HiLabs

APM Case Study 2023

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DEFINING THE SCOPE

Problem Statement

Health insurance companies struggle to meet regulatory standards and maintain an accurate provider network, leading to compliance and regulatory risks, high costs and penalties, and poor member experiences

Design an **AI solution** to automate compliance checks, ensure data accuracy, and optimize network adequacy efficiently replicating the CMS automated criteria

Why Solving this Problem is Necessary?
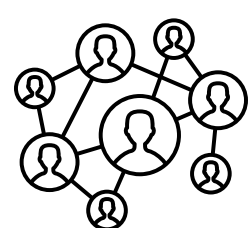
Enhanced Network Adequacy

Regulatory Compliance: Automating network adequacy checks helps health plans stay compliant with federal and state guidelines.
Improved Access to Care: By identifying gaps in provider networks, members receive timely and accessible healthcare.
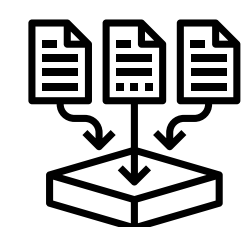
Improved Data Accuracy

Accurate Provider Information: Automated validation ensures correct locations, contact details, & active provider listings, reducing "ghost networks."
Reduced Surprise Billing and Legal Risks: Accurate provider information helps members avoid out-of-network charges.
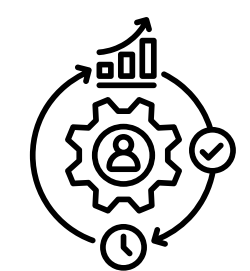
Operational Efficiency

Reduced Administrative Burden: Automation decreases labour-intensive processes and saves time and resources.
Cost Efficiency: Accurate network data prevents redundant provider recruitment, leading to lower network management expenses.
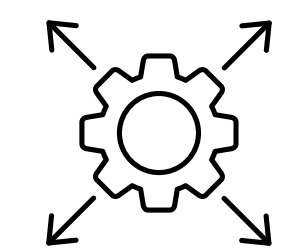
Future Scalability and Adaptability

Regulation Adaptability: Automated updates ensure compliance with new CMS or state guidelines, reducing manual work.
Scalability: Supports expanding networks, maintaining adequacy and compliance as providers grow.
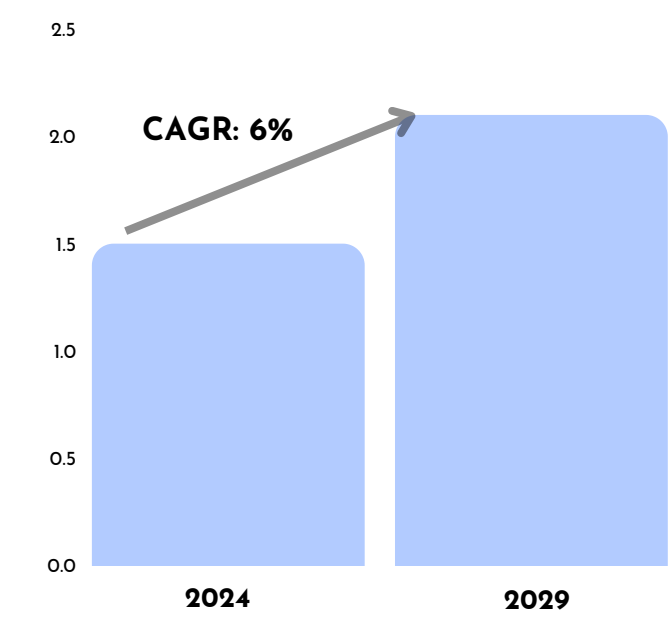
Scale of the problem

