



Algoriom

A data science company

Design, Develop and Deliver enterprise Web & Mobile apps for **Global Medical Corporates**

1

Application: **Voyager**

A cloud based real-time data collection and analysis tool



Business scope high-level requirement summary

- Design and develop a digital system to manage and monitor **patient activity** under **ongoing trial** sponsored by Novartis
- **Capture** and **store** micro details of patient activity for **deep analysis**
- Interact with **multiple devices** and **platforms** on **real-time basis** to fetch data and store in a **centralized repository**
- Develop a **centralized** system to monitor data flow, detailed **visual metrics for analytics**



Solution – key points

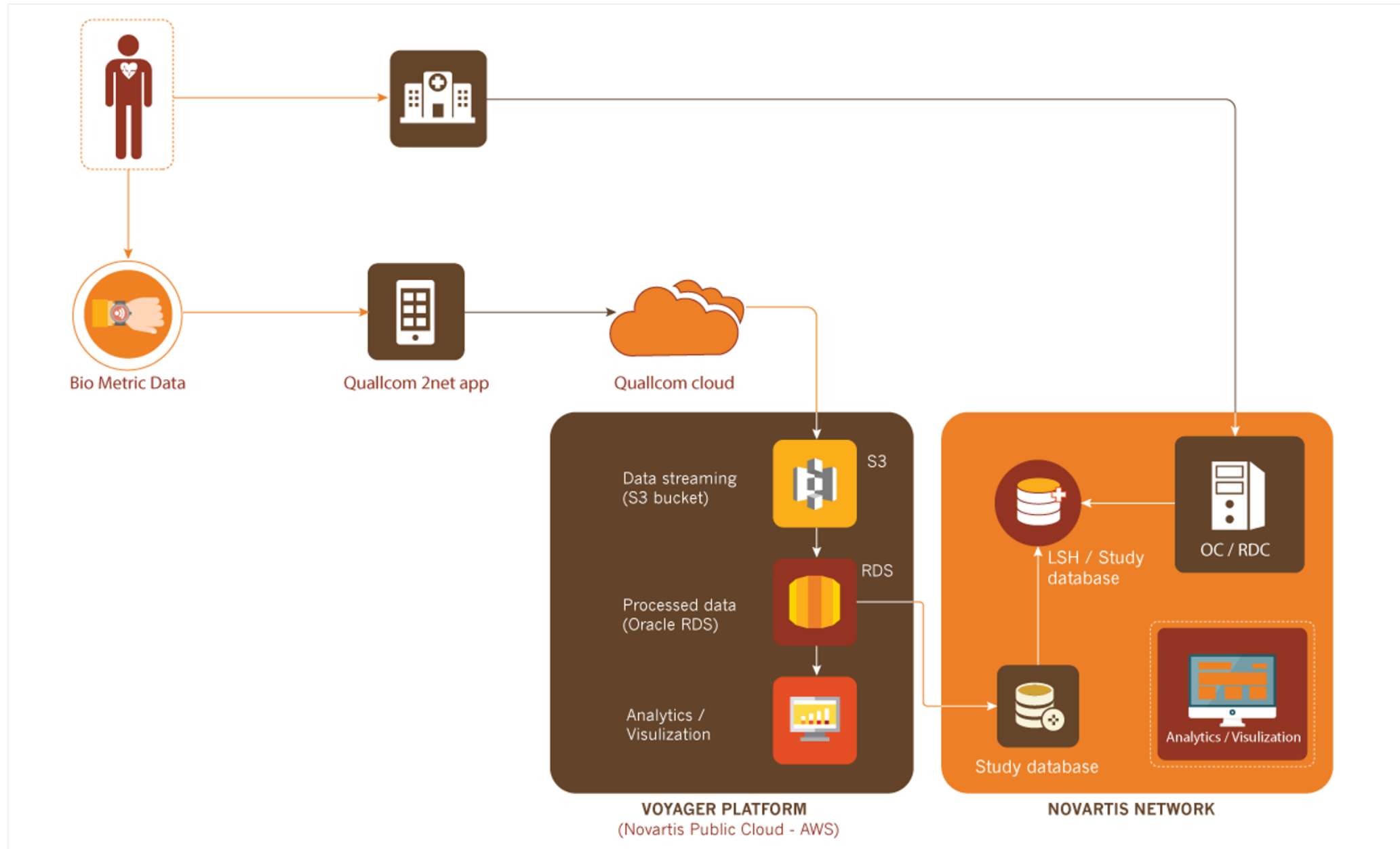
- ✓ Develop a **Cloud based** scalable application using **Java** as backend and Front end system using **modern web** interface with **HTML**
- ✓ Bridge multiple data acquisition devices and platforms through native **API interfaces** deployed on cloud.
- ✓ Design on **premise DB** and a reflection on **AWS S3** for secondary data storage and management
- ✓ Develop **centralized reporting** system for detailed data **visual reports** flowing from wearable devices using **SpotFire**.
- ✓ Include **Machine Learning** capability to get **deep insights** into data





