appointments assigned to each provider are sent to the provider in the form of a daily schedule.
3. Schedule is generated based on appointments made.

Processes:

1. System cross checks medications and verifies prescriptions.
2. Insurance claims are sent to insurance companies and bills are generated and sent to patients.
3. Payments are processed when received.
4. Appointments are maintained to prevent over scheduling.
5. Supplies are ordered when needed from supply list sent from clinic staff.
6. Payroll is generated from data provided by HR staff.

Performances:

1. System should support all branches of the clinic.
2. Response time for queries made should be at a minimum.
3. The system should be functional during normal business hours for clinic staff.
4. Payroll must be performed on a regularly scheduled basis.

Controls:

1. The system security should be of high enough level to protect sensitive patient information and meet government regulations.
2. Employee access to system should be based on their job role and permissions should be kept to as minimal as possible.
3. All access and changes to patient records should have an audit trail.
4. The system must provide logon security at the OS level and the application level.

**Data Process Model**:



Figure 1 - IT system Context Diagram

This model shows a high-level overview of the Information system model. It utilizes five entities: Patients, Providers, Insurance companies, Clinic Staff, and the American Medical Association.

**Data Flow Diagram**:



Figure 2 - IT System Data Flow Diagram

The above data flow diagram describes the types of data that flows between each process, entity, and data store. The appointment process works with the appointment data store and receives inputs from clinic staff and patients. The appointment process outputs a daily appointment list to the providers each day. The payment process manages services based on CPT codes from the American Medical association. “The Current Procedural Terminology (CPT®) codes offer doctors and health care professionals a uniform language for coding medical services and procedures to streamline reporting, increase accuracy and efficiency. CPT codes are also used for administrative management purposes such as claims processing and developing guidelines for medical care review” (American Medical Association, 2022). The payment process checks with insurance companies to make claims and receives payments from patients. This information is stored in the payment data store. The reporting process receives clinic information from clinic staff and generates information to be sent to patients. The records maintenance process keeps track of payment data, insurance data and provider data to keep record of what goes on at the clinic. The supply ordering process receives information from clinic staff to resupply the clinic with materials used during appointments. The HR and payroll process maintains clinic staff information and is responsible for paying staff and maintaining employee records.

**Data Dictionary**:

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| **Data Flow** | **Origin** | **Destination** | **Description** |
| Accounting Data | Payment Data store | Health Clinic Staff | Sends payment and accounting information regarding transactions and billing |
| Appointment Data | Appointment Process, Appoint Data store, Health Clinic Staff | Appointment Process, Appoint Data store | Information regarding appointments for patients |
| CPT Codes | AMA | Payment Process | CPT codes for medical standardization of services performed |
| Payment | Insurance Company | Payment Process | Financial payment from insurance company |
| Payment and Insurance Records | Payment Process | Payment Data Store | Records of payments and insurance information to be stored for company use |
| Bill Payment | Patient | Payment Process | Payments from patients for deductible and uncovered services |
| Post Card labels | Reporting Process | Health Clinic Staff | Reports and records to be sent to patients |
| Post card reminder | Health Clinic Staff | Patient | Reports and records from clinic regarding patients |
| Payroll | Health Clinic Staff | HR and Payroll | payroll information for employees |
| Needed Supply List | Health Clinic Staff | Supply Ordering | needed supplies to be ordered to replace supplies used during appointments |
| Daily Appointment List | Appointment Process | Provider | Daily list of appointments to be performed by the provider |

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| --- | --- |
| **Data Stores** | **Description** |
| Payment Data | Information about payments, charges and insurance claims |
| Appointment Data | Information regarding appointments being made, changed and performed |
| Provider Data | Information regarding providers and their skillsets |
| Insurance Data | Information regarding patient insurance plans and insurance providers |

