



Situation/Challenges

The failure of most health apps(including wellness management apps and prescription/non-prescription DTx apps) is caused by **the lack of interoperability** and **non-diversified services**.

Goal

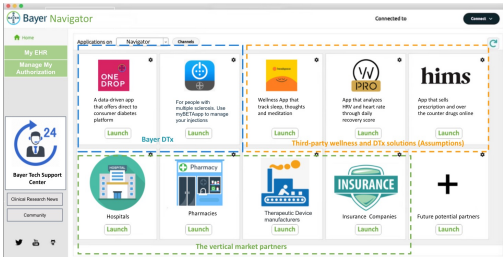
To achieve the goal of interoperability and diversified service.

At the same time, ensure the security, integrity and timeliness of healthcare data.

Solutions

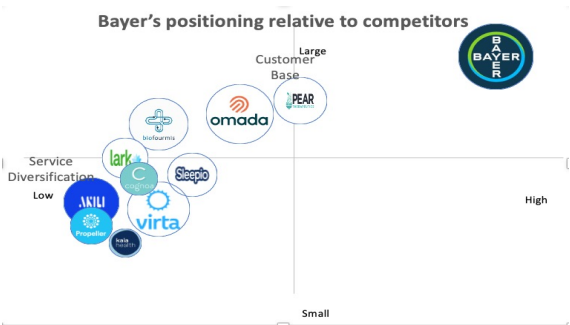
Bayer Navigator is a one-stop platform empowered by blockchain technology and an EHR system.

Build partnership with vertical and horizontal market players to provide users comprehensive and diversified services.



Impact

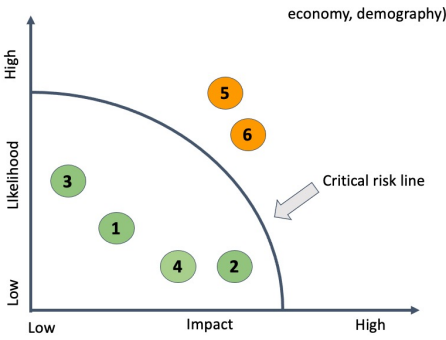
It creates opportunities and possibilities in increasing synergy effects from new alliances. Bayer will be far ahead of other DTx competitors in terms of service diversification and customer base.



Implementation/ risk evaluation

Two major risks need to be mitigated:

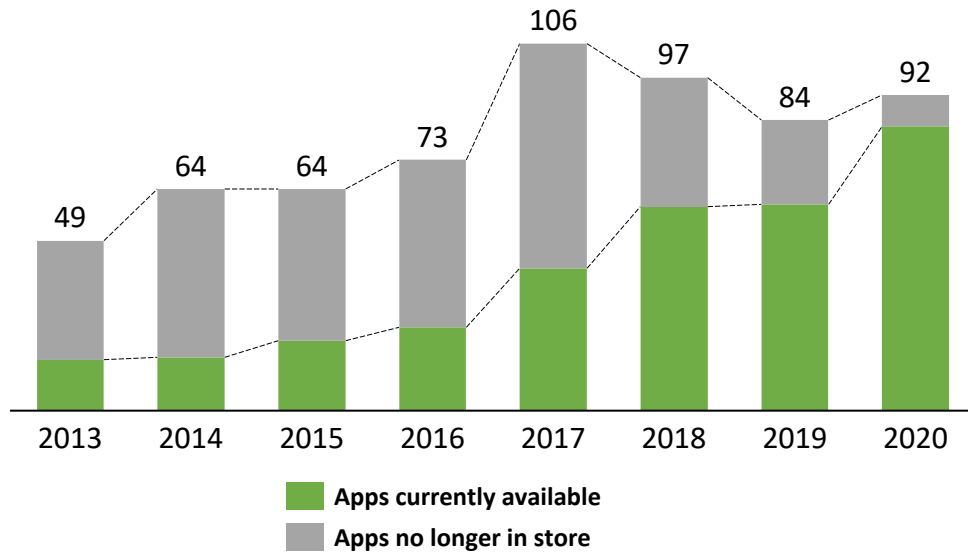
1. Potential Competition Risk
2. Compliance Risk



Interoperability and service diversification are the two major challenges in Digital Therapeutics.

The large number of health app failures is caused by...