Voyager development process








- ✓ Application design and development was planned on lines of cloud architecture system with provisions setup for data collection from external platforms like – Qualcomm Life2Net and ActiGraph.
- ✓ Device specific (ActiGraph, Striiv) customized coding was developed and integrated into application
- ✓ System was deployed onto AWS EC2 instance with an RDS DB server along with S3 storage for raw data storage
- ✓ High available system design supports continuous monitoring and validation of inflow data from device specific platforms
- ✓ Data received is process on-the-fly and stored appropriately on to local DB and Cloud DB, S3 locations
- ✓ Data stored in DB is visualized through Spotfire integration and provide multi-dimensional view of collected data as per user requirement
- ✓ Delivered detailed reports and metrics at macro & micro level for each activity collected from acquisition devices


System architecture – Data flow schematic





Application screens – UI interface screens

**NOVARTIS** **VOYAGER**Welcome Naresh, Gunti 




-  DASHBOARD
-  ALL STUDIES
-  CRON JOB SETTINGS
-  SERVER LOGS
-  USER MANAGEMENT
-  AUDIT LOGS
-  MY PROFILE

**47**
TRIALS


**2**
DEVICES

**2**
DATA HUB





QUICK ACTIONS

		STUDIES
 Abhishek Nema 2018-10-19 09:02	Study ID: PerfTest008 Ticket No: VOYAGER1069	View
 Abhishek Nema 2018-10-19 09:01	Study ID: PerfTest007 Ticket No: VOYAGER1068	View
 Abhishek Nema 2018-10-12 10:22	Study ID: PerfTest006 Ticket No: VOYAGER1067	View


NOTIFICATION


No data found


RECENT ACTIVITY

 Last Login	7 seconds ago
 Last Login	131 days ago
 Last Login	131 days ago
 Last Login	195 days ago

Application screens – UI interface screens

**NOVARTIS**

VOYAGER

Welcome vijay, manne 

DASHBOARD

DASHBOARD

ALL STUDIES

CRON JOB SETTINGS

SERVER LOGS

USER MANAGEMENT































AUDIT LOGS

MY PROFILE

All Studies

Filter by:

First << 1 2 3 >> Last

S.No	Study ID	Data Hub	Device	Created Date	Requested By	Approved By	Status	Actions	Initiate
1	PerfTest007	Actigraph	Actigraph	2018-10-19	NEMAAB1	NEMAAB1	Pending	  	
2	PerfTest008	Actigraph	Actigraph	2018-10-19	NEMAAB1	NEMAAB1	Pending	  	
3	Perftest005	Actigraph	Actigraph	2018-10-12	NEMAAB1	NEMAAB1	Pending	  	
4	Perftest006	Actigraph	Actigraph	2018-10-12	NEMAAB1	NEMAAB1	Pending	  	
5	PerfTest003	Actigraph	Actigraph	2018-10-10	NEMAAB1	NEMAAB1	Pending	  	
6	Perftest004	Actigraph	Actigraph	2018-10-10	NEMAAB1	NEMAAB1	Pending	  	
7	Test0003	Actigraph	Actigraph	2018-09-11	NEMAAB1	NEMAAB1	Pending	  	
8	VijayTest4	Actigraph	Actigraph	2018-09-10	VIJAYMA9	VIJAYMA9	Pending	  	
9	VijayTest7	Actigraph	Actigraph	2018-09-10	VIJAYMA9	VIJAYMA9	Pending	  	
10	VijayTest6	Actigraph	Actigraph	2018-09-10	VIJAYMA9	VIJAYMA9	Pending	  	

