

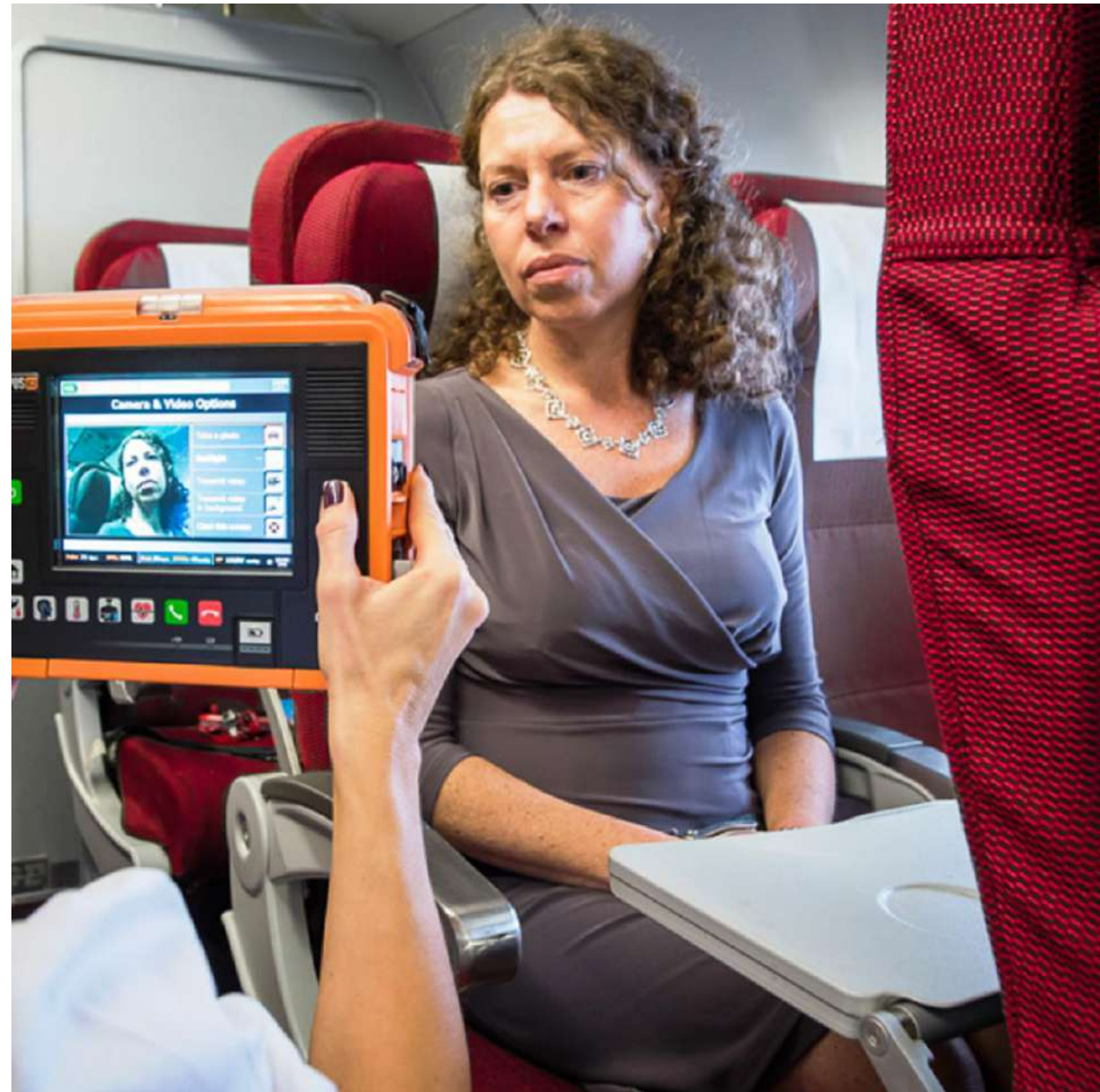
Telemedicine Foundations: Synchronous, Asynchronous, and Monitoring Modalities

DigHealth –
Micro-credentials in digital health for Ethiopia and Somalia

Proj. Ref. Num. 101179425

Capacity Building in the field of Higher Education

Introduction to Telemedicine Delivery Modalities



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Telemedicine uses various communication methods to connect providers and patients.
Three main modalities:
Synchronous
Asynchronous (Store-and-Forward)
Remote Monitoring
Each differs in timing, technology, and clinical applications.

Synchronous Telemedicine: Definition

Definition: Real-time communication between patient and provider.

- Can be video calls, voice calls, or live chat.
- Requires both parties to be present at the same time.

Synchronous: Key Features & Technologies

Features:

- Immediate feedback
- Interactive discussion, assessment, counseling

Technologies:

- Video conferencing platforms (Zoom, Teams, specialized telemedicine solutions)
- Secure telehealth portals
- Telephone consultations

Synchronous: Clinical Use Cases

Applications:

- Virtual urgent care visits
- Psychiatry and mental health counseling
- Specialist consultations (cardiology, dermatology, pediatrics)

- Follow-up appointments

Benefits:

- Patient-clinician rapport
- Faster decision-making

USE CASES: 14 Best HIPAA-Compliant Telehealth Platforms in 2025

A HIPAA-compliant telehealth platform enables healthcare providers to deliver remote care while securely managing patient information. These platforms facilitate virtual consultations, secure messaging, and data sharing, all while adhering to strict regulations that protect patient privacy.

The goal is to ensure that sensitive health information remains safe, whether it's shared during a video visit or stored in the cloud. By meeting HIPAA standards, these platforms allow healthcare providers to expand their reach and offer flexible care options without compromising the security and confidentiality of patient data.

