Stage 2 Alternatives Analysis

2.1 General Information

Agency or State Entity Name:

State Hospitals, Department of

Organization Code:

4440

Proposal Name:

Continuum – Electronic Health Record (EHR)

Department of Technology Project Number:	4440-120

2.2 Preliminary Submittal Information

Contact Information:

Contact First Name:	**Contact Last Name:**
Gina	Gonzales
Contact Email:	**Contact Phone:**
Gina.Gonzales@dsh.ca.gov	916-651-3261
Preliminary Submission Date:	**Preliminary Assessment Transmittal**:
12/16/2019	(Include transmittal as an attachment to your email submission.)

2.3 Stage 2 Preliminary Assessment

2.3.1 Impact Assessment

	Yes	No
1. Has the Agency/state entity identified and committed subject matter experts from all business sponsors and key stakeholders?	☒	☐
2. Are all current baseline systems that will be impacted by this proposal documented and current (e.g., data classification and data exchange agreements, privacy impact assessments, design documents, data flow diagram, data dictionary, application code, architecture descriptions)?	☐	☒
3. Does the Agency/state entity anticipate needing support from the California Department of Technology (CDT) Statewide Technology Procurement (STP) to conduct market research for this proposal (Market Survey, Request for Information)?	☐	☒
4. Does the Agency/state entity anticipate submitting a budget request to support the procurement activities of this proposal?	☒	☐
5. Could this proposal involve the development and/or purchase of systems to support activities included in Financial Information System for California (FI$Cal) (e.g., financial accounting, asset management, human resources, procurement/ordering, inventory management, facilities management)?	☐	☒
6. Does the Agency/state entity have a designated Chief Architect or Enterprise Architect to lead the development of baseline and alternative solutions architecture descriptions?	☒	☐
7. Will the Agency/state entity's Information Security Officer be involved in the development and review of any security related requirements?	☒	☐
8. Does the Agency/state entity anticipate performing a business-based procurement to have vendors propose a solution?	☐	☒

Stage 2 Alternatives Analysis

2.3.2 Business Complexity Assessment

Business Complexity: **See Attachment 2.3.2**	3.4	Business Complexity Zone:	☒ High	☐ Medium	☐ Low

2.4 Submittal Information

Contact Information:

Contact First Name:	**Contact Last Name:**
Gina	Gonzales
Contact Email:	**Contact Phone:**
Gina.Gonzales@dsh.ca.gov	916-651-3261
Submission Date:	**Project Approval Executive Transmittal:**
9/16/2020	(Include transmittal as an attachment to your email submission.)

Submission Type:

☒ New Submission ☐ Updated Submission (Post-Approval)

☐ Updated Submission (Pre-Approval) ☐ Withdraw Submission
Reason: Select...
If "Other," specify:

Sections Updated (For Updated Submissions Only) – (check all that apply)

- ☐ 2.1 General Information
- ☐ 2.2 Preliminary Submittal Information
- ☐ 2.3 Stage 2 Preliminary Assessment
  - ☐ 2.3.1 Impact Assessment
  - ☐ 2.3.2 Business Complexity Assessment
- ☐ 2.4 Submittal Information
- ☐ 2.5 Baseline Processes and Systems
  - ☐ 2.5.1 Description
  - ☐ 2.5.2 Business Process Workflow
  - ☐ 2.5.3 Current Architecture Information
  - ☐ 2.5.4 Current Architecture Diagram
  - ☐ 2.5.5 Security Categorization Impact Table
- ☐ 2.6 Mid-Level Solution Requirements
- ☐ 2.7 Assumptions and Constraints
- ☐ 2.8 Dependencies
- ☐ 2.9 Market Research
  - ☐ 2.9.1 Market Research Methodologies/Timeframes
  - ☐ 2.9.2 Results of Market Research
- ☐ 2.10 Alternative Solutions
  - ☐ 2.10.1 Solution Type)
    - ☐ Recommended
    - ☐ Alternative (2)
  - ☐ 2.10.2 Name
  - ☐ 2.10.3 Description
  - ☐ 2.10.4 Benefit Analysis
  - ☐ 2.10.5 Assumptions and Constraints
  - ☐ 2.10.6 Implementation Approach
  - ☐ 2.10.7 Architecture Information
- ☐ 2.11 Recommended Solution
  - ☐ 2.11.1 Rationale for Selection
  - ☐ 2.11.2 Technical/Initial IT Project Oversight Framework Complex Assessment
  - ☐ 2.11.3 Procurement and Staffing Strategy
  - ☐ 2.11.4 Enterprise Architecture Alignment
  - ☐ 2.11.5 Project Phases
  - ☐ 2.11.6 High Level Proposed Project Schedule
  - ☐ 2.11.7 Cost Summary
- ☐ 2.12 Staffing Plan
  - ☐ 2.12.1 Administrative
  - ☐ 2.12.2 Business Program
  - ☐ 2.12.3 Information Technology (IT)
  - ☐ 2.12.4 Testing
  - ☐ 2.12.5 Data Conversion/Migration
  - ☐ 2.12.6 Training and Organizational Change Management
  - ☐ 2.12.7 Resource Capacity/Skills/Knowledge for Stage 3 Solution Development
  - ☐ 2.12.8 Project Management
    - ☐ 2.12.8.1 Project Management Maturity Assessment
    - ☐ 2.12.8.2 Project Management Planning
  - ☐ 2.12.9 Organization Charts (2)
- ☐ 2.13 Data Conversion/Migration
- ☐ 2.14 Financial Analysis Worksheets

Stage 2 Alternatives Analysis

Summary of Changes:

Condition(s) from Previous Stage(s):	
Condition #	….
Condition Category	Select...
Other, specify	….
Condition Sub-category	Select...
Other, specify	….
Condition	
Assessment	Select...
Other, specify	….
Agency/state Entity Response	
Status	Select...
Other, specify	….

Select + to add conditions.

2.5 Baseline Processes and Systems

2.5.1 Description

The Department of State Hospitals (DSH) manages the nation's largest inpatient forensic mental health hospital system. Its mission is to provide evaluation and treatment in a safe and responsible manner, seeking innovation and excellence in state hospital operations, across a continuum of care and settings. DSH is responsible for the daily care and provision of mental health treatment of its patients. DSH oversees five state hospitals (Atascadero, Coalinga, Metropolitan, Napa, and Patton) and employs nearly 12,000 staff. Additionally, DSH provides services in jail-based competency treatment (JBCT) programs and conditional release (CONREP) programs throughout the 58 counties. In FY 2019-20, DSH served 10,962 patients within state hospitals and jail-based facilities, with average daily censuses of 6,143 and 333 respectively. The CONREP program maintains an average daily census of approximately 650.

In order to meet these obligations, it is crucial for DSH's five standalone hospitals to have efficient, safe, and fiscally responsible business and clinical practices that are enabled by technology. The key business processes and supporting systems impacted by this proposal are DSH patient registration, pharmacy operations, billing systems, and the effectiveness of delivery of services in primary medical, psychiatric, and nursing care. Taken together, these functions will become part of the "Continuum" product – an integrated ecosystem of person-centered, data-driven applications designed to support a spectrum of healthcare services for all DSH patients. Continuum is comprised of all the automated components of an overall health care system, including the core Electronic Health Record (EHR), the forensic Behavioral Health Assistance Module (BHAM) or its replacement function, the Pharmacy Modernization program components, health care data analytics, third party health care components (e.g., EagleSoft dental software), and legacy DSH health care systems that may be phased out or retained in more limited roles. When referring to the present EHR-focused project, the term "Continuum-EHR" is generally used.

The business drivers are best understood in the context of the key business problem areas driving the need for EHR:

1. DSH hospitals continue to depend on a 30-year-old, error-prone enterprise Master Patient Index within a system called Admission Discharge Transfer (ADT) that has outgrown and outlived its original uses and poses a risk to continued efficiency, improvement of patient safety, and ability to recruit and retain staff.
2. Pharmacy departments at DSH hospitals currently use separate, non-integrated software called Pharmacy Hospital Orders (PHO) to complete medication prescription validation and to inform billing and inventory tracking functions. However, pharmacy processes are based on this outdated mainframe system built in 1998 that is unable to maintain and adapt to current and future standards of practice and legal requirements. In advance of implementing an EHR, DSH plans to upgrade its pharmacy operations by installing a uniform pharmacy management and dispensing system that will interface patient drug information and cost data into the EHR to enhance treatment information

and improve billing efficiency. The combination of the new Pharmacy Modernization system and an EHR will permit the retirement of PHO.

3. Billing functions are currently achieved through numerous legacy programs including Admissions/ Discharge/ Transfer (ADT), Cost Recovery System (CRS), and the Data Systems Group (DSG/Experian Health). These systems populate data onto Center for Medicare & Medicaid Services (CMS) Form 1500 and Uniform Bill forms. For services performed in DSH facilities, Current Procedural Terminology (CPT) codes are entered into ADT and sent via data files to CRS, which then applies a charge for the service based on the code. For outside medical charges, the service AND charge amount are entered into ADT then transferred via data files to CRS. The DSG and CRS billing systems, which submit all reimbursement claims from the Department of Developmental Services (DDS) and DSH to CMS, are operated by another state agency – DDS and are not under the direct control of DSH.

   DSH currently remits about $4.3 million annually to the State General Fund from Medicare and private insurance recoveries (see Chart 1). It is not known how much revenue may be lost due to billing errors., More significantly, DSH is unable to bill over $22 million per year in known costs to CMS/Medicare because of shortcomings of the billing systems (see Chart 2). Actual recoveries may be slightly lower or higher based on individual billing factors. Through improved efficiencies from an EHR, such as being able to trace exact treatment and drug dosage information to individual patients for cost recovery purposes, it is estimated that receipts will increase substantially compared to current collections. In addition to the $22 million annual ongoing recovery increases cited above, following implementation of an EHR, DSH anticipates a one-time recovery of previous costs to be between $50 million and $100 million.

Chart 1
Current DSH Remittance to the State General Fund (in $ millions)

Payor Type	FY 14/15	FY 15/16	FY 16/17	FY 17/18	FY 18/19	Average
Private Payor	1,828	2,109	3,515	2,674	2,667	2,559
Part A & B	124	353	754	838	516	517
Part D	1,437	1,383	941	1,092	1,131	1,197
Supplemental	114	2	5	9	13	29
Totals	**$3,503**	**$3,847**	**$5,215**	**$4,613**	**$4,327**	**$4,302**

Chart 2
Medicare Part A Recoveries and Missed Billings (FY 2014-15 Through 2018-19)

Type of Claim or Payor	Actual Average Recovery	Estimated Annual Missed Billings
Private Payor	$2,559,000	Not known
Medicare Part A (Skilled Nursing Facility)	---	$13,295,636
Medicare Part A (Acute Medical/Psychiatric In-Patient) & Part B (Medically Necessary / Preventive Services)	$517,000	$8,988,863
Medicare Part D (Prescription Drug)	$1,197,000	Not known
Medicare Supplemental	$29,000	Not known
TOTALS	**$4,302,000**	**$22,284,499+**

4. Primary care systems are fragmented, consisting of partial paper chart processes combined with the Wellness and Recovery Module Support System (WaRMSS) mental health treatment planning and documentation software that was developed by DSH based upon a Recovery Model philosophy. However, WaRMSS does not meet the needs of a forensic psychiatric patient population and was not designed for primary care services. DSH believes that WaRMSS can be replaced, in part, by the EHR and that psychiatric patients will be better served clinically through either

enhancements to or replacement of the existing Behavioral Health Assistance Module (BHAM) that has been developed in-house and that will supplement or possibly be replaced by the broader health information in the EHR. This comprehensive approach will improve health care services to DSH patients, ensuring that a constitutionally adequate level of care is provided. Nevertheless, some functions of WaRMSS will not be replaced by EHR and must continue as a stand-alone application or be migrated to another application.