Application screens - SpotFire Reports

Voyager Overview Deep-dive screen

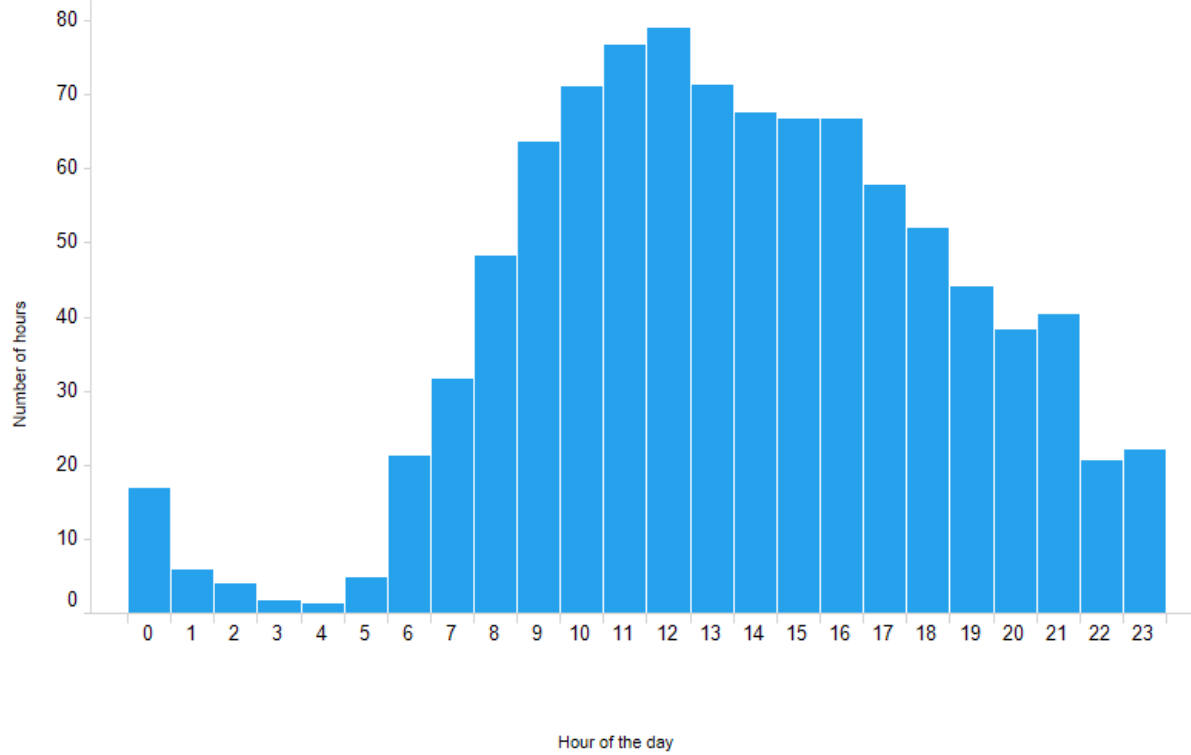
KPI Section

Total number of users : 16
Wear time per study : 67.6 %
Sleep detected per study : 32.57 %