Key Features of HIPAA-Compliant Telehealth Platforms

Data encryption: HIPAA-compliant telehealth platforms use robust encryption methods to protect sensitive health information, both during transmission and while stored. This dual layer of encryption ensures that patient data remains secure against unauthorized access at all times, whether it's being shared during a video consultation or saved in the cloud.

Secure communication: These platforms offer encrypted video conferencing and chat functionalities, which are essential for protecting patient-provider interactions. By encrypting these communications end-to-end, the platform ensures that sensitive discussions remain private, meeting the strict confidentiality standards required by HIPAA.

Key Features of HIPAA-Compliant Telehealth Platforms

Access control: Role-based access control is implemented to limit who can view or edit patient information based on their role within the organization. This feature allows administrators to set permissions that align with each staff member's responsibilities, ensuring that only those who need access to patient data can obtain it, which helps maintain privacy and security.

Audit trails: A comprehensive audit trail records every instance of data access or modification, detailing who interacted with patient information and what changes were made. This is critical for HIPAA compliance, as it provides a transparent log that can be reviewed for accountability and to verify adherence to privacy protocols.

Key Features of HIPAA-Compliant Telehealth Platforms

Cloud security: HIPAA-compliant platforms offer secure, compliant cloud storage for patient records, protecting against potential data breaches. This ensures that sensitive health information remains safe and is stored according to stringent security standards, making it readily accessible to authorized users while maintaining full compliance.

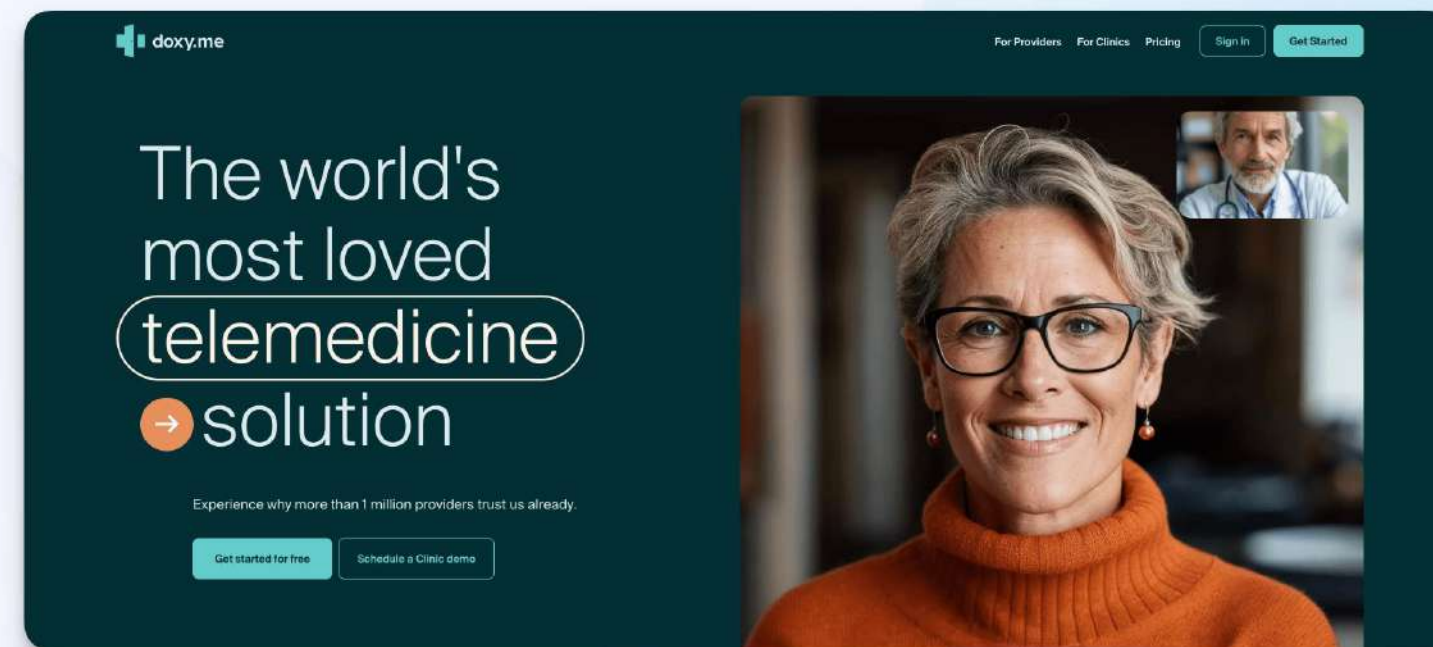
Ease of use: A user-friendly interface benefits both healthcare providers and patients. Choose a platform that simplifies navigation and makes remote consultations easy so that patients can access care seamlessly and providers can focus on delivering quality service.