Though each business program area has different objectives and staff, registration, pharmacy, billing, and primary care depend on the same patient data. Likewise, the problems faced by billing cannot be corrected without simultaneously correcting those problems faced by registration, pharmacy, and primary care. Instead of addressing these business opportunities individually and due to the need for multiple programs to coordinate complex program changes with one another, DSH acknowledges the necessity to employ an integrated approach that collectively bridges those needs common to registration, pharmacy, billing, and primary care.

While each area of the business processes and systems cited above involves separate staff and stakeholders, the interoperability of patient data across each of these business process groups is also of paramount importance to improve patient treatment and services. Patient data must be exchanged internally within hospital units and departments, across hospitals and their respective departments, as well as with external agencies, community hospitals, and regulatory bodies as required by law. Currently, this often does not happen efficiently, or not at all. Continuum will attempt to bridge the gaps.

2.5.2 Business Process Workflow

See Attachment 2.5.2 – Business Process Workflows

2.5.3 Current Architecture Information

Function: Registration

Business Function/Process(es)		Patient Registration		
Application, System or Component		**Admission-Discharge-Transfer (ADT)**		
COTS, MOTS or Custom		☐ Commercial off-the-shelf (COTS) ☐ Modified off-the-shelf (MOTS) ☒ Custom application		
Name/Primary Technology:		ADT		
Runtime Environment	Cloud Computing Used?	☐ Yes ☒ No	If "Yes," specify:	☐ Software as a Service (SaaS) ☐ Platform as a Service (PaaS) ☐ Infrastructure as a Service (IaaS)
	Server/Device Function	Mainframe		
	Hardware	Mainframe Servers		
	Operating System	z/OS		
	System Software	Natural Programming Language, ADABAS DBMS		
System Interfaces		Pharmacy Hospital Operations		
Data Center Location		☒ State Data Center host at CDT ☐ Agency/state data center operated by Agency/state entity ☐ Commercial Data Center ☐ Other		
	Other, specify			
Security	Access (check all that apply)	☐ Public ☒ Internal State Staff ☐ External State Staff ☐ Other, specify:		
	Type of Information	☒ Personal ☒ Health ☐ Tax ☒ Financial ☒ Legal		

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	(check all that apply)	☒ Confidential ☐ Other, specify:
	Protective Measures (check all that apply)	☒ Technical Security ☒ Identity Authorization and Authentication ☒ Physical Security ☒ Backup and Recovery ☒ Other, specify: Advanced Encryption Systems (AES)
Data Management	Data Owner	Name: Stephanie Perez
		Title: COAC Health Information Mangament Lead
		Business Program: Patient Registration
Data Custodian		Name: Rich Desideri
		Title: ADT Lead
		Business Program: Technology Services Division

Function: Registration

Business Function/Process(es)		Patient Registration (PaRTS)		
Application, System or Component		**Patient Registration Tracking System (PaRTS)**		
COTS, MOTS or Custom		☐ Commercial off-the-shelf (COTS) ☐ Modified off-the-shelf (MOTS) ☒ Custom application		
Runtime Environment	Name/Primary Technology:			
	Cloud Computing Used?	☐ Yes ☒ No	If "Yes," specify:	☐ Software as a Service (SaaS) ☐ Platform as a Service (PaaS) ☐ Infrastructure as a Service (IaaS)
	Server/Device Function	Application Server		
	Hardware	Physical		
	Operating System	Windows 2012R2		
	System Software	Microsoft Dynamics 365		
System Interfaces		ADT		
Data Center Location		☐ State Data Center host at CDT ☒ Agency/state data center operated by Agency/state entity ☐ Commercial Data Center ☐ Other		
	Other, specify			
Security	Access (check all that apply)	☐ Public ☒ Internal State Staff ☐ External State Staff ☐ Other, specify:		
	Type of Information (check all that apply)	☒ Personal ☒ Health ☐ Tax ☒ Financial ☒ Legal ☒ Confidential ☐ Other, specify:		
	Protective Measures (check all that apply)	☒ Technical Security ☒ Identity Authorization and Authentication ☒ Physical Security ☒ Backup and Recovery ☒ Other, specify: Advanced Encryption Systems (AES)		
Data Management	Data Owner	Name: Janna Lowder		
		Title: Staff Services Manager III		
		Business Program: Research Evaluation & Data		

Data Custodian		Name: Jay Williams Title: Chief, Data Management Office Business Program: Technology Services Division

Function: Registration

Business Function/Process(es)		Patient Registration (BEDS)		
Application, System or Component		**Bed Management (BEDS)**		
COTS, MOTS or Custom		☐ Commercial off-the-shelf (COTS) ☐ Modified off-the-shelf (MOTS) ☒ Custom application		
Name/Primary Technology:		BEDS		
Runtime Environment	Cloud Computing Used?	☐ Yes ☒ No	If "Yes," specify:	☐ Software as a Service (SaaS) ☐ Platform as a Service (PaaS) ☐ Infrastructure as a Service (IaaS)
	Server/Device Function	Application Server		
	Hardware	Physical		
	Operating System	Windows 2012R2		
	System Software	Microsoft Dynamics 365		
System Interfaces		ADT, PaRTS		
Data Center Location		☐ State Data Center host at CDT ☒ Agency/state data center operated by Agency/state entity ☐ Commercial Data Center ☐ Other		
	Other, specify			
Security	Access (check all that apply)	☐ Public ☒ Internal State Staff ☐ External State Staff ☐ Other, specify:		
	Type of Information (check all that apply)	☒ Personal ☒ Health ☐ Tax ☒ Financial ☒ Legal ☒ Confidential ☐ Other, specify:		
	Protective Measures (check all that apply)	☒ Technical Security ☒ Identity Authorization and Authentication ☒ Physical Security ☒ Backup and Recovery ☒ Other, specify: Advanced Encryption Systems (AES)		
Data Management	Data Owner	Name: Janna Lowder Title: Staff Services Manager III Business Program: Research Evaluation & Data		
Data Custodian		Name: Jay Williams Title: Chief, Data Management Office Business Program: Technology Services Division		

Function: Registration

Business Function/Process(es)	Data Management
Application, System or Component	**Operational Data Store (ODS)**

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COTS, MOTS or Custom		☐ Commercial off-the-shelf (COTS)	☐ Modified off-the-shelf (MOTS)	☒ Custom application
Name/Primary Technology:		BEDS		
Runtime Environment	Cloud Computing Used?	☐ Yes ☒ No	If "Yes," specify:	☐ Software as a Service (SaaS) ☐ Platform as a Service (PaaS) ☐ Infrastructure as a Service (IaaS)
	Server/Device Function	Database Server		
	Hardware	Physical		
	Operating System	Windows 2012R2		
	System Software	SQL		
System Interfaces		ADT, PaRTS, WaRMSS, hospital systems		
Data Center Location		☐ State Data Center host at CDT ☒ Agency/state data center operated by Agency/state entity ☐ Commercial Data Center ☐ Other		
	Other, specify			
Security	Access (check all that apply)	☐ Public ☒ Internal State Staff ☐ External State Staff ☐ Other, specify:		
	Type of Information (check all that apply)	☒ Personal ☒ Health ☐ Tax ☐ Financial ☐ Legal ☒ Confidential ☐ Other, specify:		
	Protective Measures (check all that apply)	☒ Technical Security ☒ Identity Authorization and Authentication ☒ Physical Security ☒ Backup and Recovery ☒ Other, specify: Advanced Encryption Systems (AES)		
Data Management	Data Owner	Name: Rob Schaufenbil		
		Title: Assistant Deputy Director, Clinical Operations		
		Business Program: Clinical Operations		
Data Custodian		Name: Chad Corrin		
		Title: Chief Technology Officer		
		Business Program: Technology Services Division		

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Function: Pharmacy

Business Function/Process(es)		Pharmacy Operations		
Application, System or Component		**Pharmacy Hospital Operations (PHO)**		
COTS, MOTS or Custom		☐ Commercial off-the-shelf (COTS) ☐ Modified off-the-shelf (MOTS) ☒ Custom application		
Name/Primary Technology:		PHO		
Runtime Environment	Cloud Computing Used?	☐ Yes ☒ No	If "Yes," specify:	☐ Software as a Service (SaaS) ☐ Platform as a Service (PaaS) ☐ Infrastructure as a Service (IaaS)
	Server/Device Function	Mainframe		
	Hardware	Mainframe Servers		
	Operating System	z/OS		
	System Software	Natural Programming Language, ADABAS DBMS		
System Interfaces		ADT		
Data Center Location		☒ State Data Center host at CDT ☐ Agency/state data center operated by Agency/state entity ☐ Commercial Data Center ☐ Other		
	Other, specify			
Security	Access (check all that apply)	☐ Public ☒ Internal State Staff ☐ External State Staff ☐ Other, specify:		
	Type of Information (check all that apply)	☒ Personal ☒ Health ☐ Tax ☒ Financial ☒ Legal ☒ Confidential ☐ Other, specify:		
	Protective Measures (check all that apply)	☒ Technical Security ☒ Identity Authorization and Authentication ☒ Physical Security ☒ Backup and Recovery ☐ Other, specify:		
Data Management	Data Owner	Name: Uyen Nguyen		
		Title: Clinical Operations Advisory Council Pharmacist		
		Business Program: Pharmacy Operations		
Data Custodian		Name: Lisa Chuck		
		Title: IT Specialist I		
		Business Program: Technology Services Division		

Function: Pharmacy

Business Function/Process(es)	Pharmacy Operations
Application, System or Component	**Medication Therapy Management (MTM)**
COTS, MOTS or Custom	☐ Commercial off-the-shelf (COTS) ☐ Modified off-the-shelf (MOTS) ☒ Custom application

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Name/Primary Technology:		MTM		
Runtime Environment	Cloud Computing Used?	☐ Yes ☒ No	If "Yes," specify:	☐ Software as a Service (SaaS) ☐ Platform as a Service (PaaS) ☐ Infrastructure as a Service (IaaS)
	Server/Device Function	Windows servers		
	Hardware	Physical		
	Operating System	Windows		
	System Software	.Net, C#, SQL		
System Interfaces		None		
Data Center Location		☒ State Data Center host at CDT ☒ Agency/state data center operated by Agency/state entity ☐ Commercial Data Center ☐ Other		
	Other, specify			
Security	Access (check all that apply)	☐ Public ☒ Internal State Staff ☐ External State Staff ☐ Other, specify:		
	Type of Information (check all that apply)	☒ Personal ☒ Health ☐ Tax ☐ Financial ☐ Legal ☒ Confidential ☐ Other, specify:		
	Protective Measures (check all that apply)	☒ Technical Security ☒ Identity Authorization and Authentication ☒ Physical Security ☒ Backup and Recovery ☐ Other, specify:		
Data Management	Data Owner	Name: Uyen Nguyen		
		Title: Clinical Operations Advisory Council Pharmacist		
		Business Program: Pharmacy Operations		
Data Custodian		Name: Jay Williams		
		Title: Chief, Data Management Office		
		Business Program: Technology Services Division		