Histograms: Wear time per study

Day119

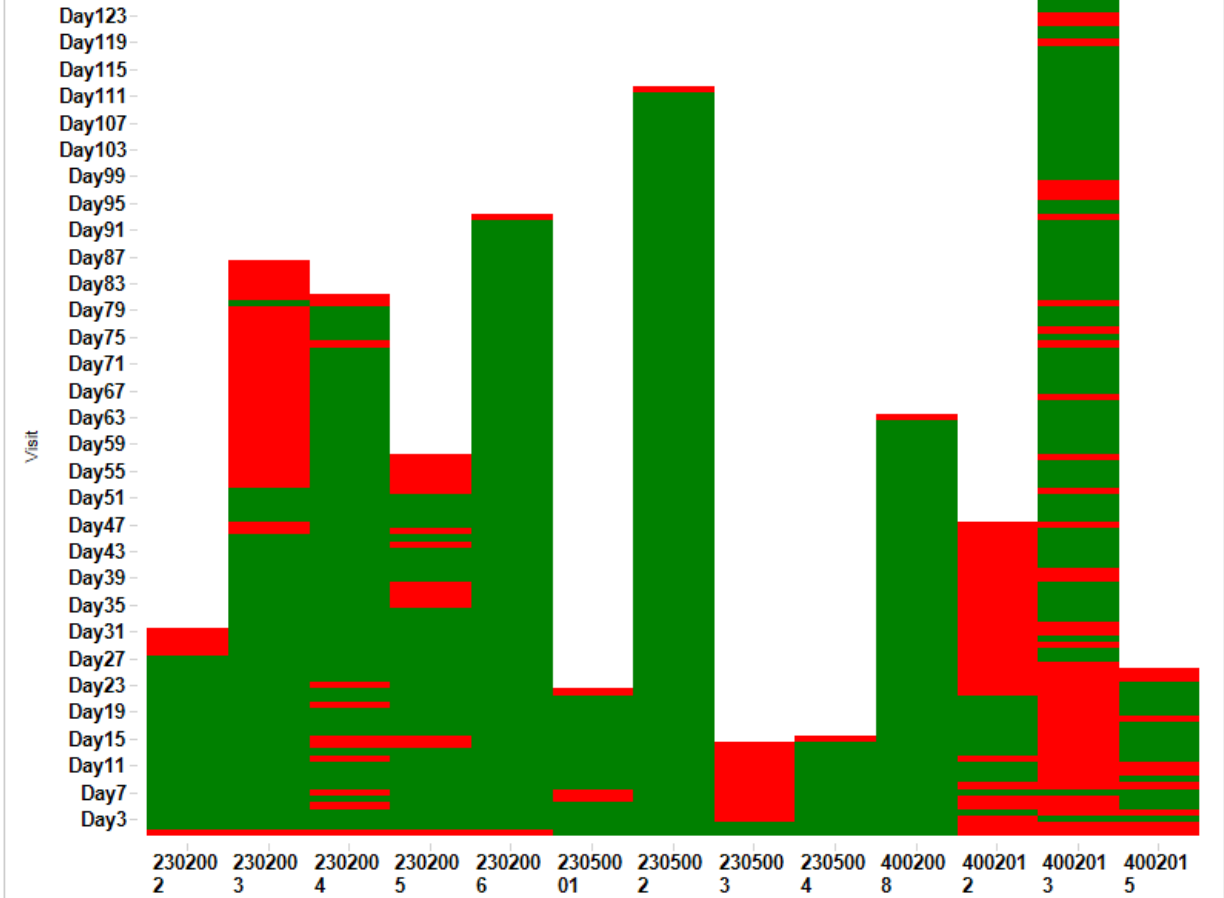
Wear time per study



Heat Maps: Wear Compliance

Wear Compliance

Patient ID



Application screens – SpotFire Reports

Voyager Overview
Deep-dive screen

🗨️
★
📶
🔍
☰
?
✕

KPI Section

Total number of users : 16
 Wear time per study : 67.6 %
 Sleep detected per study : 32.57 %

Histograms: Days of data per user

Days of data per user

Days	Number of Patients
10	1
15	1
20	1
25	1
50	1
55	1
60	1
85	1
95	2
110	1
125	1
150	1

Heat Maps: Battery level per user

Battery level per user

Patient ID

Day	2302 002	2302 003	2302 004	2302 005	2302 006	2305 001	2305 002	2305 003	2305 004	4002 008	4002 012	4002 013	4002 015
Day113													
Day108													
Day103													
Day98													
Day93													
Day88													
Day83													
Day78													
Day73													
Day68													
Day63													
Day58													
Day53													
Day48													
Day43													
Day38													
Day33													
Day28													
Day23													
Day18													
Day13													
Day8													
Day3													