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| --- | --- | --- |
| **Processes** | **Number** | **Description** |
| Appointment | 1 | Manages schedule and creates new appointments, reschedules and deletes appointments |
| Payment | 2 | Processes payments, generates insurance claims and bills/credits patient accounts |
| Reporting | 3 | Generates reports based on clinic performance and needs |
| Records Maintenance | 4 | Maintains records of all patients, services, payments and provider |
| Supply Ordering | 5 | Manages supply inventory and orders needes supplies |
| HR and Payroll | 6 | Manages employee information, company policies and employee payroll |

|  |  |  |  |
| --- | --- | --- | --- |
| **Entities** | **Inputs** | **Outputs** | **Description** |
| Patients | Post Card Reminder | Bill Payment, Appointment Request | Clients seeking medical services from the clinic |
| American Medical Association | None | CPT Codes | Uniform language for coding medical services and procedures to streamline reporting, |
| Provider | Daily Appointment List |  | Doctors, Nurse Practitioners, Physical Therapists |
| Insurance Companies | Claims | Payment | Insurance companies covering patient care |
| Health Clinic Staff | Accounting Data, Post Card labels | Appointment Data, Need Supply List | All staff members of New Century Wellness Group |

The above data dictionary is broken into sections for Data flows, Data Stores, Processes, and Entities. These are taken from the data flow diagram and describe each section to define its purpose and provide a description of each element. The data dictionary is for reference to establish a baseline understanding of each element and clarify what is going on with each element.

**Use Case Diagram**:



Figure 3 - Appointment System Use Case Diagram

The above appointment system use case shows how a patient requests an appointment and a clinic staff member verifies the availability of the appointment and then schedules it. If necessary to appointment is rescheduled and the patient is sent a remind. When an appointment is made the provider is notified and completes the appointment once the services have been performed.



Figure 4 - Billing System Use Case Diagram

The billing system use case shows services performed by the clinic are billed to patients based on AMA CPT codes. The services determine charges billed to customers. The bill generates an insurance claim which is sent to the insurance company and paid to the clinic. The patient is responsible for payment of any deductible or non-covered charge.

**Specification**:



Figure 1 - Physical Design

The physical design for the New Century Wellness Group system is set up to provide access to all employees. A mesh network will be utilized to link all the routers into one seamless network throughout the building. The network will be protected by a firewall. Each area of the clinic will have an access point to limit bandwidth and connectivity issues arising. The receptions and nurses’ desks will have two workstations each and a wireless printer to aid in business necessities. Each exam room will have a workstation in it to allow providers to access patient records, enter medical orders and note anything necessary when interacting and administering care to patients. Providers will also have dedicated workstations in their office for use when they are not performing appointments and need access to the system. Two servers are set up in an IT office. These servers are protected by an additional firewall as they store all company information regarding employees, HR, and payroll as well as a second server for all patient information, appointment information and patient insurance/payment records. The design allows for future expansion and scalability as needed by making use of a mesh network that can add network nodes as needed and workstations can be added to allow more access to the network and system.

**Data Design**:



Figure 2 - System Entity Relationship Diagram

The entity relationship diagram visually describes how each entity in the system interacts with the processes and how the entities are connected through data relationships. Each entity has its own primary attribute that can be used to specifically identify only one entity in its data table. For example, the provider primary key is the Provider\_ID field. Also listed in the provider table are the foreign keys, Employee\_ID and Appointment\_ID, that link the provider table with the other entities it has direct relationships with through data. Each of the tables is related to the others in terms of what data is housed in each table and what links them.

The overall system words in order of operations function as described in the diagram and each table is related to the next or prior tables. Each provider belongs to the health clinic staff as they are an employee. Patients schedule appointments that providers perform. Based on what happened during the appointment and what was performed, a charge is generated on the customer’s bill. This bill produces a claim that is submitted to the patient’s insurance company. The insurance company then pays the clinic for based on the claim.

**User Interface Design**:



Figure 3 - Sample User Interface Screens

The user interface uses a simplistic approach to allow users to easily navigate to their desired portion of the system. Users will use workstations anywhere in the office to log in and access the clinic’s system. The home page allows users to easily click on their desired task. In the example screen shots provided, the schedule option is clicked leading to the next screen. From here, users can view the calendar or make a new appointment for a patient. In the calendar view, appointments are broken down by date and time and each provider will have their own row of appointments each day. Navigation of the system is designed to be intuitive and utilize simplicity to streamline the use of the system to allow all tasks to be performed while running on minimal processing power. The system functions seamlessly across all workstations allowing all users to have similar experience regardless of their access level.