$2B/Yr is lost by organizations due to poor quality provider data

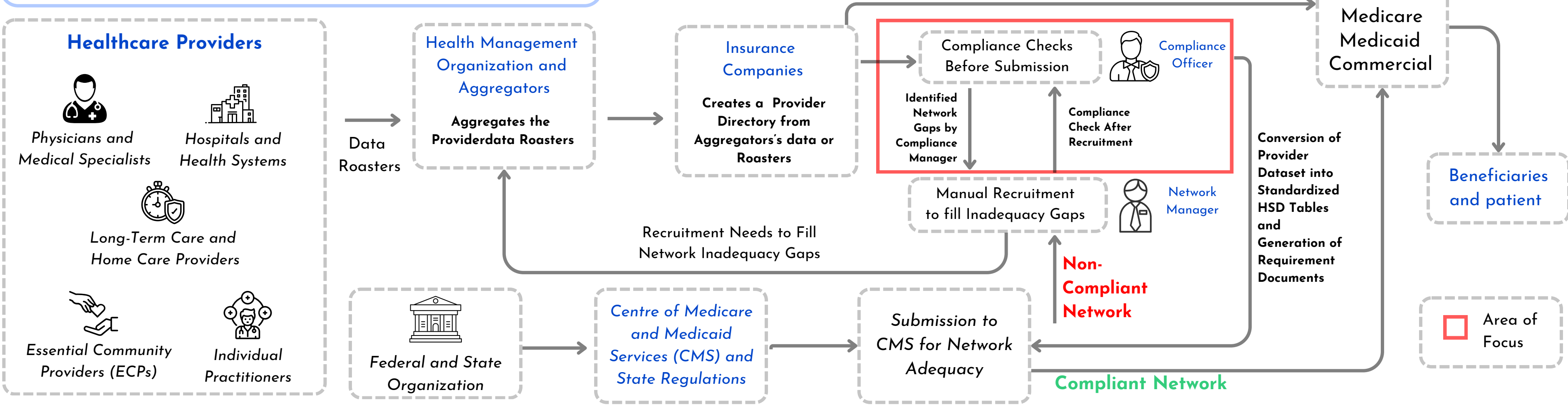**$208 million** in fines and penalties was collected by state insurance departments

25% of all insurance carriers were subject to compliance exams resulting in the enormous fines

United States Insurance Market Size (in USD Trillion)

CAGR: 6%

2024   2029

2.5
2.0
1.5
1.0
0.5
0.0

BREAKING DOWN THE PROBLEM

Stakeholder Journey with Data Flow

Healthcare Providers

Physicians and Medical Specialists

Hospitals and Health Systems

Long-Term Care and Home Care Providers

Essential Community Providers (ECPs)

Individual Practitioners

Data Roasters →

Health Management Organization and Aggregators

Aggregates the Providerdata Roasters

Insurance Companies

Creates a Provider Directory from Aggregators's data or Roasters

Compliance Checks Before Submission

Compliance Officer

Identified Network Gaps by Compliance Manager

Compliance Check After Recruitment

Manual Recruitment to fill Inadequacy Gaps

Network Manager

Non-Compliant Network

Recruitment Needs to Fill Network Inadequacy Gaps

Federal and State Organization

Centre of Medicare and Medicaid Services (CMS) and State Regulations

Submission to CMS for Network Adequacy

Compliant Network

Health Plans

Medicare
Medicaid
Commercial

Conversion of Provider Dataset into Standardized HSD Tables and Generation of Requirement Documents

Beneficiaries and patient

▢ Area of Focus

User Persona:

Sarah Martinez

Compliance Officer at XYZ Insurance

Age: 29
Location: Dallas, Texas

Goals:
- Maintain compliance with CMS and state network adequacy requirements
- Ensure provider directories are accurate and up-to-date
- Identify and resolve compliance gaps before they become regulatory issues
- Streamline compliance reporting processes and reduce manual work

Pain Points:
- Manual Processes are time-consuming, especially verifying provider for network adequacy
- Lack of consolidated view of compliance metrics makes it difficult to identify gaps
- Frequent issues with inconsistent and outdated provider data
- Regulatory deadlines and risk of non-compliance penalties create pressure

Key Problems:

Outdated and **inconsistent provider information** leads to compliance gaps and impacts member experience

Meeting diverse and **evolving network adequacy standards** across counties and specialties is challenging and time-consuming

Manual data standardization and compliance monitoring are resource-heavy and error-prone, complicating CMS submissions

Assumptions

- Geography: USA
- The Provider directory contains all the necessary tables.
- The **Existence of Mcheck Provider API** for ensuring Data Accuracy
- We are entering the Market as a **New Product** Segment & not to compete with any market leader
- The system will abide by all applicable privacy and data protection laws, such as CAA and HIPAA

How to solve this problems?