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Function: Billing			
Business Function/Process(es)		Billing	
Application, System or Component		**Data Systems Group (DSG) and Cost Recovery System (CRS)**	
COTS, MOTS or Custom		☐ Commercial off-the-shelf (COTS) ☐ Modified off-the-shelf (MOTS) ☒ Custom application	
Name/Primary Technology:		DSG, CRS	
Runtime Environment	Cloud Computing Used?	☐ Yes ☒ No	If "Yes," specify: ☐ Software as a Service (SaaS) ☐ Platform as a Service (PaaS) ☐ Infrastructure as a Service (IaaS)
	Server/Device Function	Mainframe	
	Hardware	Mainframe Servers	
	Operating System	z/OS	
	System Software	DB2 Cobol	
System Interfaces		ADT, PHO	
Data Center Location		☒ State Data Center host at CDT ☐ Agency/state data center operated by Agency/state entity ☐ Commercial Data Center ☐ Other	
	Other, specify		
Security	Access (check all that apply)	☐ Public ☒ Internal State Staff ☒ External State Staff ☐ Other, specify:	
	Type of Information (check all that apply)	☒ Personal ☒ Health ☐ Tax ☒ Financial ☒ Legal ☒ Confidential ☐ Other, specify:	
	Protective Measures (check all that apply)	☒ Technical Security ☒ Identity Authorization and Authentication ☒ Physical Security ☒ Backup and Recovery ☐ Other, specify:	
Data Management	Data Owner	Name: Angela Griffith	
		Title: Patient Cost Recovery Section Chief	
		Business Program: Billing	
Data Custodian		Name: Kevin Lanius (DSH), Shaun Wilhelm & Don Chipman (DDS)	
		Title: Unknown, Department of Developmental Services	
		Business Program: Billing	
Function: Clinical Operations			
Business Function/Process(es)		Clinical Operations	
Application, System or Component		**Wellness and Recovery Module Support System (WaRMSS)**	
COTS, MOTS or Custom		☐ Commercial off-the-shelf (COTS) ☐ Modified off-the-shelf (MOTS) ☒ Custom application	
Name/Primary Technology:		WaRMSS	
Runtime Environment	Cloud Computing Used?	☐ Yes ☒ No	If "Yes," specify: ☐ Software as a Service (SaaS) ☐ Platform as a Service (PaaS)

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			☐ Infrastructure as a Service (IaaS)
	Server/Device Function	Windows servers	
	Hardware	Physical	
	Operating System	Windows	
	System Software	ASP, .NET, MS-SQL DB	
System Interfaces		ADT	
Data Center Location		☐ State Data Center host at CDT ☒ Agency/state data center operated by Agency/state entity ☐ Commercial Data Center ☐ Other	
	Other, specify		
Security	Access (check all that apply)	☐ Public ☒ Internal State Staff ☐ External State Staff ☐ Other, specify:	
	Type of Information (check all that apply)	☒ Personal ☒ Health ☐ Tax ☒ Financial ☒ Legal ☒ Confidential ☐ Other, specify:	
	Protective Measures (check all that apply)	☒ Technical Security ☒ Identity Authorization and Authentication ☒ Physical Security ☒ Backup and Recovery ☐ Other, specify:	
Data Management	Data Owner	Name: Robert Schaufenbil	
		Title: Asst. Deputy Director, Clinical Innovation & Technology	
		Business Program: Clinical Operations	
Data Custodian		Name: Jay Williams	
		Title: Chief, Data Management Office	
		Business Program: Technology Services Division	

Function: Patient Care

Business Function/Process(es)		Patient Care	
Application, System or Component		**Physician Order System (POS)**	
COTS, MOTS or Custom		☐ Commercial off-the-shelf (COTS) ☐ Modified off-the-shelf (MOTS) ☒ Custom application	
	Name/Primary Technology:	POS	
Runtime Environment	Cloud Computing Used?	☐ Yes ☒ No	If "Yes," specify: ☐ Software as a Service (SaaS) ☐ Platform as a Service (PaaS) ☐ Infrastructure as a Service (IaaS)
	Server/Device Function	Application Server	
	Hardware	Physical	
	Operating System	Windows 2012R2	
	System Software	Adabas/Natural	
System Interfaces		PaRTS, ADT, ODS	
Data Center Location		☒ State Data Center host at CDT ☒ Agency/state data center operated by Agency/state entity ☐ Commercial Data Center ☐ Other	

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	Other, specify	
Security	Access (check all that apply)	☐ Public ☒ Internal State Staff ☐ External State Staff ☐ Other, specify:
	Type of Information (check all that apply)	☒ Personal ☒ Health ☐ Tax ☐ Financial ☐ Legal ☒ Confidential ☐ Other, specify:
	Protective Measures (check all that apply)	☒ Technical Security ☒ Identity Authorization and Authentication ☒ Physical Security ☒ Backup and Recovery ☒ Other, specify: Advanced Encryption Systems (AES)
Data Management	Data Owner	Name: Amarpreet Singh
		Title: Assistant Medical Director, DSH-Napa
		Business Program: Clinical Operations, DSH-Napa
Data Custodian		Name: Steve Rodgers
		Title: : IT Specialist II
		Business Program: Technology Services Division

Function: Patient Care

Business Function/Process(es)			Patient Care
Application, System or Component			**Behavioral Health Assistance Module (BHAM)**
COTS, MOTS or Custom			☐ Commercial off-the-shelf (COTS) ☐ Modified off-the-shelf (MOTS) ☒ Custom application
	Name/Primary Technology:		BHAM
Runtime Environment	Cloud Computing Used?	☐ Yes ☒ No	If "Yes," specify: ☐ Software as a Service (SaaS) ☐ Platform as a Service (PaaS) ☐ Infrastructure as a Service (IaaS)
	Server/Device Function		Application Server
	Hardware		Physical
	Operating System		Windows 2012 R2
	System Software		Microsoft Dynamics 365, C#
System Interfaces			PaRTS, ADT, ODS
Data Center Location			☐ State Data Center host at CDT ☒ Agency/state data center operated by Agency/state entity ☐ Commercial Data Center ☐ Other
	Other, specify		
Security	Access (check all that apply)		☐ Public ☒ Internal State Staff ☐ External State Staff ☐ Other, specify:
	Type of Information (check all that apply)		☒ Personal ☒ Health ☐ Tax ☒ Financial ☒ Legal ☒ Confidential ☐ Other, specify:
	Protective Measures (check all that apply)		☒ Technical Security ☒ Identity Authorization and Authentication ☒ Physical Security ☒ Backup and Recovery ☒ Other, specify: Advanced Encryption Systems (AES)

Data Management	Data Owner	Name: Rob Schaufenbil Title: Assistant Deputy Director of Clinical Operations Business Program: Clinical Operations
Data Custodian		Name: Steve Rodgers Title: : IT Specialist II Business Program: Technology Services Division

2.5.4 Current Architecture Diagram

See Attachments: .2.5.4.1 through 2.5.4.6 – Data Architecture

2.5.5 Security Categorization Impact Table

See Attachment 2.5.5 – Security Categorization Table

SECURITY CATEGORIZATION IMPACT TABLE SUMMARY

SECURITY OBJECTIVE	LOW	MODERATE	HIGH
Confidentiality	☐	☒	☐
Integrity	☐	☐	☒
Availability	☐	☐	☒

2.6 Mid-Level Solution Requirements

See Attachment 2.6 – Mid-Level Solution Requirements

2.7 Assumptions and Constraints

Assumptions/Constraints	Description/Potential Impact
Scope, objectives, roles and responsibilities, and approach are agreed to and understood by all parties within the project governance structure (e.g. SME task forces, steering committee)	Project Governance will define scope, objectives, roles, and responsibilities for those involved in the project, and will provide direction for how to resolve discrepancies in individual hospital practices to plan a future business practice, policy, and procedure.
All facilities have adequate wide-area networking capabilities and infrastructure to support this effort.	Financial impact of this assumption is low to none as the Medical Grade Network project is already complete, providing necessary redundancies to support related network connectivity.
Existing Local Area Networks (LAN) and Wide Area Network (WAN) infrastructure will be used where possible.	Contingent on vendor selection, DSH will evaluate need for additional network coverage and expand as required. Adequacy of wireless network capacity will be a constraint when EHR initially goes live.
DSH executive management and all staff are engaged and committed to the success of this project.	Without stakeholder buy-in and executive sponsorship, DSH risks adoption difficulties.
The project will adhere to a formal schedule.	Keeping to a formal project schedule is necessary given the size and financial impact of the project but will be a challenge due to future funding uncertainty.
Bi-directional communication between project team and stakeholders throughout the organization regarding project goals and implementation will occur.	Bi-directional communication is critical for ensuring business objectives are met and adoption causing minimal disruption.

Qualified DSH project staff have been identified and committed to this project.	Given the scope and impact of the project, experienced project staff and outside consultants, as appropriate, will help mitigate risk.
A project infrastructure will be defined and maintained throughout the project duration.	Project infrastructure will be reviewed periodically with senior TSD managers, clinical leadership, and infrastructure personnel as well as external agencies.
The project team will identify and manage project risks and issues thorough the project life cycle.	Risk and issue management will be ongoing throughout the project, and a project manager will serve as risk manager. A risk and issue log shall be maintained and reviewed on a regular basis.
Appropriate DSH clinical and technical resources are available and will be allocated to this project as required.	DSH clinical and technical resource availability may be limited at different project intervals due to 24/7/365 nature of the state hospital setting.
Supporting contracts and procurements will be completed on schedule.	Delays in contracts and procurements will create overall project delays. Project planning funds for a designated contract manager were appropriated in the BCP.
The project implementation will minimize disruptions to daily operations.	DSH will establish a "clinical cutover" plan and other transitional business processes to minimize disruption of daily operations.
Organizational change management activities will speed adoption and help mitigate organizational disruption.	DSH, assisted by OCM consultants, will create an organizational change management plan to prepare staff and systems to mitigate the impact of large scale change. DSH will leverage its Office of Communications to assist with organizational change management.
DSH-developed or 3rd party systems (e.g., BHAM, Eaglesoft) will integrate and exchange real-time data with the Electronic Health Record solution.	Without integration and real-time data exchange between internally developed or 3rd party systems, DSH will have a bifurcated health record and/or data synchronization issues.
DDS will not close down their developmental centers and subsequently their billing system (CRS and DSG/Experian Healthcare) before this project is implemented.	Without the CRS billing system from DDS, DSH would have no effective way of billing services prior to EHR project implementation. Experian has agreed to extend its contract with DDS for an additional period of time.

2.8 Dependencies

See Attachment 2.8 – DSH Reportable Projects Roadmap

Element	Description
Wireless Local Area Network (WLAN) Optimization	When EHR goes live in DSH hospitals, the demand for business uses of wireless communication will grow dramatically (greater use of mobile devices, wireless medical devices, and general access to the network where network cabling is insufficient). This will require much greater capacity of the hospitals' WLANs, which were originally designed for the Personal Duress Alarm System (PDAS). To avoid degrading the life-safety system – an essential requirement of the project – DSH is currently assessing means of optimizing WLAN capacity. Although not a component of the Continuum-EHR Project, the design and implementation of the optimization effort must be completed prior to the complete roll-out of the EHR solution.
Pharmacy Modernization	Pharmacy Modernization, including supply chain integration, medication dispensing, and inventory management, is a

	necessary component of the success of Continuum. The proposed Continuum-EHR timeline has a "soft" dependency on an Enterprise Service Bus (ESB) and cleansed data availability, which are components of the Pharmacy Modernization Project. However, as shown in Attachment 2.8, the projected completion dates for ESB and cleansed data availability is before the EHR implementation dates. The project team will closely monitor these soft dependencies to ensure minimal impact on the EHR deployment.
Behavioral Health Assistance Module (BHAM)	As part of the Continuum-EHR project, the vendor must include a behavioral health component that meets all the requirements of the DSH Behavioral Health Assistance Module (BHAM) application, which is currently being enhanced with more robust specifications. The complete specifications must be included in the EHR RFP package.
Unified Hospital Communications (UHC)	This project will supplement the current PDAS with an audible alert system. Although there is no direct impact on EHR, there may be conflicts in scheduling physical alterations on a hospital-by-hospital basis and there will be mutual demands on network staff resources.
Centralized Enterprise Data Management System (CEDMS)	This project will implement a central data management system for DSH, DDS, and HHSA in Sacramento. Although there is no direct impact on EHR, there may be competing demands for network staff and other technology resources.