**System Architecture**:

The clinic will work in a departmental structure with a hierarchy in each department as in a standard setting. The owners of New Century Wellness will sit at the top with a practice manager and a chief medical officer. The chief medical officer will be one of the providers on staff and will be responsible for managing the medical side of the clinic while the practice manager is responsible for the daily operations, reporting, HR, staffing, payroll, and billing procedures.

Ideally the system is integrated with an enterprise resource planning software to allow the stocking and ordering of supplies for the clinic to be made easier. The supply ordering menu option can be directly linked to ERP software to allow supply stock replenishment to be performed easily. In the long run developing a system in house will be best for the clinic in terms of total cost of ownership. While the upfront cost will be substantial, the system will immediately be implemented and remain scalable for future expansion and other system integration. Due to the simplicity of the system, the scalability of the system is it biggest benefit as it will not require a new system be made when expansion is necessary or additional system performances are needed to be added. The system is designed in a modular fashion to benefit the New Century Wellness Group by allowing its future plans to be kept in mind.

Web integration of the system is ideal during the development of the system. By making the system web accessible, it can be accessed off sight when necessary. Some redundancy will be put in place to allow the system to function offline as well to prevent accessibility issues in the case of any network failure. Protecting the system by requiring credential login allows the system to be always protected. When accessed off site, credential authentication will ensure that only those authorized will have access to the system. The same goes for on sight as each workstation will have to be logged into to be used and when not in use, all workstations will be required to be logged out of. The design is intended to allow seamless function regardless of location for clinic staff and providers.

In addition to credential login and authentication, the system will require multi-factor authentication for login when off site. The system will be firewall protected from outside internet access and the servers located on site will be protected by a secondary firewall in place for redundancy and specified protection of data. These firewalls will also include access control protocols to assign roles to clinic staff and specify what data is accessible by whom depending on their role.

**Feasibility Analysis**:

The goal of the proposed system is to meet the needs of the clinic while accounting for and allowing planning for the future. The proposed system is designed in a manner that combines all aspects of the business to move away from the mix of paper and legacy systems the clinic currently uses. Operationally, the system streamlines the process of users and combines all their job needs into a single place. The new system allows each user, whether it is the owners, providers, clinic staff, or managers, to perform all necessary tasks in a single place regardless of which computer they are at. This creates less paper waste while preventing paper documentation from piling up and cluttering work areas. From a technical standpoint, the streamlined and simplistic system minimizes user complications and provides as minimal a learning curve as possible when transitioning to the new system.

While the cost of the system appears to be substantial, most of the cost is front loaded. By designing the system in house and owning the new system, the clinic benefits by not requiring any leasing or software as a service subscription. This saves money for the company in the long run and allows the clinic to do whatever is needed to the system in the future as the clinic changes, adapts or implements new business strategies. The system will be complete in a minimal number of days as the critical path of the project is predefined and adhered to with open communication to stakeholders. Any places time can be gained will be utilized to deliver the final system in as short a time frame as possible and any future implementations needed to be added will not require the system to come offline during business hours reiterating the impact of the scalability of the system.

**Work Breakdown Structure**:

To develop and implement the new system, several roles and resources will need to be used. These resources will be managed in a typical tiered role setup. The project will be reported to a manager, in this case, the manager will be the owners of New Century Wellness Group as their approval is needed to proceed with the project plan. Once the project commences, a Project Manager will take over the role of running the project. The project manager’s job will be to secure the necessary resources, ensure the project stays on schedule and necessary controls are maintained. The project manager will be the direct line of communication with the owners of New Century Wellness Group to keep them up to date on the progress of the project. A system analyst will be utilized to conduct necessary analysis of the current system and develop the preliminary software specifications as a guide for the developers to work from. The analyst will work with the developers to ensure all aspects of the system are met through the development cycle. The system analyst will report to the project manager with any issues or needs as they arise. Software developers will be employed to develop the new software system and develop testing procedures to verify system use and allow bug reporting. The developers will work side by side with the system analyst to meet the needs of the requested system. After the system is initially developed, software testers will be employed to test the new system. The testers will report back to the developers with any bugs or suggestions to streamline and fix the new software system. A technical communications team will be utilized throughout the process to develop training material and user manuals for the new software system to be used to train the staff of New Century Wellness Group and be used as reference material in the future as needed. Finally, a development team will be utilized to facilitate the installation and deployment of the new software system. The development team will also aid training the new staff to use the software. These roles are broken down on the resource chart section of the project plan and can be viewed below: Graphical user interface