To solve the network adequacy and compliance management challenges
Step 1: Build a system to capture, store, and standardize data from multiple sources.
Requirements:
- Scalable Cloud-Based Storage
- Data Cleaning, Pre-processing, and Standardization tools to get data ready for analysis

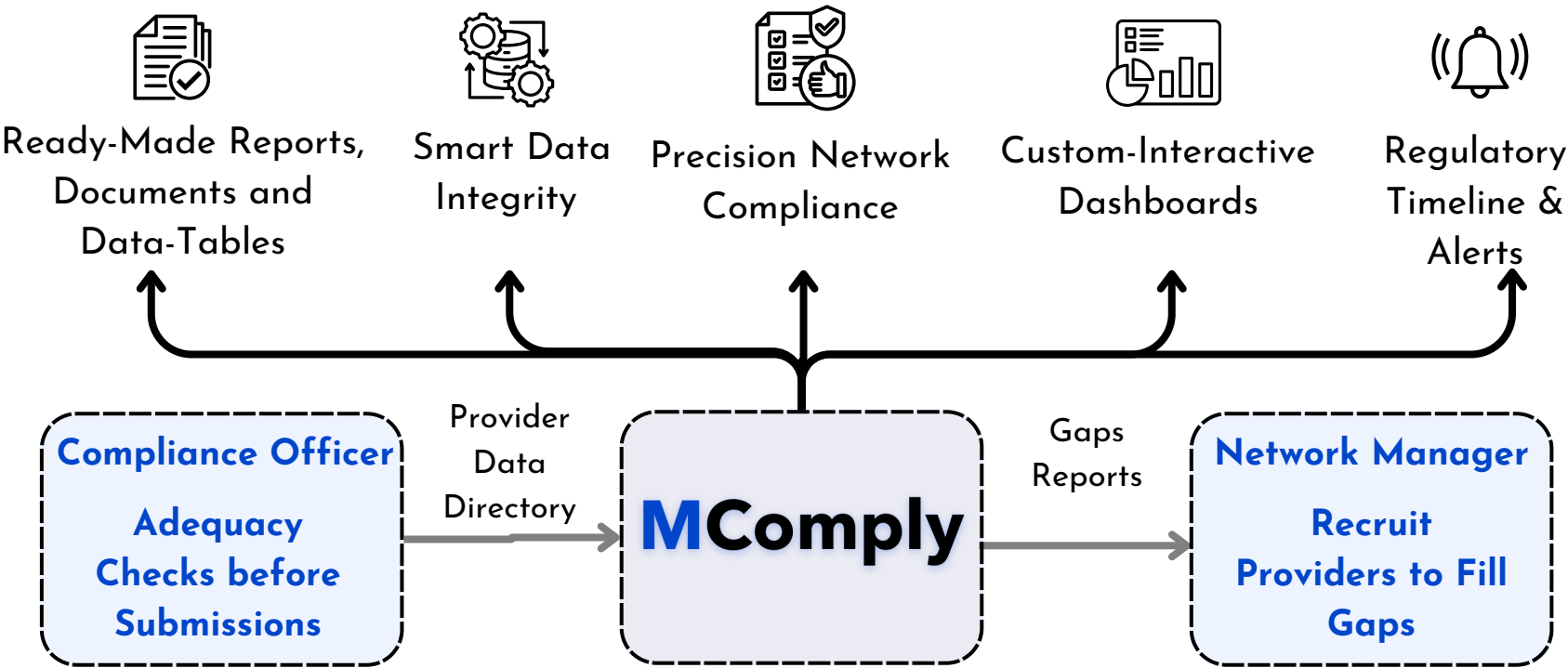**Step 2**: Develop a Compliance Analysis and Reporting solution
Requirements:
- Rule-Based Compliance Checks
- Geospatial Analysis
- Dashboard and Reporting