● Ready
608 of 608 rows
0 marked
4 columns
BatteryLevel

Application screens - SpotFire Reports

Voyager Overview | Deep-dive screen

Heat Maps: Wear Time

KPI Section
Start Data Collection: 10/18/2018
Number of days of data :126
User timezone: (UTC -5:00) Eastern Time (US & Canada), Bogota, Lima
Site Name: Centre de Recherche de l'aval

Sleep quality endpoints: Sleep efficiency

Wear Time
Date

Legend: Non-Wear (Grey), Max (Dark Green), Min (Light Green)

Sleep efficiency
Efficiency

Wearing Minutes
Time

72,268 of 72,268 rows | 0 marked | 4 columns | WearTimePerUser

● Ready

The screenshot displays a Spotfire report interface. On the left, a 'Patient Id' list includes entries like '2302002 St Thorr' and '4002013 Centre c'. The main area is divided into several sections: a 'KPI Section' with metadata, a 'Sleep quality endpoints' dropdown set to 'Sleep efficiency', a 'Sleep efficiency' bar chart showing values near 1.00, and a 'Wear Time' heatmap showing 'Wearing Minutes' on the x-axis and 'Time' on the y-axis. The heatmap uses a color scale from grey (Non-Wear) to dark green (Max) to light green (Min). A status bar at the bottom indicates '72,268 of 72,268 rows' and 'WearTimePerUser'.