The Number of Release and Removal Health Apps(Thousands) from Stores Over Time

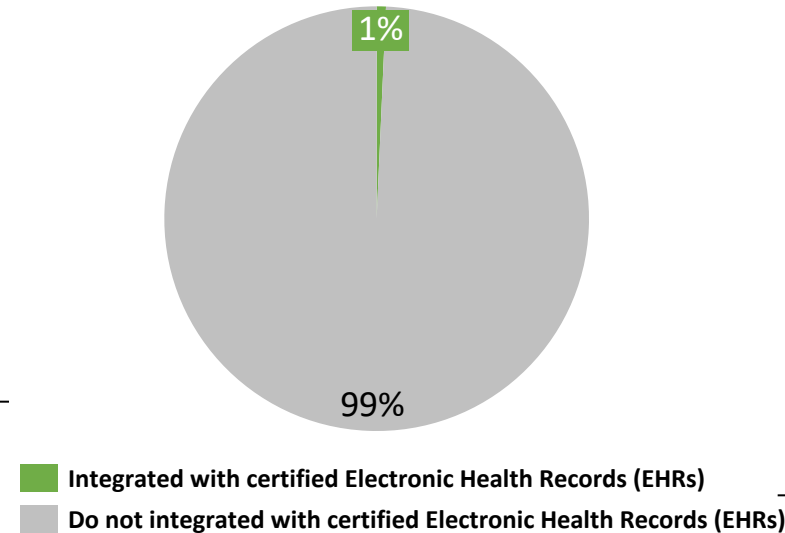


Source: 42 Matters, Jun 2021 and Jul 2017; Mevvy, Jun 2015; IQVIA AppScript App Database, Jun 2021; IQVIA Institute, Jun 2021
 Note: Includes digital health apps that are publicly available to consumers and caterized as Health& Fitness or Medical

- 85% of health apps have fewer than 5,000 downloads.
- Less than 600 published studies on digital health app efficacy.
- The net gain of 32,736 apps in the period between July 2017-June 2021 reflects over a third of apps(n=116,481) already removed from store, and the removal of nearly twice as many older apps(released prior to 2017).

...the lack of interoperability...

The Portion of Health apps that Integrate with Certified Electronic Health Records in Year 2020

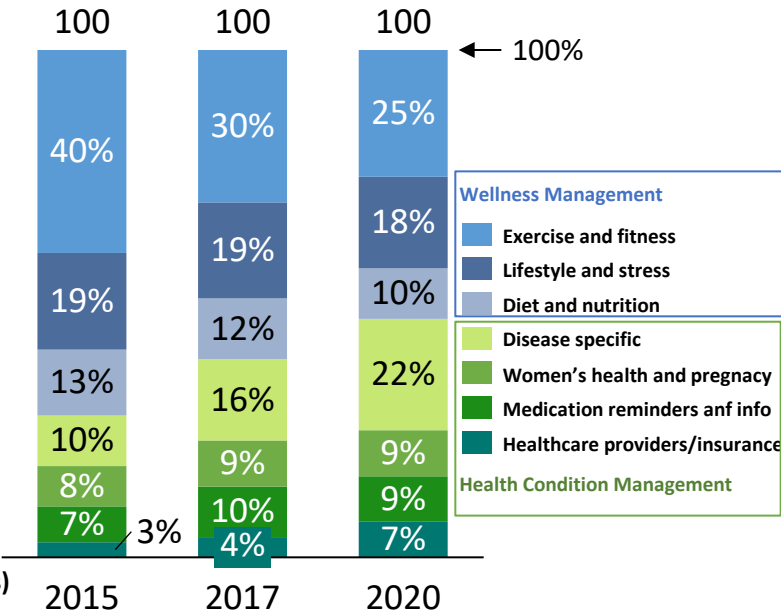


Source: the HHS' Office of the National Coordinator for Health Information Tech (ONC).

- The information deficit severely impacts patient safety and speed of care, and further, it increases overall system cost.
- The number of healthcare apps that integrate with certified electronic health records increased to 734 apps in 2020, which only take 1% of the market.
- The clinical decision support apps only made up 38% of all EHR-integrated apps.

...and non-diversified service.