Introducing **MComply** ,the All-in-One Solution for Network Adequacy Compliance

A compliance management platform tailored for **healthcare insurers** to assess and maintain **network adequacy**. It identifies gaps in the provider network while providing **data standardization for CMS submissions**. It **ensures accurate data, streamlined reports, and actionable insights**

Sector: Insurance
Geography: USA
Offering Type: B2B SaaS
Solution Stakeholders: CTOs, Compliance Officers, & Digital Transformation Leaders

Ready-Made Reports, Documents and Data-Tables

Smart Data Integrity

Precision Network Compliance

Custom-Interactive Dashboards

Regulatory Timeline & Alerts

Compliance Officer

Adequacy Checks before Submissions

Provider Data Directory

MComply

Gaps Reports

Network Manager

Recruit Providers to Fill Gaps

Data Extraction

- CMS and State Network Compliance Guidelines
- ECP Directory
- CMS Submission Rules, Required Documents, Standardization and Table(HSD) Formats

Source: CMS Website, Online Resources

- Population Density data by Geographic Area
- Official Address verification and Normalization Database

Source: US Census Bureau, US National Address Database (NAD)

- Geospatial Data on boundaries, latitude, longitude and Population centers

Source: U.S. Census Bureau's TIGER/Line Shapefiles, ESRI ArcGIS

System Design

Data Extraction from Sources

Provider Directory Data

Data Lake (AWS S3)

ETL Pipeline (Apache Nifi/Airflow)

Data Validation (Address Verification, Specialty Mapping)

Data Cleaning and Standardization

Operational DB(PostgreSQL + PostGIS)

MCheck Provider API
To improve provider data accuracy for health plans, ensuring that provider information such as addresses, specialties, and contact details is up-to-date

Cache Data (Redis)

User Interface

Models

Compliance Gap Identification Model

This rule-based algorithm model identifies compliance gaps across adequacy rules. It uses CMS compliance standards and provider data to determine if each region and specialty meets the benchmarks

Libraries and API: RASA SDK Rules, SQLAlchemy

Output: Compliance status and gap analysis

Geo-Spatial Analysis Model

This model analyzes time and distance to determine provider proximity to population centers, calculating travel duration, areas, and visualizing accessibility within required standards

Libraries and API: GeoPandas, Google Maps API, GeoPy

Output: Time and distance calculations with compliance status

Recommendations and Actionables Generation

This NLP-based model identifies steps to address compliance gaps. It suggests recruitment strategies, telehealth deployment and adjustments to optimize network adequacy.

Libraries and API: Scikit-Learn, (Spacy, GloVe, TextBlob)

Output: Recommendations for recruitment, telehealth expansion etc

Standardized Report Generation

Generates standardized reports to support compliance documentation and CMS submissions (health service delivery). Eg: Compliance Gap reports, HSD Tables

Libraries and API: Jinja2, ReportLab, OpenPyXL

Output: Structured PDF reports and HSD tables (CSV, XML)

Real-Time Interactive-Customizable Dashboard

n Denotes User Touchpoints

3 Data Selection
In Case of Multiple provider directories input

Dynamic Map
Showing all states and counties with Non-compliant states display a red hover icon