Key Features of HIPAA-Compliant Telehealth Platforms

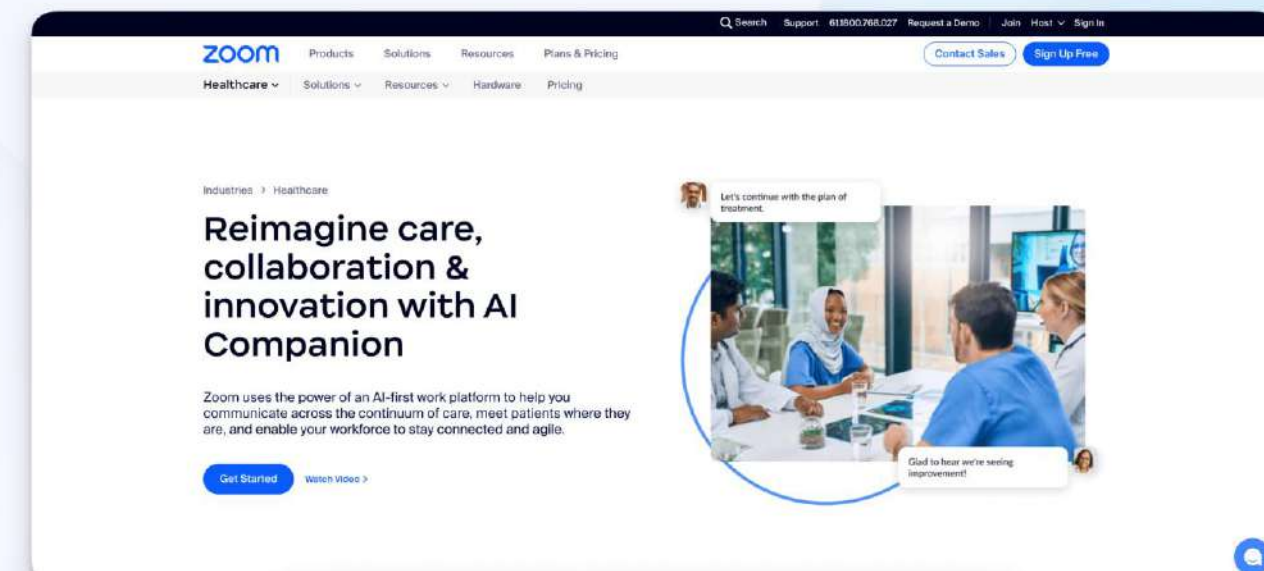
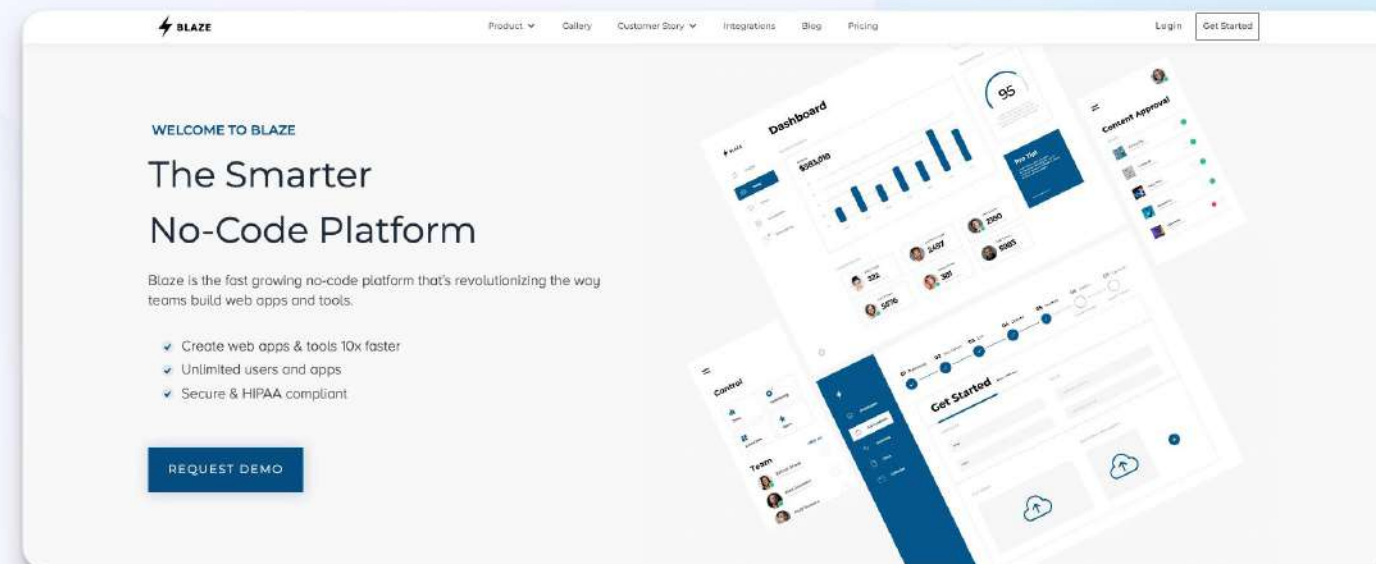
Integration capabilities: Telehealth platforms that integrate with existing EHR systems help streamline operations by keeping all patient information in one place. This minimizes disruptions to your workflow and allows for a smoother transition between in-person and remote care.

Customization: Practices have different needs, so a telehealth platform should offer customizable features that allow you to tailor the experience to your specific requirements. Whether it's customizing the user interface or setting up specific workflows, flexibility is key.

List of platforms



<https://www.blaze.tech/post/hipaa-compliant-telehealth-platforms>



Asynchronous (Store-and-Forward) telemedicine: Definition

Definition: Information and clinical data (images, recordings, documents) are collected, stored, and later sent to the provider for review.

Interaction does not occur in real time.

Asynchronous: Key Features & Technologies

Features:

- Not time-bound; parties act on their own schedules.
- Enables review, consultation, or diagnosis later.