2

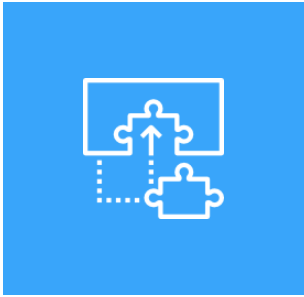
Application: **FIRST**

A collaborative platform to record, analyze and manage risks & Issues



Business scope high-level requirement summary

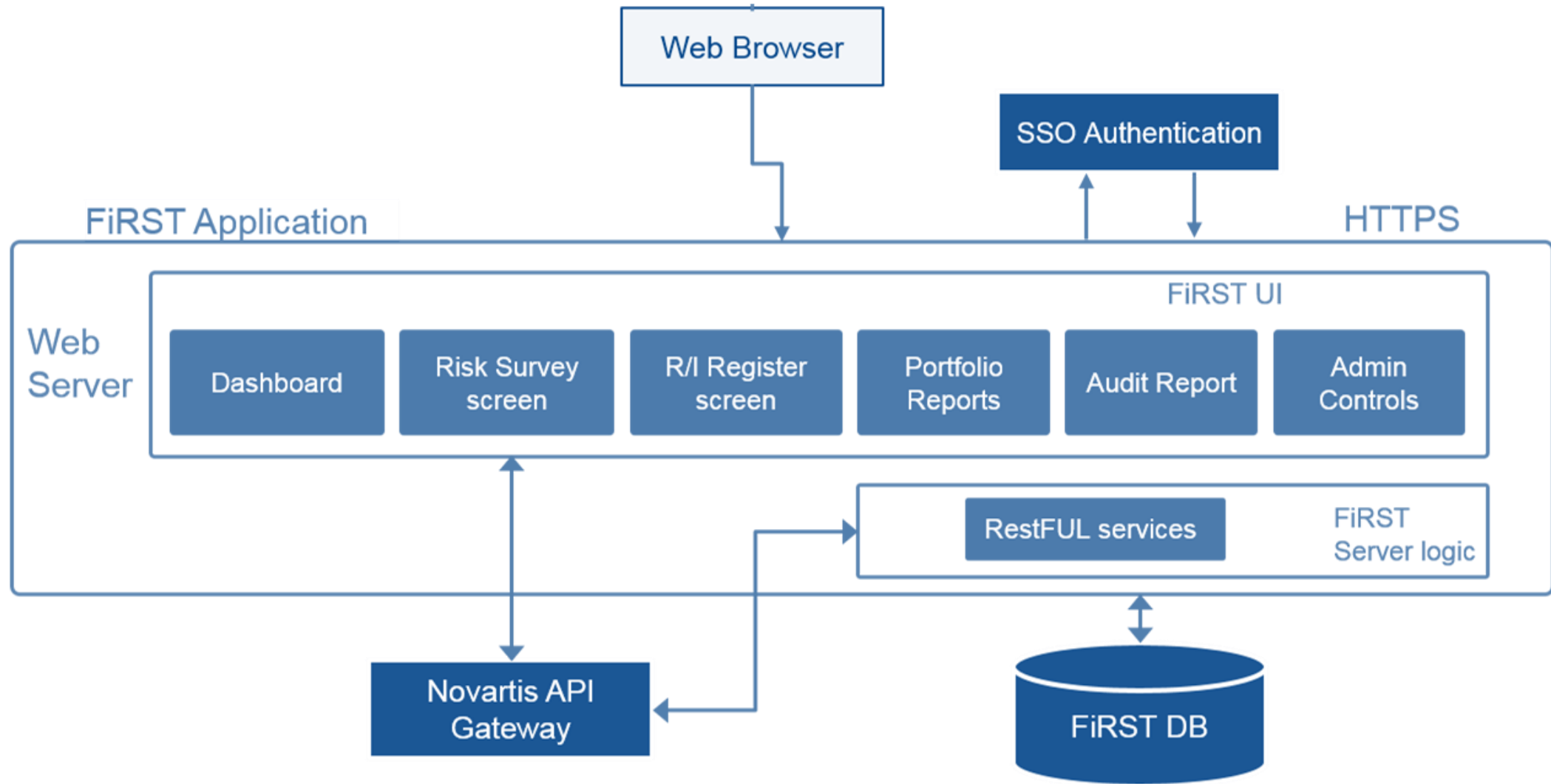
- Design and develop a **collaborative platform** for recording **Risks & Issues** for trials
- Provide a role based access system to **analyze, comment** and **co-ordinate** on formalizing applicable Risks & Issues for Trials
- System should support system management and development
- Provide **multivariate reports** presenting **deep insights** for trial Risks & Issues
- Centralized Risk & Issue management system with **multiple downstream** application support – **API Gateway** based dataflow control
- **Machine Learning** and **AI** auto categorization and suggestion for **Risk & Issue creation**
- Text and content **mining system** using **ML** techniques to extract and record text matching context from external data sources