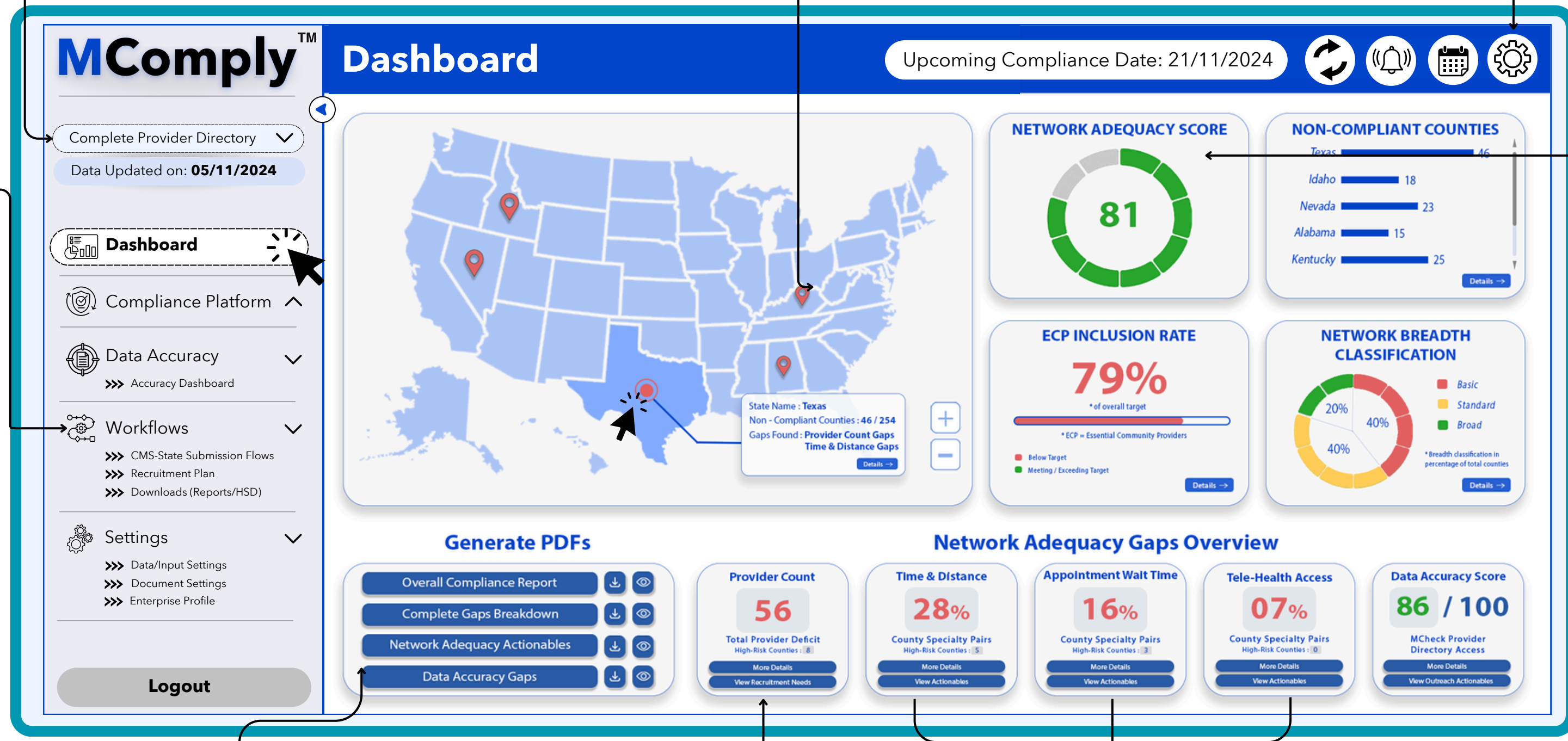**4 Dashboard Customization**

2 Timeline and Downloads

This section can manage Submission Flows to CMS, Recruitment Flows and timeline as per the gap and allow to download documents and tables (HSD)

M Comply™

Dashboard

Upcoming Compliance Date: 21/11/2024

Complete Provider Directory ⌄
Data Updated on: **05/11/2024**

- Dashboard
- Compliance Platform ⌃
- Data Accuracy ⌄
  - >>> Accuracy Dashboard
- Workflows ⌄
  - >>> CMS-State Submission Flows
  - >>> Recruitment Plan
  - >>> Downloads (Reports/HSD)
- Settings ⌄
  - >>> Data/Input Settings
  - >>> Document Settings
  - >>> Enterprise Profile