Digital Health by Category and Disease State



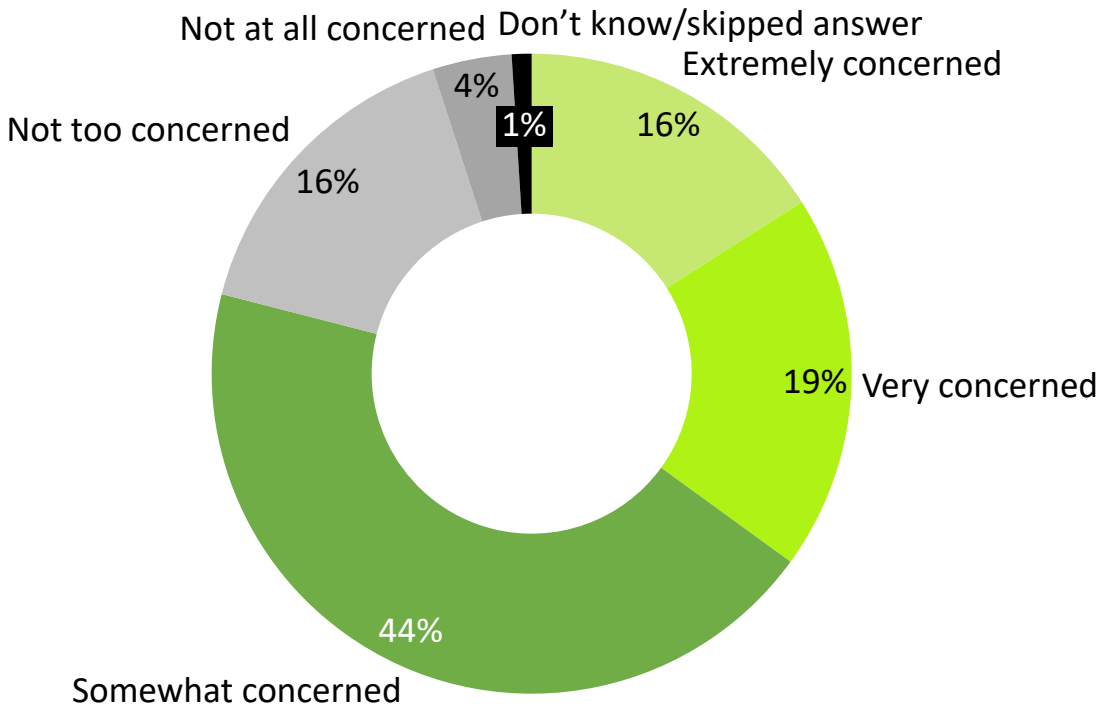
Source: 42 Matters, Jun 2021 and Jul 2017; Mevvy, Jun 2015; IQVIA AppScript App Database, Jun 2021; IQVIA Institute, Jun 2021

- The non-diversified service adds the customer retention pressure for companies.
- 90% of failed health apps offers <2 health management services.
- Though mental health and behavioral disorders are the leading category in the health condition management apps, its 22% represents a decline from 28% in 2017.

Data Security, Integrity and Timeliness are the fundamental drivers for the therapeutic services and customer satisfaction.

Majority of US adults have concerns regarding to their healthcare data...

Level of Concern that US Adults Have About the Privacy of Their Medical Information and Data on Health Apps, July 2020
% of respondents



Source: Pew Charitable Trusts, "Pew HIT National Survey" conducted by Public Opinion Strategies and Hart Research Associates, Sep 16, 2020

- Data breaches/hacking, unauthorized data use from provider, and Divulging personal health information to others(employer, family, etc.) are the major concerns.
- A lack of confidence in security could chip away at patient trust and ultimately hurt patient retention.

...and a blockchain solution can minimize concerns and ensure data integrity and timeliness.



Data Security

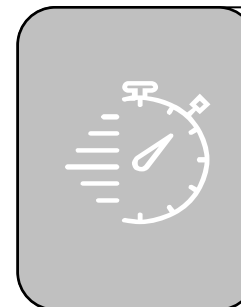
Blockchain is encrypted by nature that makes it possible to provide proper validation, which makes it unfeasible to attack. In addition, **blockchain can be private.**

Bayer can still get the benefits of a decentralized peer-to-peer network, but anyone accessing a private blockchain must authenticate their identity to gain access privileges



Data Integrity

By design, blockchain is inherently resistant to the modification of data. Blockchain ledgers are immutable meaning that if healthcare data addition has been made, it cannot be edited or deleted. Blockchain reduces the chance of healthcare data being compromised.