2.9 Market Research

2.9.1 Market Research Methodologies/Timeframes

Methodologies Used To Perform Market Research (check all that apply):

☒ Request for Information (RFI)	☐ Trade shows
☒ Internet Research	☒ Published Literature
☒ Vendor Forums/Presentation	☐ Leveraged Agreements
☒ Collaboration with other Agencies/state entities or governmental entities	☒ Other, specify: Gartner Research analyst

Time spent conducting market research:	**Over 5 Years**
Date market research was started:	**1/1/2014**
Date all market research was completed:	**07/14/2020**

2.9.2 Results of Market Research

In 2014, DSH contracted Gartner, a leading information technology research and advisory company, to perform market research, conduct an EHR alternatives assessment, and provide justification to support the procurement of an optimal EHR solution. Gartner's methodology included research and analysis on Commercial Off The Shelf (COTS) EHR systems used in the private sector at health care institutions of comparable size to DSH and COTS EHR systems currently in use at other California State and County agencies. They obtained background information about DSH to clearly understand DSH's EHR strategy, and provided a side-by-side comparison of four commercially available, comparable COTS systems. Gartner excluded heavily customized software, tailor-made software, or any system developed entirely in-house by a

healthcare institution or government agency from their analysis. They then produced a comprehensive justification, describing in detail the stacked ranking with respect to key decision drivers for DSH and the impact to DSH of selecting an EHR system that ranked highest in their analysis. The functionality delivered by the vendors included in Gartner's market research was aligned with DSH needs: EHR management, interoperability, data model, clinical decision support, clinical workflow, clinical documentation and data capture, clinical dashboard, and order management. DSH needed to narrow market research to EHRs that also covered the full continuum of care including acute care, behavioral health, and long-term care. Upon completion, Gartner's analysis was reviewed by both clinical and technical stakeholders including the Clinical Operations Division and Technology Services Division. Although some products may have improved since the completion of the Gartner study in 2014, the basic analysis of DSH's needs and capabilities remains valid. Moreover, the study validated that a COTS product could meet most of DSH's patient management, primary care, pharmacy, and billing requirements.

While Gartner's analysis was comprehensive and informative, it was limited to large industry leaders that ultimately were determined to be very costly to implement. Moreover, some vendors may have substantially improved their products since the Gartner research report. Thus, DSH has expanded the market research strategy to include viable, lower cost, smaller competitor vendors that might meet DSH's needs. 20 small EHR vendors in this market segment have been evaluated, with the field narrowed to a total of 5 vendors for further information gathering to determine if their offered solutions might meet DSH's business needs. Market research on these identified vendors consisted of solution demonstrations and internet research.

It should be noted that DSH continues to look for opportunities to refine and improve its market research, such as reviewing the Post Implementation Evaluation Report for the EHR acquisition project of the California Department of Veterans' Affairs (CalVet) and subsequent conference calls with the CalVet support team. DSH also continues to review market research and vendor information to validate and support its identified conclusions. For example, DSH has toured partner agency facilities such as the California Correctional Health Care Services (CCHCS), reviewed vendor product materials, and investigated leveraging existing state agreements, particularly the CCHCS EHR contract. DSH has also received information on an internal study conducted by the National Research Institute (NRI) of the National State Mental Health Program Directors (NSMHPD) that indicated a very low satisfaction level by state mental health agencies with their EHR solutions, particularly the Commercial Off-the-Shelf (COTS) behavioral health modules.

On January 2, 2018, DSH released a Request for Information (RFI) with a February 16, 2018 deadline for submission of responses from interested vendors. DSH received RFI responses from 8 companies, 3 of which were non-EHR vendors who did not meet DSH's requirements as set forth in the RFI. The remaining 5 vendor responses were reviewed and the number of requirements met and service level options from each vendor were analyzed and tallied for side-by-side comparison. Demonstrations from each vendor were scheduled between March and May 2018 at DSH headquarters in Sacramento, with stakeholders from all DSH facilities attending remotely. Questions from stakeholders and responses from vendors will be used to develop a RFP and to continually refine mid-level requirements. The results of this RFI demonstrated that most vendors could meet most of DSH's requirements, though varying degrees of customization may be needed. Based on these results, DSH developed a Recommended Solution that is based upon and built around a COTS EHR product.

In April 2019, DSH released a subsequent RFI that was targeted to System Integrators (SI), consultants, and the 5 EHR software vendors who responded to the first RFI. This RFI sought cost estimates for independently executing the behavioral health (BHAM) enhancements or integrating the BHAM requirements with the primary care COTS EHR, building interfaces to other internal and external systems used by DSH to compile the overall patient health record, creating a central patient scheduling system, and conducting a pilot or Proof of Concept (POC) prior to committing to the full implementation, as well as re-estimating the cost of implementing the core primary care EHR. These factors and responses from SIs and consultants had not been requested in the initial RFI. The purpose was to gain an assessment from independent parties who might partner with EHR software vendors on a comprehensive approach to meeting all of the DSH requirements.

DSH held interviews with the RFI respondents in June 2019 to allow the vendors to better explain their assumptions and methodologies so that DSH could more adequately evaluate and estimate the costs of implementing the project components included in the RFI. Respondents were allowed to submit additional information by the end of June related to refining cost estimates, infrastructure and network requirements, and any additional information in response to questions raised during demonstrations and interviews. All of the information received during each of the two phases of the RFI survey was used by DSH to develop estimates of the cost of implementing the Continuum-EHR project and refining requirements and expectations. The project estimates have been incorporated into the Financial Analysis Worksheet (FAW). Although the responding vendors generally believed that it might be possible for a COTS EHR product to be customized to meet the DSH behavioral health requirements, they were uncertain as to the extent of modification that would be required. Consequently, DSH drafted its Recommended Alternative in such a way as to allow discretion by the vendor of how to fulfill the DSH requirements.

Finally, in May 2020, DSH refreshed its previous RFI by providing much greater requirements detail for the behavioral health and scheduling components and sent the updated RFI to the respondents to the 2018 and 2019 RFIs. Responses were received from three EHR vendors (Cerner, Meditech, Meta Healthcare, and NetSmart), all of whom said they could meet the behavioral health requirements through EHR configuration, and two system integrators, who proposed custom add-on solutions for behavioral health. The EHR vendors who had previously provided detailed cost estimates for configuration, development, and hosting within their EHR systems left their previous estimates mostly in tact, though two provided additional cost estimates for the behavioral health customizations. The system integrators provided new estimates of development for a “bolt-on” behavioral health application. The new information received did not result in any changes to solution requirements, since all said they could meet the requirements, and there were no needed changes to project organization. The new cost information was used to develop revised costs for the FAW. In developing cost estimates for EHR development, DSH conservatively decided to use the highest cost estimate for each component.

2.10 Alternative Solutions

2.10.1 Solution Type

☒ **Alternative 1 (Recommended)**

2.10.2 Name

Hosted COTS Core Medical EHR Integrated with DSH-Driven Forensic Behavioral Health Requirements

2.10.3 Description

This alternative proposes to procure a commercial off-the-shelf (COTS) medical electronic health record solution that includes a Behavioral Health component that meets all of the DSH-developed forensic behavioral health requirements and that may be updated as necessary by DSH staff. The method of meeting the requirements will be determined by the vendor so long as it seamlessly integrates the behavioral health component with the medical EHR giving the user the appearance that it is a single application. DSH will require a prime or lead vendor for a comprehensive proposal. This may be an EHR software vendor doing its own system integration or it may be a combination of a consulting system integration firm partnered with an EHR software vendor. Either configuration is acceptable so long as one firm is designated as the lead or prime contractor. The estimated cost of this Alternative was derived from the information received from vendors responding to the RFIs conducted during the market research phase. DSH expects to employ a phased implementation, in which one hospital would be treated as a pilot for subsequent deployment to the other hospitals. This approach is supported by research conducted by the National Association of State Mental Health Program Directors Research Institute (NRI) of EHR implementation and experience of all 41 State Hospital systems in the United States who currently have an EHR system. The research pointed out several areas of dissatisfaction based on each system’s need for customization required to meet the unique needs of an in-patient psychiatric population. As a result, over 56% of states would not recommend their EHR/vendors to others. Further market research and dialogue with several other systems strongly indicates that the behavioral health modules in standard COTS EHR offerings will not meet the full requirements of the DSH Continuum project.

In addition to a behavioral health component that meets specific DSH requirements (DSH market research has indicated that no commercial EHR can meet DSH requirements out-of-the-box), the Continuum-EHR project will include the following components:

(1) A patient master calendar/scheduler that will interface with other calendars, including the DSH Dental application, court calendars, and other external calendars to avoid patient scheduling conflicts and to allow group treatment sessions.
(2) Data analytics capability, possibly as part of a data warehouse, that will allow statistical analysis of health care and treatment trends of patients.
(3) Migration of legacy data that must be incorporated into the EHR and the behavioral health component if it is a separate application.
(4) A pilot or Proof of Concept (POC) phase during which the vendor must demonstrate the most critical required functionality and integration.

The EHR scope will include the following functions which are believed to be common to a standard COTS EHR solution: Computerized Physician Order Entry (CPOE), Electronic Medication Administration Record, Pharmacy Orders, Point of Care Medication Administration, Document Management, Medical Provider Documentation, Medication Reconciliation, Chronic Condition Management, Billing, Picture Archiving Communication System (PACS), Labs, Radiology, and Health Information Management (HIM). These functions are all critical to implementing a closed-loop system that will achieve the stated business objectives while benefitting from the costly and time-consuming research and development that commercial vendors have performed to refine their products. Implementing these functions from a COTS solution also shortens implementation time as staff do not need to wait for systems to be developed from scratch by internal developers who do not possess expertise in developing complex EHR software solutions.

Approach (Check all that apply)**:**	
☒	Increase staff – new or existing capabilities
☒	Modify the existing business process or create a new business process
☐	Reduce the services or level of services provided
☒	Utilize new or increased contracted services
☐	Enhance the existing IT system
☐	Create a new IT system
☒	Perform a business-based procurement to have vendors propose a solution
☐	Other, specify:

2.10.4 Benefit Analysis

Benefits/Advantages

- Enables quick access to patient records for more coordinated, efficient care
- Meets business objectives for areas of most urgent, critical need while providing a complete medical solution, including closed-loop pharmacy and clinician documentation
- Phased implementation reduces amount of business disruption and high impact organizational change
- Faster development and implementation relative to fully custom development allows DSH to reap the benefits of EHR sooner
- Retains some ability to configure to DSH needs
- Helps promote legible, complete documentation and accurate, streamlined coding and billing
- Maximizes number of business objectives achieved
- Solution research and development costs, time, and risks transferred to COTS vendor
- Enhances privacy and security of patient data
- Remote hosting service uptime consistent with EHR industry standards
- Service level agreement allows for support and maintenance provided by vendor, reducing burden on DSH

- Potential for health information exchange with other hospitals and facilities

Disadvantages

- Makes DSH responsible for application integration costs & COTS solution customization
- The use of COTS solutions may require some process and workflow changes, and also some features and functions may have to be separately procured or built and then integrated with the core EHR, as available COTS solutions may not be a perfect fit for DSH's model of care (ambulatory medical care in an inpatient setting)
- Increased reliance on consultants and contractors for specialty skillsets for integration, configuration, and implementation
- Requires an increased complement of additional staff to provide 24/7/365 system maintenance and support, with additional training required to assume functions completed by contractors and consultants
- Customizations of COTS, creates increased risks to the underlying software potentially leading to performance issues

	Objective Timeframe				
Objective Number	**Within 1 Year**	**2 Years**	**3 Years**	**4 Years**	**Over 4 Years**
1.1	☒	☐	☐	☐	☐
1.2	☒	☐	☐	☐	☐
2.1	☒	☐	☐	☐	☐
2.2	☒	☐	☐	☐	☐
2.3	☒	☐	☐	☐	☐
3.1	☒	☐	☐	☐	☐
3.2	☒	☐	☐	☐	☐
3.3	☒	☐	☐	☐	☐
3.4	☒	☐	☐	☐	☐
3.5	☒	☐	☐	☐	☐
4.1	☒	☐	☐	☐	☐
4.2	☒	☐	☐	☐	☐
4.3	☒	☐	☐	☐	☐
5.1	☒	☐	☐	☐	☐
5.2	☒	☐	☐	☐	☐
5.3	☒	☐	☐	☐	☐

	Anticipated Time to Achieve Financial Benefits After Project Go-Live				
Financial Benefit	Within 1 Year	2 Years	3 Years	4 Years	Over 4 Years
Increased Revenues	☐	☒	☐	☐	☐
Cost Savings	☐	☐	☐	☐	☒
Cost Avoidance	☐	☒	☐	☐	☐
Cost Recovery	☐	☒	☐	☐	☐