Logout

State Name : **Texas**
Non - Compliant Counties : **46 / 254**
Gaps Found : **Provider Count Gaps Time & Distance Gaps**
Details →

NETWORK ADEQUACY SCORE
81

NON-COMPLIANT COUNTIES
Texas — 46
Idaho — 18
Nevada — 23
Alabama — 15
Kentucky — 25
Details →

ECP INCLUSION RATE
79%
* of overall target
* ECP = Essential Community Providers
● Below Target
● Meeting / Exceeding Target
Details →

NETWORK BREADTH CLASSIFICATION
20% 40% 40%
● Basic
● Standard
● Broad
* Breadth classification in percentage of total counties
Details →

5 Overall Network Adequacy Score
gives a quick view of how well the network meets regulatory requirements

6 Adequacy Gaps
Represents the percentage of non-compliant county-specialty pairs due to each adequacy gap over all the Target States.
Eg. 28% of county-specialty pairs don't meet time & distance adequacy requirements.

1 Data Input

Settings Overview:
Easily set up compliance settings based on plan type —Medicare, Medicaid, or Commercial

Data Input Options:
Choose data input sources from local storage or cloud, configurable in Input Settings

Document Customization:
Tailor compliance documents and reports to specific needs within Document Settings

Generate PDFs
- Overall Compliance Report ⬇ 👁
- Complete Gaps Breakdown ⬇ 👁
- Network Adequacy Actionables ⬇ 👁
- Data Accuracy Gaps ⬇ 👁

Network Adequacy Gaps Overview

Provider Count
56
Total Provider Deficit
High-Risk Counties : 8
More Details
View Recruitment Needs

Time & Distance
28%
County Specialty Pairs
High-Risk Counties : 5
More Details
View Actionables

Appointment Wait Time
16%
County Specialty Pairs
High-Risk Counties : 3
More Details
View Actionables

Tele-Health Access
07%
County Specialty Pairs
High-Risk Counties : 0
More Details
View Actionables

Data Accuracy Score
86 / 100
MCheck Provider Directory Access
More Details
View Outreach Actionables

7 Quick Report Exports
Functionality to Generate PDFs used for Reporting, Maintaining Logs & Timelines, Manual Outreach for Improving Data Accuracy (Through Data Accuracy Gaps Report) etc.

7 Count of Provider Deficites
in target states that needs to be filled

High-Risk Counties
Counties with a large number of gaps are marked as high-risk counties for each particular adequacy gap type.
For example, Five counties show major gaps in meeting time and distance adequacy requirements across county-specialty pairs

Advanced Compliance Analytics and Insights

n Denotes User Touchpoints

Compliance Analytics
Compliance Analysis section for in-depth review of adequacy gaps using advanced filtering options

1 Compliance Analytics
State Filter dropdown provides a list of all states for filtered analysis and includes an 'All States' option to select all states simultaneously

Advanced Filtering
Option available for More advanced filters like
- Compliance Status
- Provider Type
- Population Coverage Threshold
- Distance Threshold

etc.

MComply

Complete Provider Directory ⌄
Data Updated on: **05/11/2024**

- Dashboard
- Compliance Platform ⌃
- Data Accuracy ⌄
  - ⋙ Accuracy Dashboard
- Workflows ⌄
  - ⋙ CMS/State Timelines
  - ⋙ Recruitment Plan
  - ⋙ Downloads (Reports/HSD)
- Settings ⌄
  - ⋙ Data/Input Settings
  - ⋙ Document Settings
  - ⋙ Enterprise Profile

Logout

Compliance Platform

Upcoming Compliance Date: 21/11/2024

Select State ⌄ | Select County ⌄ | Select County Type ⌄ | Select Specialty ⌄ | More ⇄