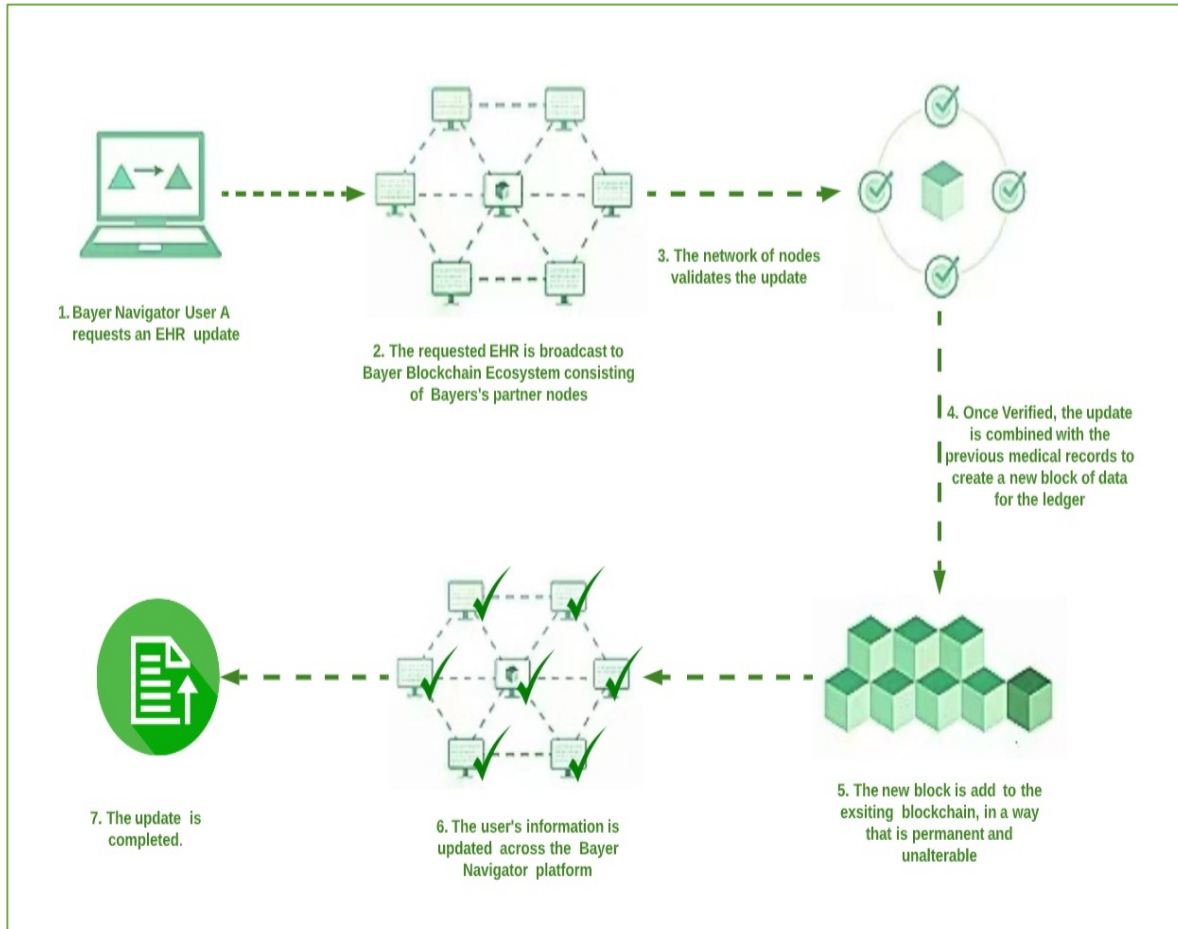
Timeliness

The Electronic Health Records(EHR) can be delivered to the nodes on blockchain timely. This process may result in real-time updates of health information, which can improve the efficiency.

Introducing one-stop platform empowered by blockchain technology: Bayer Navigator

To achieve interoperability

Bayer Navigator integrates EHR system and blockchain technology. The process is shown below:



To achieve service diversification

Bayer Navigator is incorporated with horizontal market partners and vertical market partners.

Potential horizontal market partners:

- **Prescription Digital Therapeutic:** Regulated, Prescribed via HCP, High-priced
- **Non-prescription Digital Therapeutic:** Unregulated, Available via employer benefits, Moderately priced.
- **Wellness App:** Unregulated, All access, Free

Potential vertical market partners:

- **Hospital:** Community Hospitals (Nonfederal Acute Care), Federal Government Hospitals, Nonfederal Psychiatric Care, Nonfederal Long-term Care.
- **Insurance Company:** Exclusive Provider Organization (EPO), Preferred Provider Organization (PPO), Point of Service (POS), Health Maintenance Organization (HMO)
- **Pharmacy:** community pharmacy, hospital pharmacy, clinical pharmacy, industrial pharmacy, compounding pharmacy, etc.
- **Digital therapeutic device manufacturers**

Introducing one-stop platform empowered by blockchain technology: Bayer Navigator (Cont.)