2.10.5 Assumptions and Constraints

- Vendor costs submitted with their RFI responses are reasonable estimates
- DSH network capacity including Wi-Fi access will be adequate or can be increased if necessary
- Interface possible with DSH Active Directory and Security Assertion Markup Language (SAML) compliant
- Runs on Windows 10 Operating System and applicable service pack upgrades

- Direct connection with redundancy and network connectivity with point-to-point VPN is available
- Network segmentation for end-user devices is provided
- Ability to log, view, and audit system access (e.g., records access)
- Business does not need to scan files for previously discharged patients and only scan important historical documents from currently admitted patients
- An Enterprise Service Bus will be acquired and deployed that will be used to effectively and efficiently integrate all solutions
- Integrates with external PACS
- Data centers and data transmissions through domestic methods/channels only – no offshore data storage or transmission is necessary
- The state is able to find qualified state resources to perform customization and maintain the COTS
- Data conversion and migration can be successfully performed by state staff, with vendor assistance
- Solution is HIPAA/HITECH compliant and ONC certified
- Refer to section 2.7 for general assumptions and constraints

2.10.6 Implementation Approach

Identify the type of existing IT system enhancement or new system proposed (check all that apply)**:**

- ☐ Enhance the current system
- ☐ Develop a new custom solution
- ☒ Purchase a Commercial off-the-Shelf (COTS) system
- ☐ Purchase or obtain a system from another government agency (Transfer)
- ☐ Subscribe to a Software as a Service (SaaS) system
- ☐ Other, specify:

Identify cloud services to be leveraged (check all that apply)**:**

- ☐ Software as a Service (SaaS) provided by OTech
- ☒ Software as a Service (SaaS) provided by commercial vendor
- ☒ Platform as a Service (PaaS) provided by OTech
- ☒ Platform as a Service (PaaS) provided by commercial vendor
- ☒ Infrastructure as a Service (IaaS) provided by OTech
- ☒ Infrastructure as a Service (IaaS) provided by commercial vendor
- ☐ No cloud services will be leveraged by this alternative. Provide a description of why cloud services are not being leveraged:

Identify who will modify the existing system or create the new system (check all that apply)**:**

- ☒ Agency/state entity IT staff
- ☒ A vendor will be contracted
- ☐ Inter-agency agreement will be established with another governmental agency. Specify Agency name(s):
- ☐ Other, specify:

Identify the implementation strategy:

- ☐ All requirements will be addressed in this proposed project in a single implementation.
- ☒ Requirements will be addressed in incremental implementations in this proposed project.
- ☐ Some requirements will be addressed in this proposed project. The remaining requirements will be addressed at a later date.
  Specify the year when the remaining requirements will be addressed:

Identify if the technology for the proposed project will be mission critical and public facing:

☐ The technology implemented for this proposed project will be considered mission critical and public facing.

2.10.7 Architecture Information

Business Function/Process(es)		Patient Registration, Pharmacy Operations, Billing, Clinical Operations, Behavioral Health		
Application, System or Component		COTS Medical EHR with additional Forensic Behavioral Health Applications which are COTS or Custom depending on market capabilities		
COTS, MOTS or Custom		Commerical off-the-shelf (COTS)		
	Name/Primary Technology:	EHR		
Runtime Environment	Cloud Computing Used?	☒ Yes ☐ No	If "Yes," specify:	Software as a Service (SaaS)
	Server/Device Function	Cloud SaaS		
	Hardware	Cloud SaaS		
	Operating System	Cloud SaaS		
	System Software	Cloud SaaS		
	System Interfaces	REST/Web Services, HL7 Messaging, Other API calls		
System Interfaces				
Data Center Location	Other, specify	State data center operated by department of Technology		
Security	Access (check all that apply)	☐ Public ☒ Internal State Staff ☐ External State Staff ☒ Other, specify: Auditors upon request		
	Type of Information (check all that apply)	☒ Personal ☒ Health ☐ Tax ☒ Financial ☒ Legal ☒ Confidential ☐ Other, specify:		
	Protective Measures (check all that apply)	☒ Technical Security ☒ Identity Authorization and Authentication ☒ Physical Security ☒Backup and Recovery ☐ Other, specify:		
Data Management	Data Owner	Name: Dr. Katherine Warburton		
		Title: Deputy Director		
		Business Program: Clinical Operations		
Data Custodian		Name: Thuan Ngo		
		Title: Enterprise Applications Chief		
		Business Program: Technology Services Division		

2.10.1 Solution Type

☒ **Alternative #2**

2.10.2 Name

Hosted COTS (or MOTS) that includes a custom internal vendor-developed behavioral health module

2.10.3 Description

Under this Alternative, which was rejected as the Recommended Alternative, DSH would procure a COTS EHR system and would engage the vendor to supplement the standard system with a custom-developed behavioral health module that would meet all the DSH forensic and treatment process requirements. This is based upon a determination that the standard vendor COTS behavioral health module cannot be configured to meet the DSH forensic health treatment pathway requirements. Effectively, this would make the product a Modified Off-the-Shelf (MOTS) EHR because custom modifications to the vendor's source code would be required for the integrated module. The behavioral health modules

incorporated into current commercial EHR products, where they exist at all, are not designed for forensic use and the special classes of forensic patients, treatment protocols, and mandated reporting timelines used by DSH. In addition, DSH would have to make network upgrades necessary to accommodate the EHR solution and wireless devices that would be needed to enhance efficiency and patient care. The system acquisition would also include a pilot phase during which the vendor must demonstrate all of the required functionality and integration. The estimated cost of this Alternative was derived from the information received from vendors responding to the RFIs conducted during the market research phase.

The following functions would be purchased and implemented from a COTS EHR solution: Computerized Physician Order Entry, Electronic Medication Administration Record, Pharmacy operations, Point of Care Medication Administration, Document Management, Medical Provider Documentation, Medication Reconciliation, Chronic Condition Management, Billing, Picture Archiving Communication System (PACS), Labs, Radiology, and Health Information Management. These functions are all critical to implementing a closed-loop system that will achieve the stated business objectives while benefitting from the costly and time-consuming research and development that commercial vendors have performed to refine their products.

The vendor's development team would then integrate a custom behavioral health module into the COTS EHR product, incorporating all BHAM specifications, requirements, and functionality that fulfill the following business functions: Forensic Behavioral Health Documentation, Patient Scheduling (including group treatment sessions), Treatment Planning and Pathways, Reporting And Quality Improvement, and Bed Utilization Management. This alternative is essentially the same as the Recommended Alternative (Alternative No. 1) except that the custom behavioral health module would be required to be externally developed as a custom application and interfaced with the COTS solution. This is based on an assumption that the functionality cannot be reproduced through configuration of a COTS product.

Approach (Check all that apply)**:**	
☒	Increase staff – new or existing capabilities
☒	Modify the existing business process or create a new business process
☒	Reduce the services or level of services provided
☒	Utilize new or increased contracted services
☐	Enhance the existing IT system
☒	Create a new IT system
☐	Perform a business-based procurement to have vendors propose a solution
☐	Other, specify:

2.10.4 Benefit Analysis

Benefits/Advantages

- Integrates with COTS solution(s) to handle forensic behavioral health documentation in a manner consistent with the EHR functions because the behavioral health module is created by the EHR vendor
- Helps promote legible, complete documentation and accurate, streamlined coding and billing
- Maximizes number of business objectives achieved
- Solution research and development costs, time, and risks transferred to COTS vendor
- Enhances privacy and security of patient data
- Remote hosting service uptime consistent with EHR industry standards
- Service level agreement allows for support and maintenance provided by vendor, reducing burden on DSH
- Potential for health information exchange with other hospitals and facilities
- Allows for locally developed systems customized to DSH's forensic business needs to be integrated with a modern electronic health record application

Disadvantages

- Increased reliance on consultants and contractors for specialty skillsets for integration, configuration, and implementation

- Requires an increased complement of additional staff to provide 24/7/365 system maintenance and support, with additional training required to assume functions completed by contractors and consultants
- COTS solution, BH module, and DSH homegrown applications must be able to exchange data in real-time, which increases project complexity
- Requires custom solution to meet behavioral health requirements, which would have a highly negative effect on future upgrades, since standard vendor upgrades could not be applied directly to the custom components.
- Customizations of COTS, creates increased risks to the underlying software potentially leading to performance issues

Anticipated Time to Achieve Objectives After Project Go-Live					
	Objective Timeframe				
Objective Number	Within 1 Year	2 Years	3 Years	4 Years	Over 4 Years
1.1	☒	☐	☐	☐	☐
1.2	☒	☐	☐	☐	☐
2.1	☒	☐	☐	☐	☐
2.2	☒	☐	☐	☐	☐
2.3	☒	☐	☐	☐	☐
3.1	☒	☐	☐	☐	☐
3.2	☒	☐	☒	☐	☐
3.3	☒	☐	☐	☐	☐
3.4	☒	☐	☐	☐	☐
3.5	☒	☐	☐	☐	☐
4.1	☒	☐	☐	☐	☐
4.2	☒	☐	☐	☐	☐
4.3	☒	☐	☐	☐	☐
5.1	☐	☒	☐	☐	☐
5.2	☐	☒	☐	☐	☐
5.3	☐	☒	☐	☐	☐

Anticipated Time to Achieve Financial Benefits After Project Go-Live					
Financial Benefit	Within 1 Year	2 Years	3 Years	4 Years	Over 4 Years
Increased Revenues	☐	☐	☐	☐	☒
Cost Savings	☐	☐	☐	☐	☒
Cost Avoidance	☐	☐	☐	☐	☒
Cost Recovery	☐	☐	☐	☐	☒

2.10.5 Assumptions and Constraints

- EHR can integrate with or replace DSH internal systems such as BEDS, PaRTS, WaRMSS, ADT, and BHAM
- DSH network capacity including Wi-Fi access can be adequately increased
- Runs on Windows 10 Operating System and applicable service pack upgrades
- Network segmentation is possible for end-user devices
- Ability to log, view, and audit system access (e.g., records access)

- Important historical documents can be scanned from current record and made available electronically
- An Enterprise Service Bus will be acquired and deployed that will be used to effectively and efficiently integrate all solutions
- Integrates with external PACS
- Data centers and data transmissions are supported through domestic methods/channels only – no offshore data storage or transmission
- The state is able to find qualified state resources to perform customization and maintain the COTS
- Data conversion and migration can be successfully performed by state staff, with vendor assistance
- Solution is HIPAA/HITECH compliant and ONC certified
- Refer to section 2.7 for general assumptions and constraints

2.10.6 Implementation Approach

Identify the type of existing IT system enhancement or new system proposed (check all that apply)**:**

☐ Enhance the current system
☒ Develop a new custom solution
☒ Purchase a Commercial off-the-Shelf (COTS) system
☐ Purchase or obtain a system from another government agency (Transfer)
☐ Subscribe to a Software as a Service (SaaS) system
☐ Other, specify:

Identify cloud services to be leveraged (check all that apply)**:**

☐ Software as a Service (SaaS) provided by OTech
☒ Software as a Service (SaaS) provided by commercial vendor
☒ Platform as a Service (PaaS) provided by OTech
☒ Platform as a Service (PaaS) provided by commercial vendor
☒ Infrastructure as a Service (IaaS) provided by OTech
☒ Infrastructure as a Service (IaaS) provided by commercial vendor
☐ No cloud services will be leveraged by this alternative. Provide a description of why cloud services are not being leveraged:

Identify who will modify the existing system or create the new system (check all that apply)**:**

☐ Agency/state entity IT staff
☒ A vendor will be contracted
☐ Inter-agency agreement will be established with another governmental agency. Specify Agency name(s):

☒ Other, specify: Agency/state entity IT staff will be able to configure the system but not customize it.