Compliance Summary

Overall Compliance Score
82 / 100

Provider Count Compliance
75 / 100

Time and Distance Compliance
80 / 100

Appointment Wait Time Compliance
78 / 100

Tele-Health Access Compliance
81 / 100

Data Accuracy Score
78 / 100

View Previous Filters / Logs
Save Filtered View
Generate Compliance Report
Generate Actionables List

Provider Count | Time and Distance | Appointment Wait Times | Tele-Health Availability | ECP Inclusion

State	County	Specialty	Required Provider Count	Current Provider Count	Provider Deficit	Population Coverage (%)	Compliance Status
Texas	Harris	Primary Care	12	9	3	75 %	Non - Compliant →
Arizona	Cochise	Cardiology	5	7	0	98 %	Compliant →
California	Santa Clara	Behavioral Health	10	6	4	63 %	Non - Compliant →

County Specialty Gaps Identified (Prioritized on Urgency)
• Santa Clara County, CA – Behavioral Health: Requires 3 additional providers to meet population coverage standards.
•
•
View All

Quick Actionables (Prioritized on Urgency)
• Prioritize recruiting 5 Primary Care Providers in Harris County, TX.
•
•
View All

2 Compliance Types
For analyzing network adequacy across various compliance types. The table below displays key parameters relevant to each compliance type and shows all the County-Specialty Pairs both compliant and Non-compliant

3 Provider List
Arrow allows to view all providers within a specific county-specialty pair, including key parameters for adequacy checks

5 Quick Actionables
Provide a prioritized list of actions, such as addressing recruitment needs or handling discrepancies in provider data, which may lead to provider removal if necessary

7 Save Filtered View/ View Previous Filters & Logs

6 Actionable Reports
Action button to generate an optimized actionable list, prioritizing coverage of all inadequacy gaps while minimizing overall recruitment needs

4 Identified Gaps
List of county-specialty gaps based on selected filters prioritized according to the urgency

Scalable Pricing Model & Market Positioning

Pricing Strategy

We'll use tiered pricing with an additional usage-based fee to suit different company sizes, plans, and usage patterns, ensuring scalability and steady revenue

- **Tiered Base Fee (Upfront Subscription Cost):** A fixed monthly charge based on company size, and setup needs, covering platform access, support, & customization
- **Usage-Based Fee (Variable Costs):** A variable charge based on the amount of data processed

Basic

$2999/month

billed monthly

$3 for every GB of data processed

[Get Basic]

- ✓ Complete Network Adequacy
- ✓ Basic Reporting
- ⊗ Data Accuracy with Mcheck
- ⊗ Standardized Tables and Reports
- ⊗ Timelines and Workflow Integration
- ⊗ Platform Customization

Plus

$9999/month

billed monthly

$1 for every GB of data processed

[Get Plus]

- ✓ Complete Network Adequacy
- ✓ Basic Reporting
- ✓ Data Accuracy with Mcheck
- ✓ Standardized Tables and Reports
- ⊗ Timelines and Workflow Integration
- ⊗ Platform Customization

Premium

$24999/month

billed monthly

$0.5 for every GB of data processed

[Get Premium]

- ✓ Complete Network Adequacy
- ✓ Basic Reporting
- ✓ Data Accuracy with Mcheck
- ✓ Standardized Tables and Reports
- ✓ Timelines and Workflow Integration
- ✓ Platform Customization

In the initial phase, we need to **monitor the balance of revenue** from base fees versus usage fees to understand customer behavior and value perception. **Adjustments to pricing tiers** or the inclusion of more features in the base fee might be needed to optimize revenue

Cost Structure

It's important to balance charging sufficiently to cover expenses and achieve profitability while maintaining **prices low enough to attract the customer volume necessary** for business expansion. Entering a new market requires us to control expenses via revenue generation and to capture market share
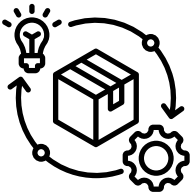
Product development
$250,000