Description automatically generated

The work breakdown structure is illustrated in the following Gantt chart.

Graphical user interface, application

Description automatically generated

The work breakdown structure is displayed as the major task groups for each section of the project and defines estimated days of work required per section along with the estimated start and finish date for each task. Each task on the chart contains smaller tasks within each. These have been minimized to allow the entire Gantt chart to fit onto the provided screenshot. The entire project file will be attached to be viewed more in depth if necessary.

**Project Monitoring and Control Plan**:

The project manger will hold primary responsibility for monitoring and controlling the project. This will be done by utilizing the structured walk-through approach. “A structured walk-through is a review of a project team member’s work by other members of the team. Generally, systems analysts review the work of other systems analysts, and programmers review the work of other programmers, as a form of peer review. Structured walk-throughs take place throughout the SDLC and are called design reviews, code reviews, or testing reviews, depending on the phase in which they occur” (Tilley & Rosenblatt, 2017). These reviews have been accounted for in the project plan. To aid in the control and monitoring of the project, the project has been laid out following a standard system design template and includes in depth tasks on the timeline to make tasks clear and easily trackable. With this project plan, problems should be easily visible and resolvable in a timely manner to prevent unnecessary extension of the project timeline and maintain controls for target dates and cost estimates. A system is put into place that directs each group of employees to report to someone above them to facilitate open communication and keep everyone on the timetable and on track. These directions will be communicated to each person on the project to ensure issues do not arise along the path of development. The project manager will be the top of this chain and should be receiving regular reports from everyone as the project goes through the development cycle. If necessary, the project manager can contact the owners of New Century Wellness Group for clarification and guidance in the event an issue arises that requires it.

The critical path for the project entails all the task roles necessary except the training section as the training portion runs parallel to the entire development process, as can be seen in the following Gantt chart, the path is similar but does not include the training portion as it is not part of the critical path for the project. The critical path “is a series of tasks that, if delayed, would affect the completion date of the overall project. If any task on the critical path falls behind schedule, the entire project will be delayed” (Tilley & Rosenblatt, 2017).

Graphical user interface, application, table, Excel

Description automatically generated

The project is very linear in scope, as a result, issues arising along the development path could potentially extend the estimated time of system completion.

**Timeline**:

The following timeline shows the proposed project from start to finish:

Graphical user interface, application

Description automatically generated

The estimated total time for system development and implementation is 106 days. This equates to 1,524 hours of work across all tasks and resources used. The projected start date is September 5th, 2022 with an estimated completion date of January, 30th, 2023. The total estimated cost for the project is $48,460. The cost breakdown is shown in the following graphic: Chart, table

Description automatically generated

This cost breakdown highlights each major section of the tasklist and provides the estimated cost associated with the task category.

# References

American Medical Association. (2022). *CPT® overview and code approval*. Retrieved from American Medical Association: https://www.ama-assn.org/practice-management/cpt/cpt-overview-and-code-approval#:~:text=CPT%C2%AE%20code%3F-,What%20is%20a%20CPT%C2%AE%20code%3F,reporting%2C%20increase%20accuracy%20and%20efficiency.

Tilley, S., & Rosenblatt, H. (2017). *Systems Analysis and Design, Eleventh Edition.* Boston: Cengage Learning. Retrieved from file:///C:/Users/Jeremy/AppData/Local/Temp/Temp1\_1305494601\_568552.zip/1305494601\_568552/9781285171340\_CH01.pdf