Identify the implementation strategy:

☐ All requirements will be addressed in this proposed project in a single implementation.
☒ Requirements will be addressed in incremental implementations in this proposed project.
☐ Some requirements will be addressed in this proposed project. The remaining requirements will be addressed at a later date.
Specify the year when the remaining requirements will be addressed:

Identify if the technology for the proposed project will be mission critical and public facing:

☐ The technology implemented for this proposed project will be considered mission critical and public facing.

2.10.7 Architecture Information

Business Function/Process(es)	Patient Registration, Pharmacy Operations, Billing, Primary Care, Behavioral Health, & Complete EHR functionality

Select + to add a business process with the same application, system, or component; COTS, MOTS or custom solution; runtime environment; system interfaces, data center location; and, security.

Application, System or Component		Leverage vendor's Commercial Off-the-Shelf EHR Solution Integrated with vendor-developed forensic Behavioral Health application		
COTS, MOTS or Custom		Modified off-the-shelf (MOTS)		
	Name/Primary Technology:	EHR		
Runtime Environment	Cloud Computing Used?	☒ Yes ☐ No	If "Yes," specify:	Software as a Service (SaaS)
	Server/Device Function	Vendor will specify		
	Hardware	Vendor will specify		
	Operating System	Vendor will specify		
	System Software	Vendor will specify		
System Interfaces		Web Services		
Data Center Location	Other, specify	Commercial data center		
Security	Access (check all that apply)	☐ Public ☒ Internal State Staff ☒ External State Staff ☒ Other, specify: Auditors upon request		
	Type of Information (check all that apply)	☒ Personal ☒ Health ☐ Tax ☒ Financial ☒ Legal ☒ Confidential ☐ Other, specify:		
	Protective Measures (check all that apply)	☒ Technical Security ☒ Identity Authorization and Authentication ☒ Physical Security ☒Backup and Recovery ☐ Other, specify:		
Data Management	Data Owner	Name: Dr. Katherine Warburton		
		Title: Deputy Director		
		Business Program: Clinical Operations		
Data Custodian		Name: Thuan Ngo		
		Title: Acting Chief, Enterprise Applications		
		Business Program: Enterprise Application Development		

2.10.1 Solution Type

☒ **Alternative #3**

2.10.2 Name

Build a Custom EHR Solution

2.10.3 Description

This alternative proposes building a custom in-house EHR solution in multiple phases. The first phase would include incorporating the current Admission/Discharge/Transfer (ADT) Program functionality, which assists in registering and discharging patients, and expanding the current Physician Ordering System (POS) which is in use only at DSH-Napa to the four other State hospitals. These applications would have to be converted to newer technology. Because ADT and POS are mainframe applications, they would have to be completely re-written on a more user-friendly platform and user interface for use by clinicians. Outside consultants, familiar with EHR technologies, would be required for the development work.

ADT requires entry by specially-trained HIMD employees who transcribe hand-written notes from clinicians. POS, in its current form, performs computerized physician order entry (CPOE) which allows facilitation of medication orders by providers. The rest of the clinical care – including multidisciplinary documentation, the recording of medication administration, the ordering and viewing of laboratory and radiology tests, and the choosing and accessing of specialty consultation reports – is done manually and entered into a paper chart. Phase 1 would, therefore, result in only minimal EHR functionality. The new EHR would have to integrate with all existing applications, including those resulting

from the Pharmacy Modernization project. In addition, DSH would have to make network upgrades necessary to accommodate the EHR solution and wireless devices that would be needed to enhance efficiency and patient care.

Following Phase 1, which is expected to last a minimum of 1-2 years, DSH's other legacy systems would be enhanced or, more likely, completely replaced, and then implemented as Phase 2 and beyond. This would include the Pharmacy Hospital Operations (PHO) program which fills medication orders, and the Cost Recovery System (CRS) which performs billing. Integration with or replacement of the PaRTS (pre-registration), BEDS (bed utilization), and BHAM (forensic behavioral health) systems would also be completed or replaced during this second phase. All of these legacy applications would need additional functionality to meet modern EHR expectations and regulatory requirements.

Beyond Phase 2, DSH would require additional project phases that would rely upon outside consultants to provide expertise in developing a product roadmap to include other business functionality of a complete EHR product, such as labs, PACS (imaging), Health Information Exchange (HIE) and HL7 interfaces, data analysis, and dental. DSH would possibly need to complete a separate RFP for specialized Health Information Technology (HIT) consulting services needed to complete the remaining phases. DSH staff would provide support, training, and necessary expertise to use and maintain the system, including needing to increase staffing levels to support a 24/7 help desk.

For purposes of cost estimating, it is assumed that the entire implementation project would require four years or more – sufficient to meet the above phasing outline – and that the effort would be comparable to development by a vendor software company of its commercial EHR product or the U.S. Veterans' Administration (USVA) of developing its VISTA EHR. The cost estimate in the Financial Analysis Worksheet for this Alternative is based, therefore, upon the valuation or annual expenditure by a major EHR software company and consideration of the cost and effort expended by the USVA on its EHR system.

Approach (Check all that apply)**:**	
☒	Increase staff – new or existing capabilities
☒	Modify the existing business process or create a new business process
☐	Reduce the services or level of services provided
☒	Utilize new or increased contracted services
☒	Enhance the existing IT system
☒	Create a new IT system
☐	Perform a business-based procurement to have vendors propose a solution
☐	Other, specify:

2.10.4 Benefit Analysis

Benefits/Advantages

- Would not require the purchase of a commercial EHR product so there would possibly be a lower initial (first year) cost to the State
- Able to utilize existing patient registration data via ADT or PaRTS
- Ensures the State would own the software and have control of the application
- Leverages an established, internally developed system of applications
- Would allow for greater customization of systems for DSH's care model
- System updates can be completed and implemented on DSH's project schedule
- Design and functions can be iterated according to developing staff needs via an Agile project methodology

Disadvantages

- Does not provide lab results, specialty consultation, or radiology reports and therefore would not centralize a patient's medical data in one location
- Would require the concomitant use of paper charts to manage patients until all phases are fully deployed, which would be a considerably longer period of dual entries than under the COTS alternatives.
- Substantially increases financial risk to the state by replicating features of commercial EHR products (e.g., CPOE, closed-loop pharmacy) in an internally developed system
- Will not meet all of DSH's business needs as effectively or quickly as a COTS EHR implementation
- Would require multiple development iterations to meet the registration, behavioral health, primary care, or billing business needs of DSH
- Would require specialized contractor(s) to implement Health Information Exchange (HIE) with other agencies (e.g., CONREP, CDCR) or facilities (e.g., external hospitals)
- Requires specialized external technical contractors to rewrite POS, CRS, ADT, and PHO applications to incorporate missing EHR elements such as HIPAA compliance, e-signatures, alienist access portals, revenue cycle, and to keep current with ICD/CPT code changes and The Joint Commission requirements
- Requires a significant number of external clinical subject matter consultants to provide an adequate knowledge base to develop EHR functionality for specialist practice areas (e.g., Cardiology, Podiatry)
- OTech servers, if employed to host the system, may not meet optimal standards for system uptime of EHR solutions (i.e., 99.9+%), compromising patient care and safety
- State would assume all responsibility and liability for the system
- Software development is not a core competency of DSH
- Development time, implementation time, and total cost of ownership could vastly exceed a COTS EHR solution

Select + to add disadvantages

Anticipated Time to Achieve Objectives After Project Go-Live

	Objective Timeframe				
Objective Number	**Within 1 Year**	**2 Years**	**3 Years**	**4 Years**	**Over 4 Years**
1.1	☐	☒	☐	☐	☐
1.2	☐	☒	☐	☐	☐
2.1	☐	☐	☐	☒	☐
2.2	☐	☒	☐	☐	☐
2.3	☐	☐	☐	☒	☐
3.1	☐	☐	☐	☐	☒
3.2	☐	☐	☐	☒	☐
3.3	☐	☐	☒	☐	☐
3.4	☐	☐	☒	☐	☐
3.5	☐	☐	☒	☐	☐
4.1	☐	☐	☒	☐	☐
4.2	☐	☐	☐	☒	☐
4.3	☐	☐	☐	☒	☐
5.1	☐	☒	☐	☒	☐
5.2	☐	☒	☐	☒	☐
5.3	☐	☒	☐	☒	☐

Anticipated Time to Achieve Financial Benefits After Project Go-Live					
Financial Benefit	Within 1 Year	2 Years	3 Years	4 Years	Over 4 Years
Increased Revenues	☐	☐	☐	☐	☒
Cost Savings	☐	☐	☐	☐	☒
Cost Avoidance	☐	☐	☐	☐	☒
Cost Recovery	☐	☐	☐	☐	☒

2.10.5 Assumptions and Constraints

- Necessary business process reengineering will occur for all business areas that will utilize EHR
- DSH will have sufficient numbers and skill sets of staff for development and support of a DSH-developed EHR system that will be rolled out in phases
- CRS continues to be available through DSH's business partner for an extended period of time (or it must be replaced with a newly written application)
- ADT/PHO/POS/CRS updates will be implemented in the same phase
- ADT/PHO/POS/CRS can integrate with PaRTS, BEDS, and BHAM
- The applications will be HL-7, SNOMED, and ICD-10 compliant
- The applications will interface with external business partners
- The state is able to find qualified state resources to perform customization and maintain the COTS
- Data conversion and migration can be successfully performed by state staff, with vendor assistance
- DSH is staffed and capable of providing 24/7 user support
- DSH is able to maintain high availability uptime and level of service

2.10.6 Implementation Approach

Identify the type of existing IT system enhancement or new system proposed (check all that apply)**:**

☒ Enhance the current system
☒ Develop a new custom solution
☐ Purchase a Commercial off-the-Shelf (COTS) system
☐ Purchase or obtain a system from another government agency (Transfer)
☐ Subscribe to a Software as a Service (SaaS) system
☐ Other, specify:

Identify cloud services to be leveraged (check all that apply)**:**

☐ Software as a Service (SaaS) provided by OTech
☐ Software as a Service (SaaS) provided by commercial vendor
☒ Platform as a Service (PaaS) provided by OTech
☐ Platform as a Service (PaaS) provided by commercial vendor
☒ Infrastructure as a Service (IaaS) provided by OTech
☐ Infrastructure as a Service (IaaS) provided by commercial vendor
☐ No cloud services will be leveraged by this alternative. Provide a description of why cloud services are not being leveraged:

Identify who will modify the existing system or create the new system (check all that apply)**:**

☒ Agency/state entity IT staff
☒ A vendor will be contracted
☐ Inter-agency agreement will be established with another governmental agency. Specify Agency name(s):

☐ Other, specify:

Stage 2 Alternatives Analysis

Identify the implementation strategy:

☐ All requirements will be addressed in this proposed project in a single implementation.
☒ Requirements will be addressed in incremental implementations in this proposed project.
☐ Some requirements will be addressed in this proposed project. The remaining requirements will be addressed at a later date.

Specify the year when the remaining requirements will be addressed: 2030

Identify if the technology for the proposed project will be mission critical and public facing:

☐ The technology implemented for this proposed project will be considered mission critical and public facing.

2.10.7 Architecture Information

Business Function/Process(es)		Complete DSH Hospital Operations (including registration, billing, pharmacy, primary medical care, forensic behavioral health, etc.)		
Application, System or Component		Full suite custom EHR		
COTS, MOTS or Custom		Custom application		
	Name/Primary Technology:	EHR		
Runtime Environment	Cloud Computing Used?	☐ Yes ☒ No	If "Yes," specify:	Select...
	Server/Device Function	Windows Server		
	Hardware	Virtual Servers		
	Operating System	Windows		
	System Software	Microsoft Dyanmic CRM, SQL		
System Interfaces		Web Services		
Data Center Location	Other, specify	State data center operated by department of Technology		
Security	Access (check all that apply)	☐ Public ☒ Internal State Staff ☐ External State Staff ☒ Other, specify: Auditors upon request		
	Type of Information (check all that apply)	☒ Personal ☒ Health ☐ Tax ☒ Financial ☒ Legal ☒ Confidential ☐ Other, specify:		
	Protective Measures (check all that apply)	☒ Technical Security ☒ Identity Authorization and Authentication ☒ Physical Security ☒Backup and Recovery ☐ Other, specify:		
Data Management	Data Owner	Name: Katherine Warburton		
		Title: DSH Deputy Director		
		Business Program: DSH Admin		
Data Custodian		Name: Thuan Ngo		
		Title: Enterprise Applications Chief		
		Business Program: Technology Services Division		

Select + to add business functions/processes.