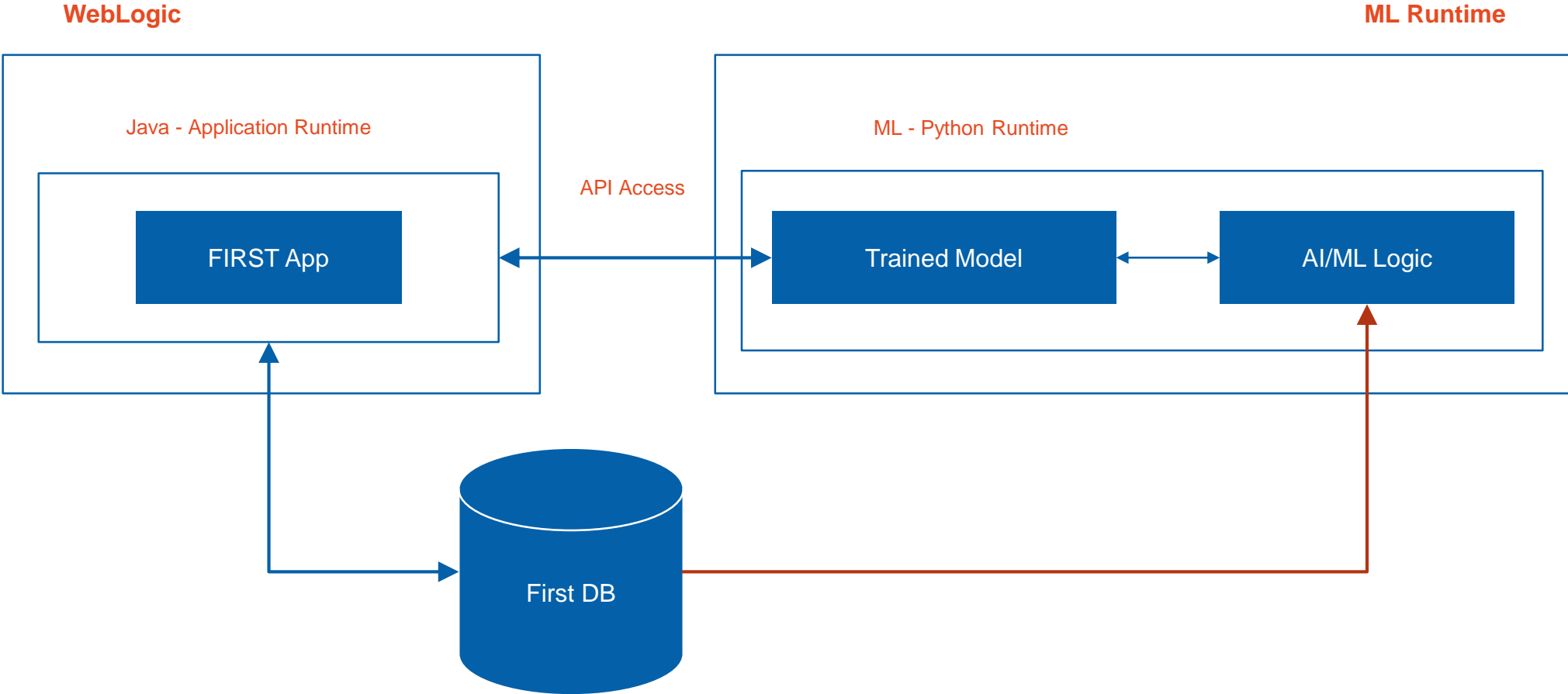
Solution – key points

- ✓ Develop Modern UI/UX platform using ReactJS and Java as backend architecture
- ✓ Implement multilevel interchangeable Role based access system for recording and managing Risks & Issues
- ✓ Centralized data connectivity through API Gateway integration for consuming data from external downstream applications
- ✓ Machine Learning system design based on NLP/NLTK to analyze text, context and present appropriate matching Risks & Issues from system
- ✓ QlickSense integration for high level visual and low level detailed reports with micro details based on multi level filter selections.


FiRST Application Arch - outline



FIRST Machine Learning Arch - outline



Application screens – UI interface screens



FIRST







Facilitated Issue and Risk Surveillance Tool

Allows initial entry and collaboration of Clinical Trial Risks, tracking progress, ongoing management of Risks and Issues including Actions.

Select Trial

Select Trial

Copy from

 Trial Dashboard Summary	 Risk Survey	 Risk/Issue Register
 Reports	 Transactional Audit Trail	 Admin Controls

Application screens – UI interface screens

FIRST Facilitated Issue and Risk Surveillance Tool

Welcome, **Bhoomraogari Sairakshith** Logout

SELECT TRIAL: CABL001X2203

Trial Dashboard Sum... Risk Survey Risk/Issue Register Reports Transactional Audit T... Admin Controls

Home > Trial Dashboard Summary - Risk/Issue Register

All All - Category All - R/I Status All - Creator All - Action Owner All - Function All - Score All - Impact All - Action Status

Risks

Score		
Low	Medium	High
R 5	R 3	R 2
A 8	A 6	A 2

Issues

Impact		
Low	Medium	High
I 2	I 3	I 6
A 1	A 1	A 3

Entry by Date

Entry Timeframe	Risks	Issues	Actions
Entered in Last Month	--	--	--
Total Entered Life of Trial	10	13	21

Action Aging

Action Due Date	Risks	Issues
Overdue >= 30 Days	8	--
Overdue < 30 Days	--	--
Due in 1 Week	--	--
Due in 2 Weeks	--	--
Due 3-4 Weeks	--	--
Due > 30 Days	--	--

<https://first-qa.novartis.net/first/index#/start/dashboard>

Application screens – UI interface screens

FIRST Facilitated Issue and Risk Surveillance Tool

Welcome, **Bhoomraogari Sairakshith** [Logout](#)

SELECT TRIAL
Trial Dashboard Summary
Risk Survey
Risk/Issue Register
Reports
Transactional Audit Trail