Technologies:

- Secure messaging portals
- Electronic forms/document uploads
- Teledermatology/photo sharing
- PACS (Picture Archiving and Communication System) for imaging

Asynchronous: Clinical Use Cases

Applications:

- Teleradiology (sending X-rays, MRIs for later interpretation)
- Teledermatology (skin images for delayed diagnosis)
- Pathology (lab results review)
- Specialist consults requiring extensive record review

Benefits:

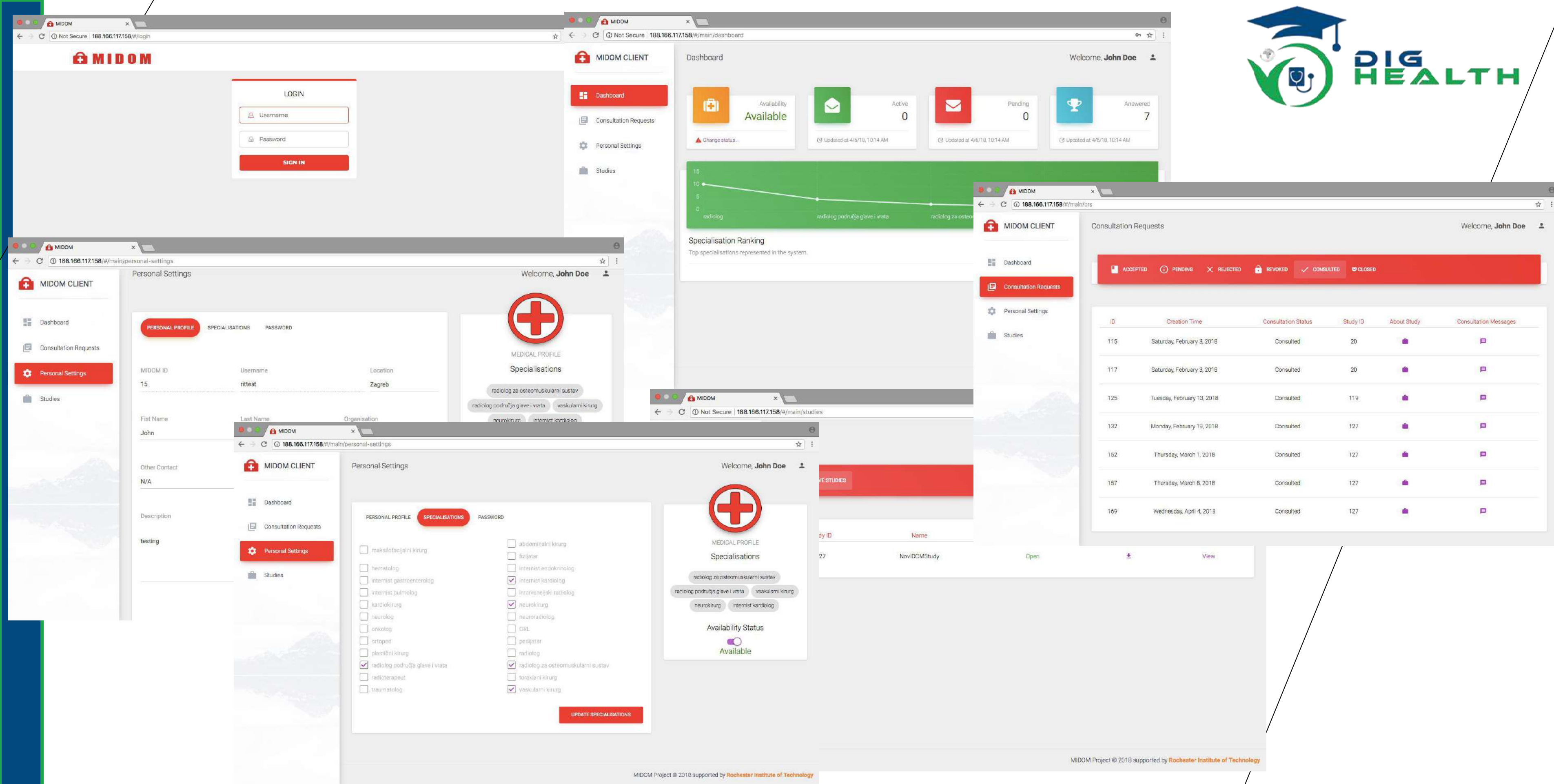
- Efficiency for busy clinicians
- Useful in low-bandwidth or time zone-separated settings

USE case: Medical Imaging and Diagnostics On the Move (MIDOM)

Defining a system for allowing medical diagnostics to be performed in a collaborative, distributed and mobile environment. Primary system users can be medical specialists (radiologists etc.) that will be able to seek consultations/opinions from their colleagues from other departments/locations/institutions, regarding specific diagnostic procedure results.

The novelty of MIDOM is that it utilizes mobile technology to reach the gap between diagnosticians and medical specialists providing required expertise in the interpretation of diagnostic imaging data.

Exchanged data in the form of studies consisting of different multimedia content, could be made available to users regardless of their current location by providing them with access to data from their mobile devices.