1

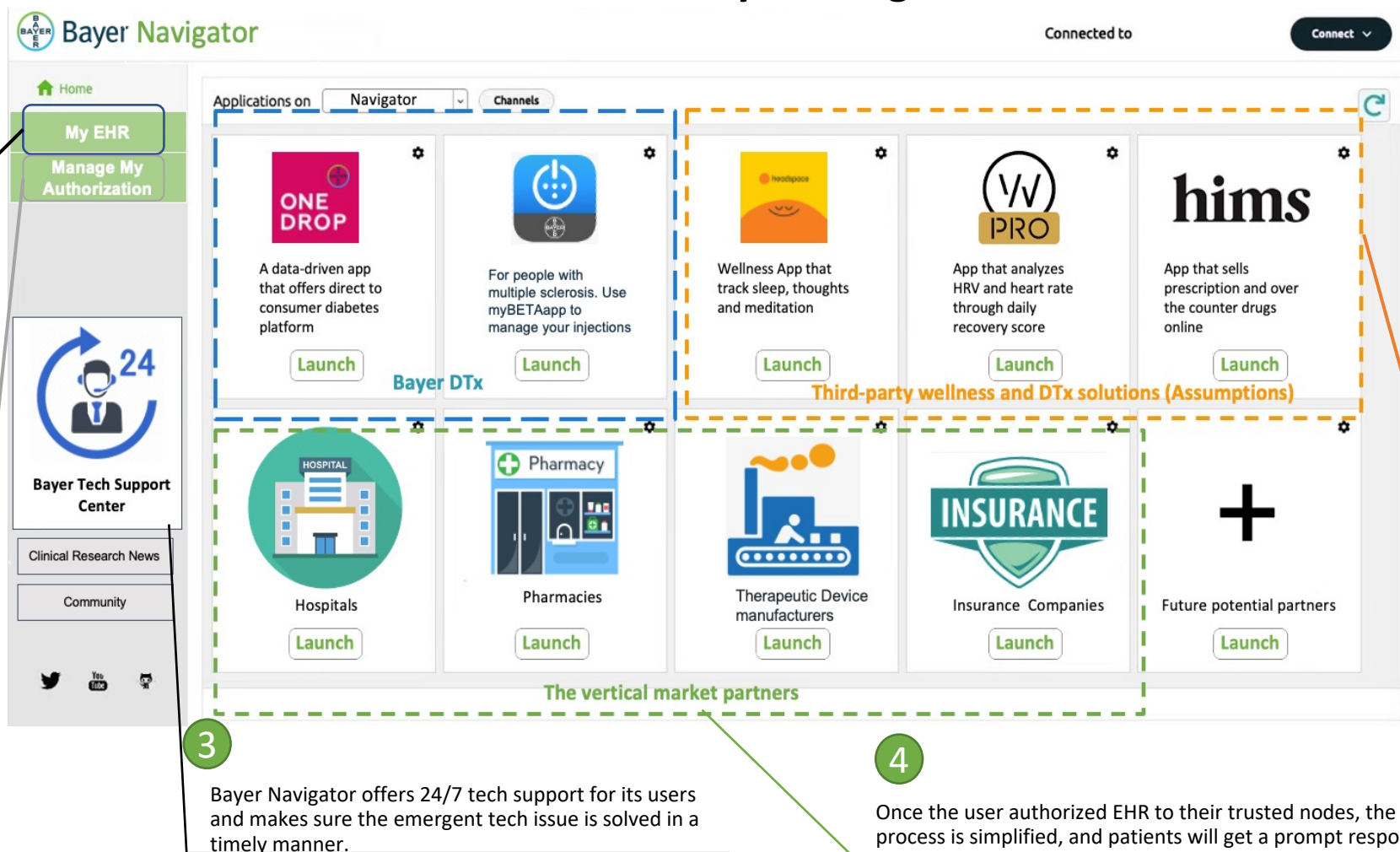
Bayer Navigator offers EHR management solutions for its users. Users can upload the record. (The detailed process can be viewed in the previous deck)

2

The EHR was encrypted and stored on the blockchain, and organizations (nodes) needed a decryption token from users to access the information. Users have three options:

1. sending the dynamic decryption token to the specific nodes for the single access.
2. and sending a highly-secured token to the specific nodes for permanent access.
3. Not sending the decryption token to the specific nodes. The information stays encrypted.