Category Status: All

- Safety - IMP/Class Profile 0
- Safety - IMP Unknown information NS
- Safety - Patient Population C
- Safety - Study Assessments/Procedures 0
- Study Complexity fasdf adfdk C
- Patient Population NS
- Technology NS
- Data Source, Acquisition and Cleaning NS
- Endpoints / Statistical Analysis NS
- Organization / Resourcing NS
- IMP/Study Medication Handling and Administration NS
- IMP/Study Medication NS

Home > Risk Survey [Export to Excel](#)

All - Status
All - Creator
All - Action Owner
All - Score
All - Action Status

Category : Safety - IMP/Class Profile Review Complete

Core Question: >> **Trigger Question(s) - Consider the following while entering risk statements:** >> **Score Guidelines:** >>

Risk ID	Details	Status	Risk Statement	Actions	Comments	Score	Edit
R003	Entered On: 29-SEP-2018 Entered By: Ashima mahaja ⓘ Probability: High ⓘ Impact: High ⓘ Detectability: High Mitigation Strategy: Accept	Closed	Potential delay in release of IMPD and CoA documentation and required documents from vendors which a...	2	Bhoomraogari Sairakshith: ssss Bhoomraogari Sairakshith: dddd <input type="button" value="Comment"/> 2 Comments	 9	<input type="button" value="Edit"/>
R009	Entered On: 14-DEC-2018 Entered By: Bhoomraogari Sairakshith ⓘ Probability: Medium ⓘ Impact: Medium ⓘ Detectability: Medium Mitigation Strategy: Accept	Open - Actions Pending	ggg1 leading to ggg1 resulting in ggg1	1	<input type="button" value="Comment"/>	 8	<input type="button" value="Edit"/> <input type="button" value="Delete"/>
R007	Entered On: 11-DEC-2018 Entered By: Bhoomraogari Sairakshith ⓘ Probability: Medium	Open - Actions Completed	uuu leading to uuu resulting in uuu	2	<input type="button" value="Comment"/>	 8	<input type="button" value="Edit"/> <input type="button" value="Delete"/>

Showing 1 to 7 of 7 Risk Results [Create New Risk](#)

Application screens – UI interface screens

FIRST Facilitated Issue and Risk Surveillance Tool Welcome, **Bhoomraogari Sairakshith** [Logout](#)

SELECT TRIAL: CABL001X2203 [Trial Dashboard Sum...](#) [Risk Survey](#) [Risk/Issue Register](#) [Reports](#) [Transactional Audit T...](#) [Admin Controls](#)

Home > Risk/Issue Register Open Risks : 9 Closed Risks : 1 Open Issues : 13 Closed Issues : -- Open Actions : 15 Closed Actions : 6 Past Due Actions : 8 [Export to Excel](#)

All - Category All - Status All - Creator All - Action Owner All - Function All - Score All - Action Status

[Risk](#) [Issue](#) [Risks Converted to Issues](#)

Record ID	Record Details	Status	Category	Risk Statement	Actions	Score	Edit
R003	Entered On: 29-OCT-2018 Entered By: Vijay Manney Probability: High Impact: High Detectability: Medium Mitigation Strategy: Accept	Open - Issue(s) Occurred	Safety - IMP/Class Profile	tmxlkfed leading to dfsdfsdf resulting in sdfsdf	All Actions : 1 Open : 1 Completed : 0 Over Due : 0	18	Refresh Edit
R001	Entered On: 12-OCT-2018 Entered By: Bhoomraogari Sairakshith Probability: High Impact: High Detectability: Medium Mitigation Strategy: Mitigate	Open - Actions Completed	Safety - IMP/Class Profile	rrr2 leading to rr2 resulting in rr2	All Actions : 1 Open : 1 Completed : 0 Over Due : 1	18	Refresh Edit
R007	Entered On: 14-DEC-2018 Entered By: Bhoomraogari Sairakshith Probability: Medium Impact: Medium Detectability: Medium Mitigation Strategy: Mitigate	Open - Actions Pending	Safety - Patient Population	rt1 leading to rt1 resulting in rt1	All Actions : 4 Open : 2 Completed : 2 Over Due : 1	8	Refresh Edit

Showing 1 to 10 of 10 Risk Results [Create New Risk or Issue](#)