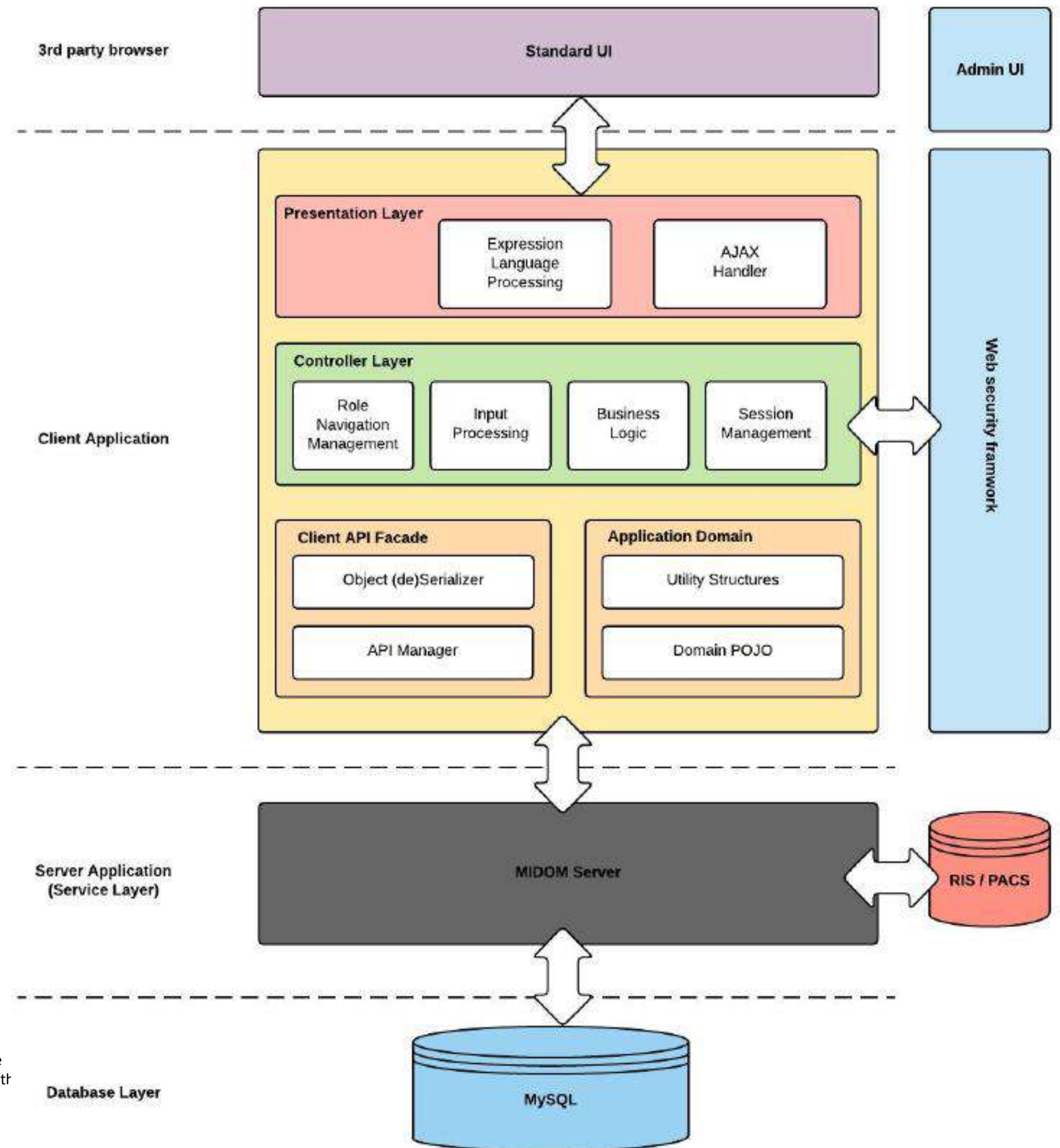
Main components of the MIDOM system

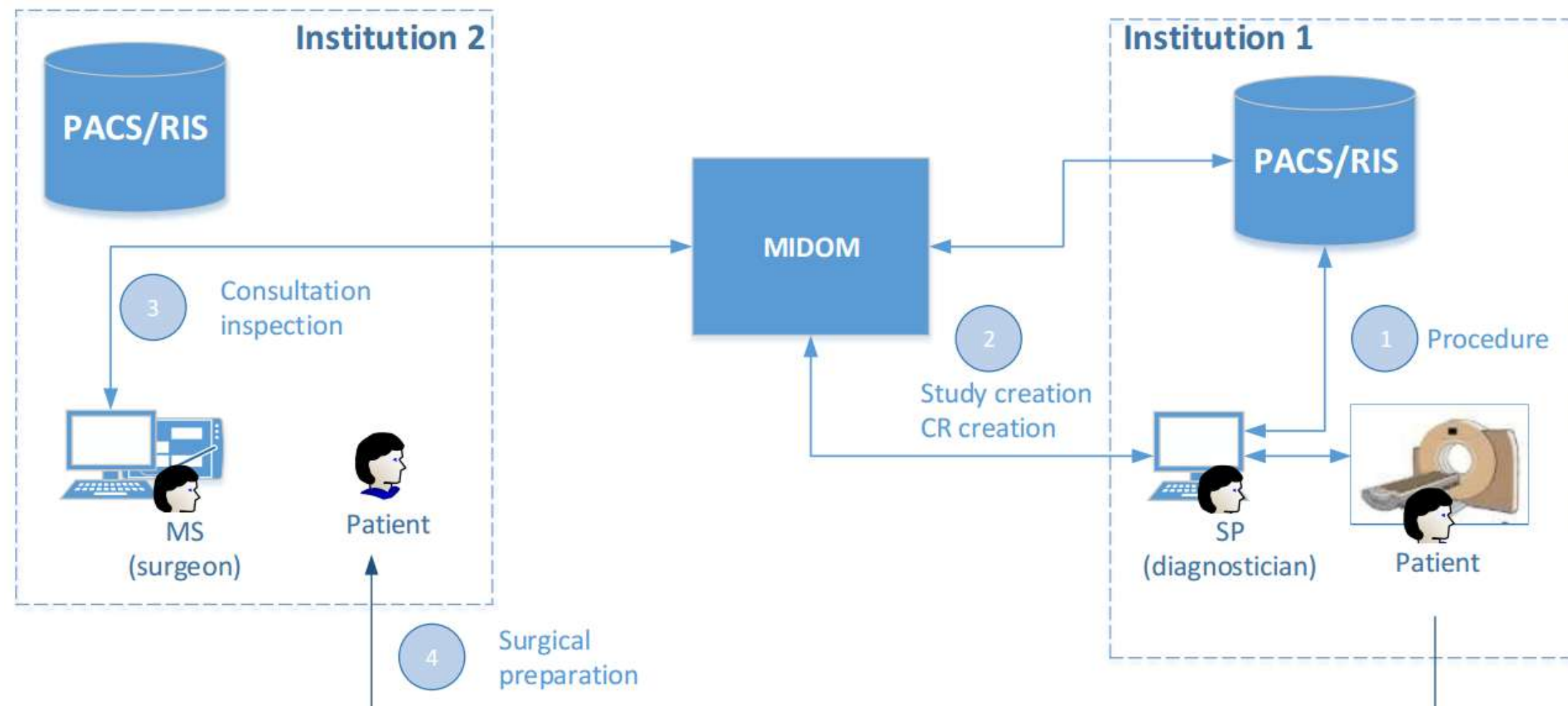
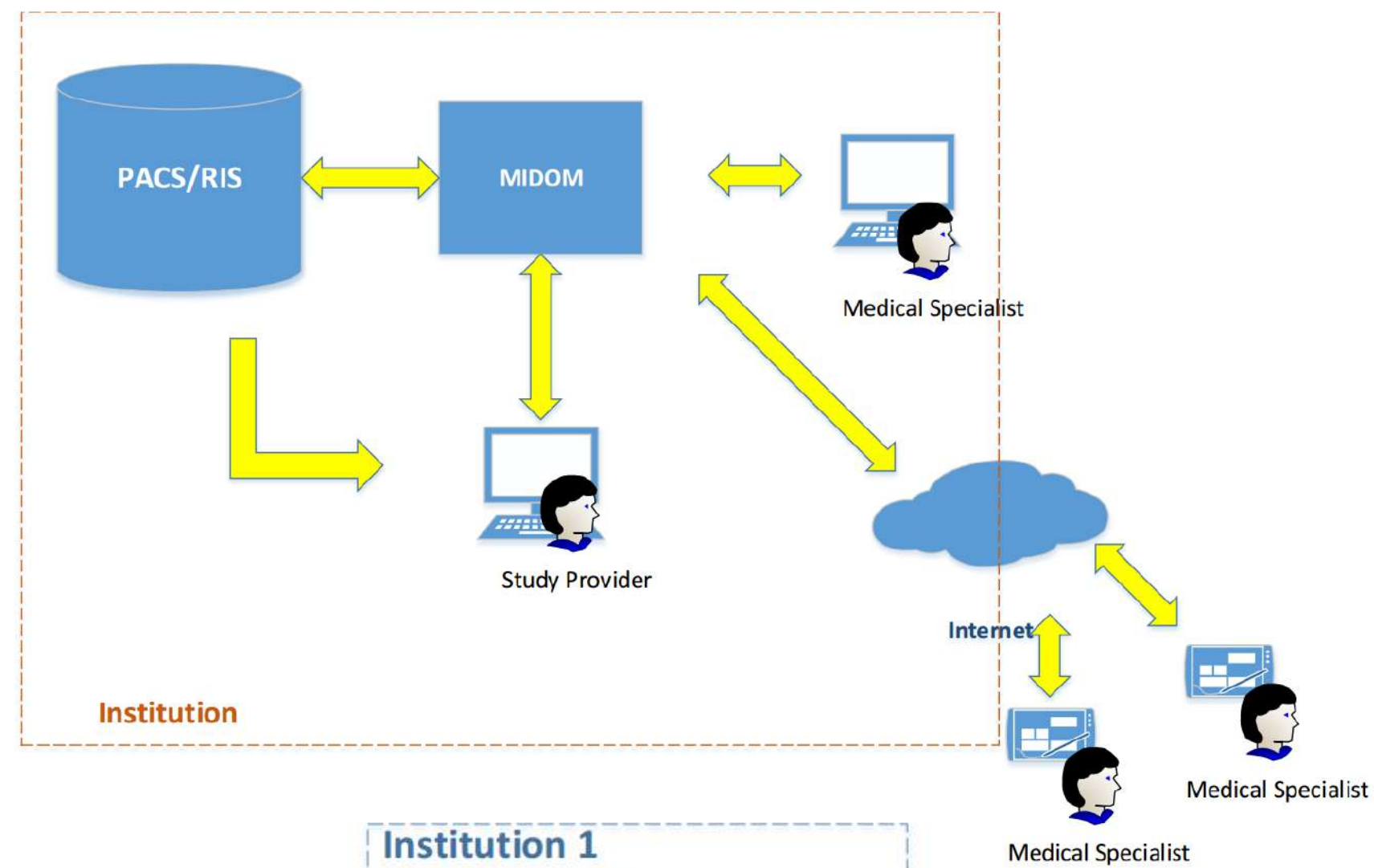
MIDOM server component – the central application that facilitates the collaboration of medical specialists on sets of diagnostic procedure results (studies). This component hosts studies and related multimedia (high-resolution image) data and keeps track of the status of each study and consultation request. MIDOM server performs computationally and storage-intensive operations in order to adjust to communication and processing power characteristics of the Medical Specialist end devices.

Study Provider (SP) component is used by medical specialists seeking consultations with other colleagues. It allows inspection, selection and extraction of diagnostic imaging data from the hospital's information system (HIS) or PACS/RIS in order to form a study. It also allows for requests for consultations and collection of feedback/opinions returned by Medical Specialists through MS component.

Medical Specialist (MS) component is a mobile part of the system, where medical specialists offering consultation services are able to accept consultation requests (CRs), inspect diagnostic data for which consultation was requested and provide feedback. MS end devices (most frequently in the form of tablets, laptops or smartphones) are connected either to institution's WLANs or public mobile networks.

MIDOM application layers





Remote Monitoring: Definition

Definition: Patient health data is collected continuously or at intervals via connected devices and transmitted to healthcare providers for analysis and action.