2.11 Recommended Solution

2.11.1 Rationale for Selection

The recommended solution (Alternative #1) focuses on deploying foundational EHR essentials consisting of standardized patient registration, pharmacy operations, primary care services, and billing modules by implementing a COTS medical EHR solution and integrating it with a custom DSH-Driven Forensic Behavioral Health application meeting specific DSH forensic behavioral health requirements. In its market research efforts and through discussions with mental health

hospitals in other states, DSH has learned that COTS mental and behavioral health modules are uniformly inadequate for meeting the full DSH requirements through standard configuration alone. There are no COTS forensic behavioral health products; nor do any EHR vendors appear to have any intentions to develop such a product. Moreover, just as EHR vendors must constantly update their products to accommodate changes in medical technology and practices, DSH must continually be able to update its forensic behavioral health application based on changes in forensic requirements, largely driven by state laws and regulations.

This approach of focusing on the forensic behavioral health component is supported by research conducted by the National Association of State Mental Health Program Directors Research Institute (NRI) in 2019 of EHR implementation and experience of all 41 State Hospital systems in the United States who currently have an EHR system. The research pointed out several areas of dissatisfaction based on each system's need for customization required to meet the unique needs of an in-patient psychiatric population. As a result, over 56% of states would not recommend their EHR/vendors to others. Further market research and dialogue with several other systems strongly indicates that the behavioral health modules in standard COTS EHR offerings will not meet the full requirements of the DSH Continuum-EHR project. In addition, the vendor must implement interfaces to other legacy systems, both internal and external, such as the new DSH pharmacy system.

Implementation of the Recommended Alternative at DSH would resolve problems in registration, pharmacy, and billing business areas and improve patient care by modernizing systems and processes to current healthcare standards. Rather than develop independent projects to address registration, primary care, pharmacy, and automated billing – which could lead to increased cost and a burden on technology resources – acquisition of a complete EHR system would address the need for interoperable patient data exchange across each of these systems and with external stakeholders. The inadequate state of business processes and systems underlying these key hospital operations, along with significant financial, regulatory, and service improvement business drivers, make moving forward with the Recommended Alternative a logical and fiscally sound decision. Moreover, requiring vendor hosting of the solution will reduce DSH's needs to staff and maintain the resultant system and will expedite deployment.

Alternative 2 – Hosted MOTS that includes a custom vendor-developed behavioral health module within a COTS EHR – is not considered viable because of the high risk involved with developing an entirely new module and altering the source code for an existing COTS product. Moreover, it would create additional complexity for maintaining what would essentially be a custom product using proprietary code and developed entirely by outside resources. It would require its own patching and refresh cycles from the vendor. Because it would be a custom product, DSH could not apply standard patches and new versions from the vendor. Moreover, DSH would have an ongoing dependency with the original vendor for all future updates and maintenance. System integrators responding to the DSH RFI were unable to estimate a cost for building this custom module within an EHR. The effort, however, would seem to be similar to the effort to convert and complete BHAM, so DSH has assumed that the one-time development cost would be equivalent to the cost of Recommended Alternative #1, though maintenance would be at a higher cost than the standard EHR maintenance.

Alternative 3 – Build a Custom EHR Solution – will involve significant risk of failure. By using a proven COTS product, DSH can reliably meet its EHR needs by taking advantage of the considerable research and development investment of EHR vendors. COTS products are designed and configured to meet best practices and industry standards. Moreover, they can be implemented in a relatively short period using vendor developed accelerators and tools, and can be remotely supported by the vendor if desired. Development time for a custom EHR solution is conservatively estimated to be at least two to three times longer than that required to implement a COTS product. Additionally, none of the states that currently use a homegrown system would recommend their system. This is in part because they are not web-enabled and do not meet meaningful use criteria, which is a requirement for full CMS-based billing.

DSH will engage in the competitive bid process as part of PAL Stages 3 and 4, and compare functions and costs among EHR vendors in order to select the most economical solution that meets the department's business program and functional requirements. The following advantages can be realized with the Recommended Solution:

- Meets all urgent, critical need business objectives
- Patient registration, billing, and pharmaceutical data would be available on a near real-time basis
- Includes a custom forensic behavioral health assistance application and provides a closely aligned fit of both the medical and forensic needs of DSH's unique population
- Aligns to state, Agency, and Departmental strategies
- Considers the organizations' ability to adapt to change to promote better user adoption
- Reduces risk to the State by leveraging the research and development, resources, expertise, and lessons learned of a COTS vendor to the greatest extent possible
- Builds on an existing COTS solution which saves development time compared to employing a completely custom system
- Lowers need for specialized skill sets to manage, maintain and upgrade
- Rapid Implementation – saving the time to order and install hardware and build out an existing data center can save valuable time and expense

The following disadvantages were identified with the Recommended Solution:

- Requires internal 24/7/365 system maintenance and support--including continuous proactive monitoring and industry-standard system uptime
- Available COTS solutions may not meet all of DSH's business needs without significant customization, which could come at an increased cost and maintenance requirements.

In selecting this Recommended Alternative #1, DSH rejected one other suggested solution as being unfeasible. The rejected option was to share the current EHR used by California Correctional Health Care Service (CCHCS), within the Department of Corrections and Rehabilitation (CDCR), which has previously gone through a lengthy and costly procurement process. This option was considered because many patient inmates will be cared for by both DSH and CCHCS during their recovery and rehabilitation. Over 90% of DSH patient admissions in recent years have been forensic commitments that are sent to DSH through the criminal court system or the prison system. DSH works with CDCR inmates and parolees at all five state hospitals.

Specifically, DSH provides inpatient mental health treatment to current CDCR inmates as needed during their prison term under Penal Code (PC) Section 2684. DSH also treats CDCR inmates who have been classified as Sexually Violent Predators (SVPs) as well as CDCR parolees who have been classified as Mentally Disordered Offenders (MDOs). Prison and state hospital staff collaborate on a daily basis. Since these commitments frequently transition between CDCR/CCHCS and DSH, it logically might be beneficial for these two organizations to deploy the same EHR solution or otherwise be able to share a patient-centric record.

This alternative would, however, require a shared domain and, to the extent that the systems may not be retired, integration with DSH-specific applications such as ADT, PaRTS, BEDS, WaRMSS, and BHAM. DSH would have to share system infrastructure with CCHCS with limited DSH-centric configuration of the client. DSH staff would provide support, training, and all the necessary expertise for implementation, deployment, and maintenance of any software infrastructure not managed by CCHCS or its contractors. This proposal would require the Department to have shared vision, strong governance, coordination, compliance, and communication with CCHCS to develop and customize systems that impact multiple DSH facilities. It would also require DSH to adjust many of its business processes and policies to align with CCHCS's in order to make use of the CCHCS configuration of the EHR solution. It is imperative as well that both departments agree upon security rules and regulations. When business rules conflict, DSH and CCHCS would need to develop consensus on a single process. Because of the many difficulties and process changes that would be required, in 2018 the CCHCS vendor communicated to DSH that the federal CCHCS Receiver is not interested in moving forward with a shared implementation of its EHR. Consequently, DSH has not explored this option any further.

2.11.2 Technical/Initial CA-PMM Complexity Assessment

Complexity		Complexity Zone	
Technical Complexity Score:	3.4	☐ Zone I	Low Criticality/Risk
		☐ Zone II/III	Medium Criticality/Risk
		☒ Zone IV	High Criticality/Risk

2.11.3 Procurement and Staffing Strategy

Activity

Solicitation Development

Responsible (check all that apply)	When Needed (check all that apply)	Cost Estimate Verification (check all that apply)
☒ Agency/state entity staff ☒ STP staff ☒ CDT Project Approvals and Oversight staff ☐ CA-PMO staff ☒ DGS staff ☐ Contractor ☐ Other, specify:	☒ Stage 3 Solution Development ☒ Stage 4 Project Readiness and Approval ☐ After project is approved (after Stage 4 Project Readiness and Approval)	☒ Market research conducted (MR) ☒ Cost estimate provided (CE) ☐ CDT CE ☐ DGS CE ☒ Request for Information (RFI) conducted ☐ Comparable vendor services have been used on previous contracts (CV) ☐ Leveraged Procurement Agreement (LPA)

Complete Only if Contractor Responsible for Activity

Procurement Vehicle	Select...	**Contract Type**	Select...
If "Other," specify:		If "Other," specify:	

Requirements Elicitation

Responsible (check all that apply)	When Needed (check all that apply)	Cost Estimate Verification (check all that apply)
☒ Agency/state entity staff ☐ STP staff ☐ CDT Project Approvals and Oversight staff ☐ CA-PMO staff ☐ DGS staff ☒ Contractor ☐ Other, specify:	☒ Stage 3 Solution Development ☒ Stage 4 Project Readiness and Approval ☐ After project is approved (after Stage 4 Project Readiness and Approval)	☒ Market research conducted (MR) ☒ Cost estimate provided (CE) ☐ CDT CE ☐ DGS CE ☒ Request for Information (RFI) conducted ☐ Comparable vendor services have been used on previous contracts (CV) ☒ Leveraged Procurement Agreement (LPA)

Complete Only if Contractor Responsible for Activity

Stage 2 Alternatives Analysis

Procurement Vehicle	Request for Offer/Master Service Agreement (RFO/MSA)/RFP	**Contract Type**	Fixed Price (FP)
If "Other," specify:		If "Other," specify:	

Conduct Procurement

Responsible (check all that apply)	**When Needed** (check all that apply)	**Cost Estimate Verification** (check all that apply)
☒ Agency/state entity staff ☒ STP staff ☒ CDT Project Approvals and Oversight staff ☐ CA-PMO staff ☒ DGS staff ☐ Contractor ☐ Other, specify:	☒ Stage 3 Solution Development ☒ Stage 4 Project Readiness and Approval ☒ After project is approved (after Stage 4 Project Readiness and Approval)	☒ Market research conducted (MR) ☒ Cost estimate provided (CE) ☐ CDT CE ☐ DGS CE ☒ Request for Information (RFI) conducted ☐ Comparable vendor services have been used on previous contracts (CV) ☒ Leveraged Procurement Agreement (LPA)

Complete Only if Contractor Responsible for Activity

Procurement Vehicle	Select...	**Contract Type**	Select...
If "Other," specify:		If "Other," specify:	

Project Oversight

Responsible (check all that apply)	**When Needed** (check all that apply)	**Cost Estimate Verification** (check all that apply)
☒ Agency/state entity staff ☐ STP staff ☒ CDT Project Approvals and Oversight staff ☐ CA-PMO staff ☐ DGS staff ☐ Contractor ☐ Other, specify:	☒ Stage 3 Solution Development ☒ Stage 4 Project Readiness and Approval ☒ After project is approved (after Stage 4 Project Readiness and Approval)	☐ Market research conducted (MR) ☐ Cost estimate provided (CE) ☒ CDT CE ☐ DGS CE ☐ Request for Information (RFI) conducted ☒ Comparable vendor services have been used on previous contracts (CV) ☐ Leveraged Procurement Agreement (LPA)

Complete Only if Contractor Responsible for Activity

Procurement Vehicle	Select...	**Contract Type**	Select...
If "Other," specify:		If "Other," specify:	

Independent Verification and Validation (IV&V)

Responsible (check all that apply)	When Needed (check all that apply)	Cost Estimate Verification (check all that apply)
☐ Agency/state entity staff ☐ STP staff ☐ CDT Project Approvals and Oversight staff ☐ CA-PMO staff ☐ DGS staff ☒ Contractor ☐ Other, specify:	☐ Stage 3 Solution Development ☐ Stage 4 Project Readiness and Approval ☒ After project is approved (after Stage 4 Project Readiness and Approval)	☐ Market research conducted (MR) ☒ Cost estimate provided (CE) ☐ CDT CE ☐ DGS CE ☐ Request for Information (RFI) conducted ☒ Comparable vendor services have been used on previous contracts (CV) ☒ Leveraged Procurement Agreement (LPA)

Complete Only if Contractor Responsible for Activity			
Procurement Vehicle	Formal Solicitation (IFB/ RFP)	**Contract Type**	Fixed Price (FP)
If "Other," specify:		If "Other," specify:	

Select + to add activities.