User View of Bayer Navigator



5

Having third-party service providers (ranging from wellness management to DTx) can offer diversified services to Bayer Navigator users. From Bayer's perspective, they can reduce the exposure to Bayer's operational risks. From third-party service providers' perspectives, they can have a solid customer base that Bayer has built.

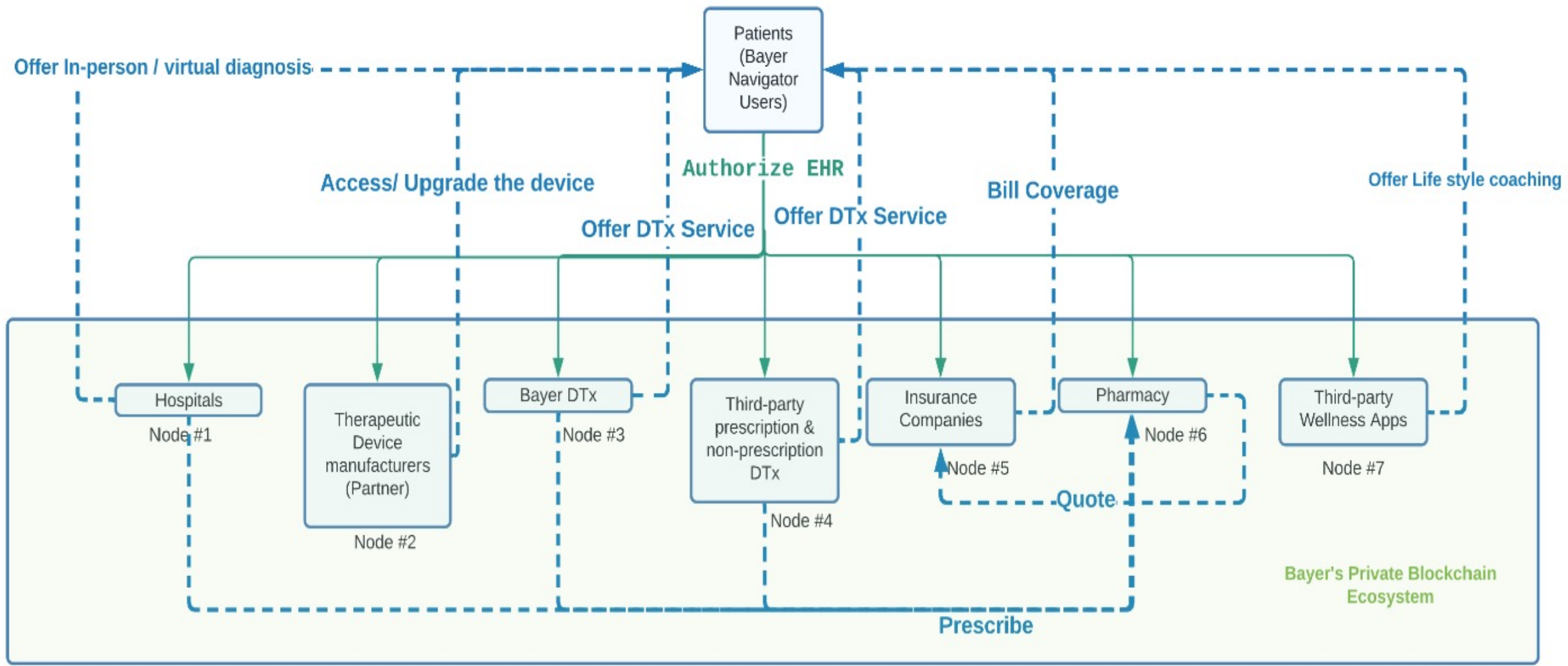
3

Bayer Navigator offers 24/7 tech support for its users and makes sure the emergent tech issue is solved in a timely manner.