No direct communication at the data transmission moment.

Remote Monitoring: Key Features & Technologies

Features:

- Real-time or scheduled data capture
- Passive or active monitoring

Technologies:

- Internet of Medical Things (IoMT): wearable sensors, home medical devices
- Mobile health apps
- Cloud-based dashboards for providers

Remote Monitoring: Clinical Use Cases

Applications:

- Chronic disease management (diabetes, hypertension, COPD)
- Elderly care (fall sensors, activity monitors)
- Rehabilitation and recovery tracking
- COVID-19 symptom tracking

Benefits:

- Early detection of changes
- Reduced hospitalizations
- Improved patient engagement

Integration and Deployment of Telemedicine Systems - Setting up a Telemedicine Infrastructure: Hardware, Software and Network Requirements

Key Components:

Hardware: High-resolution cameras, microphones, telemedicine carts, wearable health devices, and digital diagnostic tools (e.g., stethoscopes, otoscopes).

Software: Secure telehealth platforms for video consultations, EHR integration, AI-powered diagnostics, and appointment scheduling tools.

Network Requirements: High-speed internet (min. 15 Mbps), cloud-based storage for real-time data access, and secure VPN connections for data protection.

reMOTE: Hardware & Software Key Components

Hardware: High-resolution cameras

TEVO-VHD202U: High-Performance Video Conferencing Camera

- 20x optical zoom with 1080P HD resolution
- 2.1MP CMOS sensor (1/3 inch, 16:9)
- Pan-Tilt-Zoom (PTZ) functionality
- USB2.0 plug-and-play connectivity
- Compatible with major video conferencing platforms
- Supports multiple mounting options
- Advanced features: 2D/3D noise reduction, preset positions
- Quiet and smooth operation using belt drive technology
- Supports Visca, Pelco-P, and Pelco-D protocols



Wodwin HD Webcam for Telemedicine Cart

- 1080P Full HD resolution with 30 fps
- 94° wide-angle view for comprehensive patient coverage
- USB 2.0 connectivity for easy plug-and-play setup
- 3-in-1 design with built-in speaker and microphone array
- Compatible with Windows, macOS, and ChromeOS
- Versatile mounting options for telemedicine carts
- Auto-focus and low-light correction for clear imaging
- HIPAA-compliant encryption for secure video transmission
- Integration with major telehealth platforms
- Durable construction for medical environments



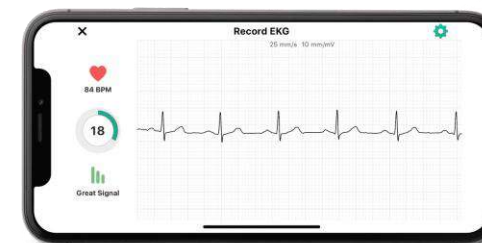
reMOTE: Hardware & Software Key Components

Hardware: IoMT Wearable Devices

Omron HeartGuide: A wearable blood pressure monitor that looks like a smartwatch but can take clinical-grade blood pressure readings throughout the day



AliveCor KardiaMobile: A pocket-sized ECG device that can record medical-grade ECGs in just 30 seconds, detecting atrial fibrillation and other heart rhythm abnormalities



Dexcom G6: A continuous glucose monitoring system for diabetics that uses a small sensor inserted under the skin to provide real-time glucose readings every 5 minute