Fixed Costs
$200,000/Yr

Variable Costs
$0.3/GB

Link to Guesstimate for Complete Cost-Breakdown

Revenue Projection

$$1200 \times 20\% \times \$150K = \$36M \text{ annually}$$

1200		20%		$150K		$36M annually
No. Of Insurance providers in 2023	×	% Penetration	×	ARPU	=	Projected Revenue

**This is just a Guesstimate for Revenue (Penetration based on research)

PEST Analysis

Political: Compliance with CMS & state adequacy standards (e.g., HIPAA) is crucial, with regulatory fines driving demand

Economical: Insurers face high compliance costs, making our solution attractive. Rising healthcare IT budgets further support adoption

Social: Patients expect accessible care and data transparency. An aging population heightens demand for adequate provider networks

Technological: AI advancements boost network adequacy, while interoperability supports integration with existing systems

Source: NAIC Report, Market Penetration

Success Metrics, Pitfalls and Mitigations and Future Enhancements

Success Metrics

✦ **North Star Metric: "Time to Compliance Insights"**

This metric evaluates how effectively the **platform aids in quickly identifying and prioritizing compliance gaps**. It combines elements of data integration, real-time analytics, and ease of navigation to provide users with actionable insights

$$\text{Time to compliance Insights} = \frac{\text{Sum of "Time from Provider Data Update to Prioritized Insight"}}{\text{Total Number of Data updates}}$$

Success Metrics based on the Pirate Funnel Framework (AAARRR)

Awareness	• # of visitors to the service's web page • % of Visitors Engaging with the Webpage
Acquisition	• # of Visitors Signing Up (Lead-to-Signup Conversion Rate) • % of Visitors Who Become Paying Customers (Customer Conversion Rate) • Customer Acquisition Cost (CAC)
Activation	• % of New Users Completing Onboarding • Average Time Spent on the Platform per session • # Time to First Insight (From Onboarding to First Compliance Check)
Retention	• User Retention Rate • Churn Rate • Feature Utilization Rate
Revenue	• Monthly Recurring Revenue (MRR) • Customer Lifetime Value (CLV) • Expansion Revenue Rate
Referral	• Net Promoter Score (NPS) • Referral Rate • Viral Coefficient

Pitfalls & Mitigations

User Adoption and Platform Learning Curve	Users may face a **steep learning curve** or underutilize features, impacting overall platform effectiveness	Offer **intuitive onboarding**, in-app guidance, and user support, as well as regular training sessions to ensure users understand key functionalities
Scalability and Maintenance Challenges	Increasing data volume and a **growing number of rules** can lead to performance issues and make the system difficult to maintain	Use a hybrid rule-based and ML approach for easier maintenance, and **implement microservices** and cloud functions for efficient scaling
Data Security and Compliance Risks	Potential risks with sensitive compliance and healthcare data; failure could lead to severe **legal repercussions**	Implement advanced encryption, conduct **regular security audits**, and ensure adherence to regulatory standards like HIPAA and GDPR
Difficulty in Adapting to Changes in Health Regulations	Constant updates in CMS and state regulations can make it **challenging to keep the system compliant**, risking regulatory issues	The compliance monitoring team will track regulatory changes regularly. Use **modular rule configurations** to update rules without significant system changes

Future Enhancements

Advanced API Access for External Systems: Provide **API access** for network adequacy check, enabling integration with clients' existing ERP and compliance management systems

Global Compliance Features for International Expansion: Extend the platform's capabilities to cover **international compliance standards**, opening doors for markets outside the U.S

GenAI-Powered Compliance Insights: Integrate Generative AI to auto-generate detailed, easy-to-understand compliance reports and summaries, offering clear explanations of gaps, **tailored recommendations**, and CMS-ready documentation

Direct Integration with Provider Recruitment Platforms (PS 2): Enable seamless integration with **provider recruitment platform**, allowing users to directly address compliance gaps by identifying and recruiting qualified providers in regions where gaps are identified, streamlining the process of network adequacy compliance