4

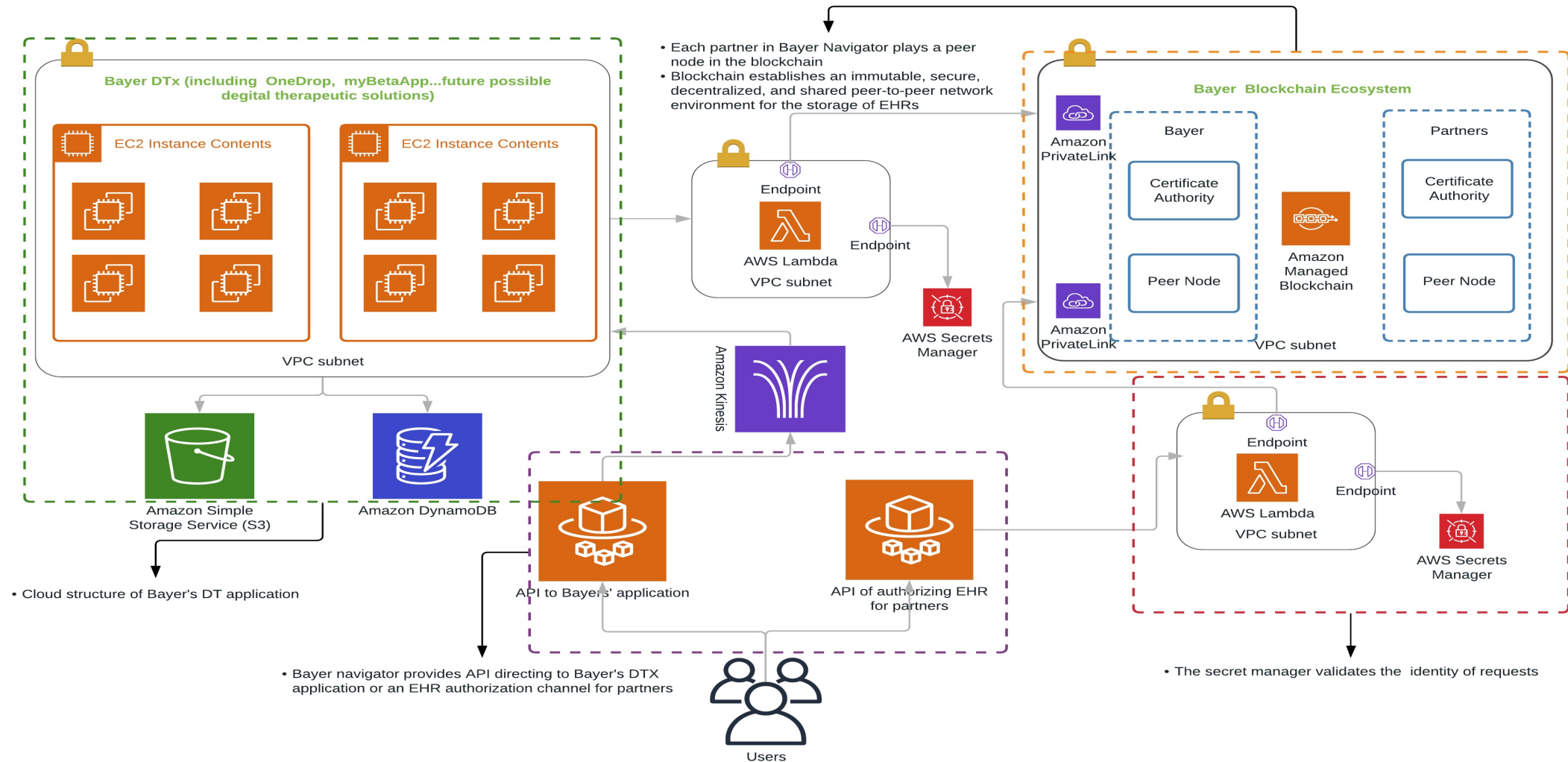
Once the user authorized EHR to their trusted nodes, the registration process is simplified, and patients will get a prompt response from the doctors, pharmacist, device manufacturers and insurers.

Bayer Navigator established an ecosystem through the interflow of highly secured data from users and the nodes on the private blockchain.



The infrastructure recommendation for the Bayer Navigator platform

We assume Bayer will adopt AWS for their cloud and blockchain services to lower the infrastructure operational cost. So that Bayer can focus on value-added activities to create better customer experiences and diversified offerings.



Bayer Navigator makes it possible for Bayer to achieve a greater customer base and highly diversified service.



Bayer’s positioning relative to competitors



Bayer Navigator solves problems in lack of interoperability through the uses of EHR and blockchain technology. Meanwhile, addressing the concerns in non-diversified services, Bayer developed segments in both horizontal and vertical market partners. By introducing Bayer Navigator, the positioning of the target segments differentiates Bayer from other DTx competitors. Bayer's new digital therapeutics approach creates opportunities and possibilities in increasing synergy effects from new alliances. In this process, Bayer will be far ahead of other DTx competitors in terms of service diversification and customer base. It is difficult for competitors to replicate Bayer's strategy in digital therapeutics, which makes the new perception of combining EHR and blockchain technology with Bayer Navigator a holistic approach.