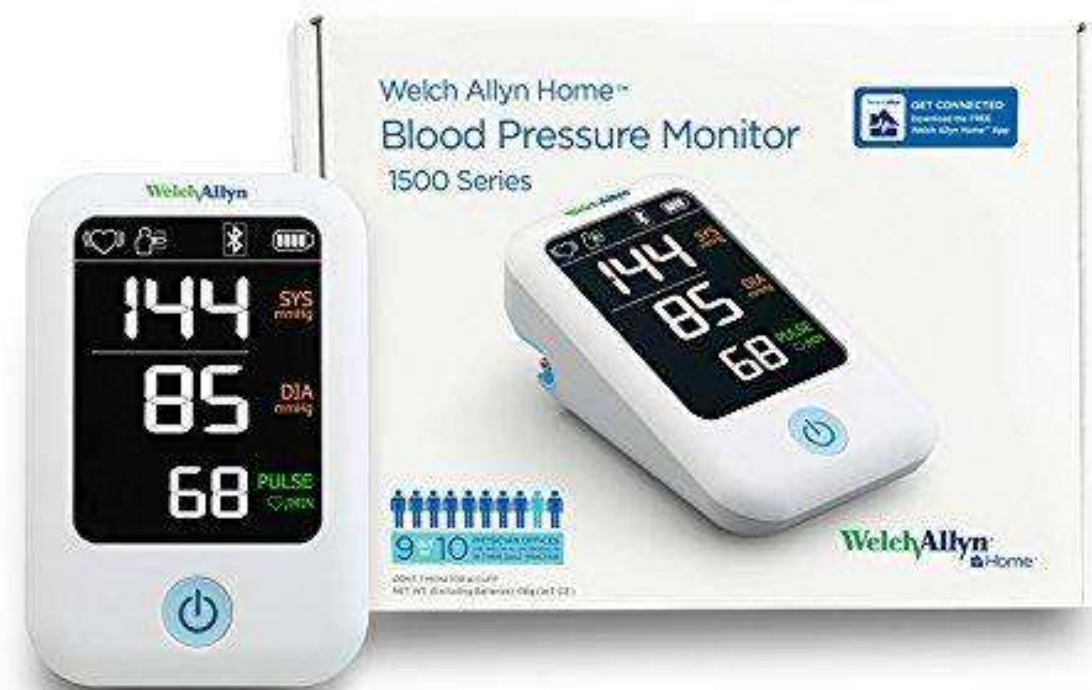


Smart device sold separately*

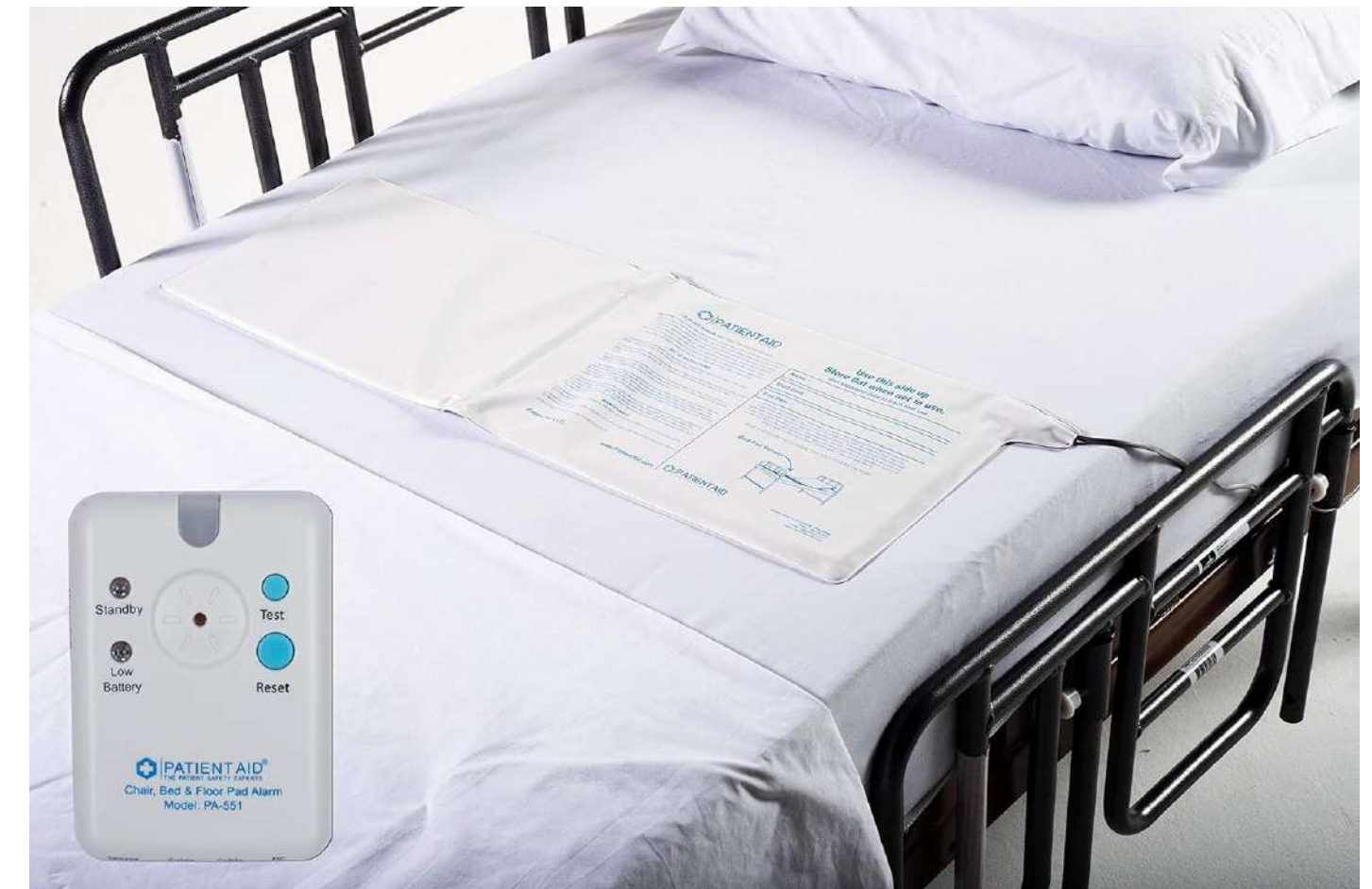
reMOTE: Hardware & Software Key Components

Hardware: IoMT Wearable Devices

Bluetooth-enabled blood pressure monitors, scales, and glucometers: These devices connect to a cellular gateway to transmit health data through cellular networks.



Advanced Bed and Floor Alarm for Elderly Monitoring



Comparative Table of Modalities

Modality	Timing	Typical Tech	Use Cases
Synchronous	Real-time	Video/voice calls, chat	Urgent consults, follow-up
Asynchronous	Delayed	Secure messaging, PACS, portal	Imaging, dermatology, records
Remote Monitor	Continuous	IoMT devices, apps, dashboards	Chronic care, post-acute, elderly

Summary of Key Concepts

Telemedicine: Remote clinical care using ICT.

Telehealth: Encompasses telemedicine plus education, public health, admin.

eHealth: ICT framework for all digital healthcare activities; backbone for storing, managing, accessing data.

mHealth: Leverages mobile devices and apps for individual and public health interventions.

Advantages & Limitations

Synchronous: Best for urgent/multifaceted needs; limited by schedule, bandwidth.

Asynchronous: Great for records, images; slower feedback; relies on robust documentation.

Remote Monitoring: Scalable, continuous care; depends on device reliability and patient compliance.

Choosing the Appropriate Modality

Factors:

- Urgency of case
- Type of health issue
- Technology access and literacy
- Patient preference and safety
- Clinical context (urban/rural, resources)

Summary

Modalities offer different strengths for varied clinical needs.
Most telemedicine systems combine several modalities for comprehensive care.

Thank you!