	Yes	No
Will any of the activities identified above result in a competitive or non-competitive solicitation that will be over the Agency/state entity's DGS delegated purchasing authority?	☒	☐

2.11.4 Enterprise Architecture Alignment

The recommended solution allows DSH to reach its goal of building an enterprise architecture for its hospital operations by providing a single solution for all of its core business areas such as registration, pharmacy (operations, medication tracking, medication administration), primary care, and billing.

Information Technology Capability Table

Information Technology Capability	Existing Enterprise Capability to be Leveraged	New Enterprise Capability Needed
Public or Internal Portal/Website	☒	☐
Public or Internal Mobile Application	☐	☒
Enterprise Service Bus	☒	☐
Identity and Access Management	☒	☐
Enterprise Content Management (including document scanning and eForms capabilities)	☐	☒
Business Intelligence and Data Warehousing	☒	☐
Master Data Management	☒	☒
Big Data Analytics	☐	☒

2.11.5 Project Phases

Phase 1 Technical foundation and data integration

Description	Phase Deliverable
• Complete application development foundation and environments • Ensure all application layers including data integration and security are ready	• Development environments complete • Security layer architecture and tools complete and approved by ISO • Data integration architecture and tools complete and approved by EAS Chief

Phase 2 Develop COTS components and customize modules as necessary

Description	Phase Deliverable
• Complete implementation and configuration of each commercial software component • Complete pilot test cases • Complete master patient scheduler • Complete development of behavioral health application	• Pilot test plan • Complete Configuration: Primary care • Complete Configuration: Pharmacy • Complete Configuration: Computerized Physician Order Entry (CPOE) • Complete Configuration: Electronic Medication Administration Record (eMAR) • Complete Configuration: Billing • Complete treatment pathways of forensic behavioral health system components

Phase 3 Data integration

Description	Phase Deliverable
• Complete data integration with COTS, EHR solutions, and other existing systems	• Data integration with COTS, EHR solutions, and other existing systems • Establish integration of EHR with external DSH health care programs

Phase 4 Pilot phase, employee training, and Pilot Deployment

• Complete all testing and validation • Accept product • Train employees • Deploy final solution as a pilot	• Acceptance sign-off • Training material and class scheduling • Deployment Plan • Product deployed in pilot capacity

Phase 5 Deployment to hospitals

Description	Phase Deliverable
• Deploy to first hospital • Deploy to subsequent hospitals	• First hospital deployment • Subsequent hospital deployments

2.11.6 High Level Proposed Project Schedule

Proposed Project Planning Start Date:	7/1/2018	**Proposed Project Planning End Date:**	6/13/2022
Proposed Project Start Date:	7/2/2023	**Proposed Project End Date:**	6/22/2025

Activity Name	Start Date	End Date
Stage 3 Solution Development	10/16/2020	6/13/2022
Stage 4 Project Readiness and Approval	7/5/2022	4/5/2023

2.11.7 Cost Summary	
Total Proposed Planning Cost:	33,881,704
Total Proposed Project Cost:	268,315,796
Total Proposed Future Operations IT Staff & OE&E Costs (Continuing):	41,250,716
Total Proposed Annual Future Operations IT Costs (M&O):	41,250,716

2.12 Staffing Plan

2.12.1 Administrative

To successfully mitigate risk, DSH's staffing plan requests the following resources to complete Stages 3 and 4 of the Project Approval Lifecycle, including solution development/procurement and project readiness:

- Extension for two more years of four (4) positions authorized in FY 2018-19. These positions provide full-time technical management, procurement assistance, organization of subject matter experts (SME), and legal advice.
- Twelve (12) new EHR Advocate positions – one for each major disciplinary area who will augment clinical resources to provide input and implement organizational readiness activities to ensure project activities are integrated effectively with the clinical goals of the project – through project implementation. The EHR Advocates may transition into the functional support team for the EHR product after Go Live.
- Backfill positions for the Project Executive Sponsor (Assistant Deputy Director) and Clinical Project Director (Supervising Rehabilitation Therapist) through project implementation to allow them to devote full-time effort to EHR project requirements.
- Three (3) contract project managers, who will track and manage all DSH EHR project readiness and governance efforts. The contract managers will coordinate with control agencies, lead and prepare the procurement approach and procurement documents, and manage the schedule and deliverables. This is key to ensure proper planning, monitoring, risk mitigation, issue resolution, and communication.
- A contract to provide Organizational Change Management (OCM) and Business Process Improvement (BPI) assistance
- A contract to conduct a review of DSH Wireless Local Area Networks (WLAN), assess the WLAN's ability to support EHR wireless devices, perform predictive site surveys, provide engineering details, and make appropriate recommendations
- A contract to provide data architecture assistance
- As the project progresses, DSH must request additional resources for system development assistance, configuration, training, and ongoing support. These positions will be identified subsequently.

In addition to the core project team, advisors have been designated for clinical disciplines, budget, and cost recovery.

2.12.2 Business Program

Following the EHR Governance Plan and as part of project planning and execution, the EHR Advocates will work with clinical and administrative subject matter experts (SME) – staff of the system integration consultants who will be implementing the EHR solution and DSH SMEs – to provide assistance with business process improvements, gap analysis, policy revision recommendations, and business program support. DSH will request additional temporary staffing assistance to backfill for project SME staff through use of limited term positions or contracted registry staff. Where staff augmentation is not possible, DSH must make use of overtime or reduced coverage as necessary.

2.12.3 Information Technology (IT)

The project manager will track and manage all recommended solution efforts and will be responsible for developing a project management plan and monitoring all daily activities associated with this proposal. The project manager will also be responsible for tracking milestones and success criteria and preparing status reports, escalating risks and issues, etc.

Resources are in place to begin transitioning existing systems (e.g., ADT, PHO, BHAM) to their future state. TSD staff are already assigned to maintain continued use of these systems and begin the process of organizing data for migration. CRS is the exception, as the system is maintained by another state entity, the Department of Developmental Services (DDS). An inter-agency data migration plan will have to be developed for this system.

Because the Recommended Solution will be hosted by the vendor, DSH will not need additional IT infrastructure or programming staff for its maintenance. Nevertheless, some augmentation may be necessary to support additional network demands, such as for wireless devices used with the EHR, and for data management, health care informatics, and reporting requirements resulting from the EHR implementation. Consulting assistance will probably be needed for development and training on informatics.

2.12.4 Testing

DSH has existing experienced resources who are capable of providing testing training and assistance, and have performed all stages of testing in previous projects, including Functional, Integration, Security, Regression, Stress/Load, Performance, and User Acceptance Testing (UAT). Testers for the EHR will be selected from the SMEs who defined workflows and requirements. End user and acceptance testing will be a key responsibility of the EHR Advocates during the project execution phase. In addition, DSH has automated testing tools that may be employed for the project, particularly for user stress/load tests.

2.12.5 Data Conversion/Migration

Data conversion and migration planning will be completed by experienced consultants and current TSD staff and will be described more completely in the Stage 3 and Stage 4 Project Approval Lifecycle documentation. A Data Migration and Conversion Plan (Attachment 2.13) outlines the DSH approach to this subject. Data conversion will be a responsibility of the SI and will involve master data transfer from existing legacy systems to the new EHR. Among other tools, the DSH Enterprise Service Bus (ESB) will be utilized for data transfers.

2.12.6 Training and Organizational Change Management

There will inevitably be a degree of business disruption that will be mitigated by effective training, planning, basic computer skills education, completion of a gap analysis between current and needed skill sets, business process improvements, and other Organizational Change Management (OCM) efforts tailored to each hospital's organizational needs.

Training will be provided by DSH EHR Advocate staff in cooperation with the vendor (as applicable), who will primarily employ a train-the-trainer approach to utilize experienced staff in the hospitals representing all health care disciplines. DSH has robust training departments at each of its hospitals with enough qualified staff to coordinate training provided by the EHR trainers. Cost estimates include any requests relevant to training and organizational change management.

The implementation system integrator and other consultant staff will prepare an OCM Plan for the project. OCM planning will then be completed by EHR Advocates and the project implementation vendor. To ensure success, DSH executive leadership must fully endorse and support the OCM planning. Implementation of OCM efforts will be completed by EHR Advocates, local hospital-specific Change Ambassadors (to be identified), and other key stakeholders, with oversight by the Clinical Operations Division.

2.12.7 Resource Capacity/Skills/Knowledge for Stage 3 Solution Development

Pending budget approval, DSH anticipates an increase in staff and resources for Stage 3 Solution Development and other EHR implementation efforts. Staff detailed in the Financial Analysis Worksheet (FAW) will participate in the remainder of the planning phases and through the project duration as indicated. An experienced consulting team has been engaged to assist with the Stage 3 procurement planning, requirements definition, and evaluation. Moreover, the DSH IT Procurement team has extensive experience working with competitive acquisitions and contracting, both leveraged agreements and open bids. The project governance team includes the Deputy Directors for IT and non-IT procurement.

Planning and implementation efforts will leverage the support and guidance of the Executive Sponsor and the Executive Advisory Team for decision making relative to critical change requests and risks/issues which cannot be resolved at the lower levels of the project team structure. Along with control agencies, project members identified and illustrated in the project structure will support the Stage 3 effort. Staff serving in the IT Specialist I classification and DSH procurement staff have the capacity, skill, and knowledge of DSH's procurement program and resources to support the procurement effort, and are familiar with DSH's governance framework as it pertains to procurement.

A training program with emphasis in Organizational Change Management and Business Process Improvement will need to be developed for the staff that will be advocating for the project and subsequently serving as trainers. The project consultant, currently scheduled to be requested in the FY 2023-24 budget, will be tasked with assisting in this effort.

2.12.8 Project Management

2.12.8.1 Project Management Risk Assessment

Project Management Risk Score:	2.5

See Attachment 2.12.8.1 – Project Management Risk Assessment

2.12.8.2 Project Management Planning

Are the following project management plans or project artifacts complete, approved by the designated Agency/state entity authority, and available for Department of Technology review?

Project Charter	Yes	**Completed and approved**
Scope Management Plan	Yes	**Completed and approved**
Risk Management Plan	Yes	**Completed and Approved**
Issue and Action Item Management Plan	Yes	**Completed and Approved**
Communication Management Plan	Yes	**Completed and Approved**
Schedule Management Plan	Yes	**Completed and Approved**
Human Resource Management Plan	Yes	**Completed and Approved**
Staff Management Plan	Yes	**Combined with HR Management Plan**
Stakeholder Management Plan	Yes	**Completed and approved**
Governance Plan	Yes	**Completed and Approved**

2.12.9 Organization Charts

See Attachment 2.12.9 and 2.12.9A – Project Organization Chart and DSH Organization Chart

2.13 Data Conversion/Migration

Identify the status of each of the following data conversion/migration activities:

Data Management Plan	Completed	Data Quality Assessment	In Progress
Data Conversion/Migration Requirements	In Progress	Data Quality Business Rules	In Progress
Current Environment Analysis	In Progress	Data Dictionaries	In Progress

Data Profiling	In Progress	Data Cleansing and Correction	In Progress

See Attachment 2.13– Data Migration and Conversion Plan

2.14 Financial Analysis Worksheets

See Attachment 2.14 – Financial Analysis Worksheets

Preliminary Assessment – Department of Technology Use Only	
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