Note: We mapped several key DTx players in the current market and majority of them only focused less than three specialties. The size of the circle is determined by the amount of funding they got by December,2020 (source: The Digital Therapeutics Report. Insider Intelligence eMarketer).

In order to successfully implement the Bayer Navigator platform by 2032, it is important to mitigate major risk factors.



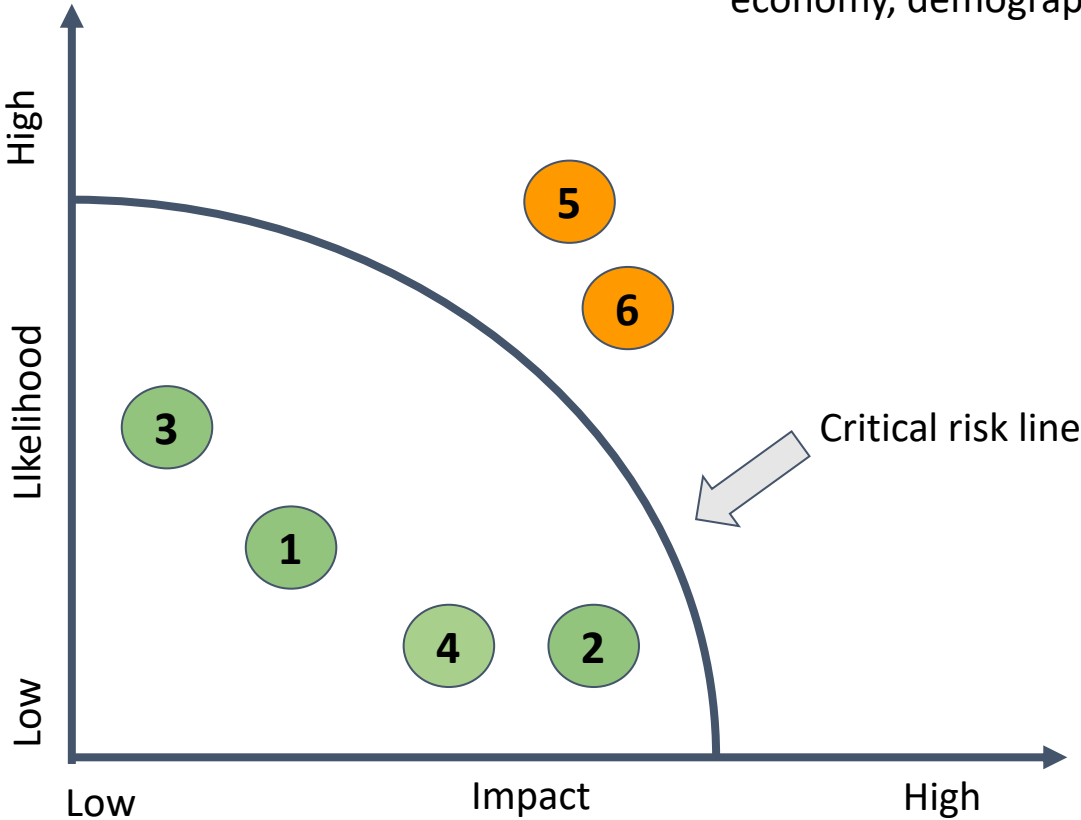
Minor Risk

- 1

Partnership Risk
(Contract issue and default risk)
Implementation Risk
(the potential for a development or deployment failure)
- 3

Revenue Risk
(stable income, solid growth rate, reasonable cost structure)
- 4

Macroeconomics Risk
(Covid-19, the recovery of economy, demography)



Major Risk

- 5

Potential Competition Risk
(Whether the current pattern easy to imitate?
e.g. Health systems Intermountain Healthcare, Presbyterian Healthcare Services, and SSM Health co-launched a digital health transformation company called Graphite Health)
- 6

Compliance Risk
(Potential exposure to legal penalties, financial forfeiture and material loss e.g. Only 22% of EHR-integrated apps support FHIR, the industry-wide interoperability standard for data exchange, according to the ONC's new data.)

How to mitigate?	Mitigation factors
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- | | | |
|---|---|------------------------------------|
| 5 | <ul style="list-style-type: none">Create uncopiable customer experiencesBuild a recognizable brand | Customer Service
Brand Loyalty |
| 6 | <ul style="list-style-type: none">Understand the latest enforcement policiesBuild a culture of ethics and compliance | Time-sensitive
Internal control |