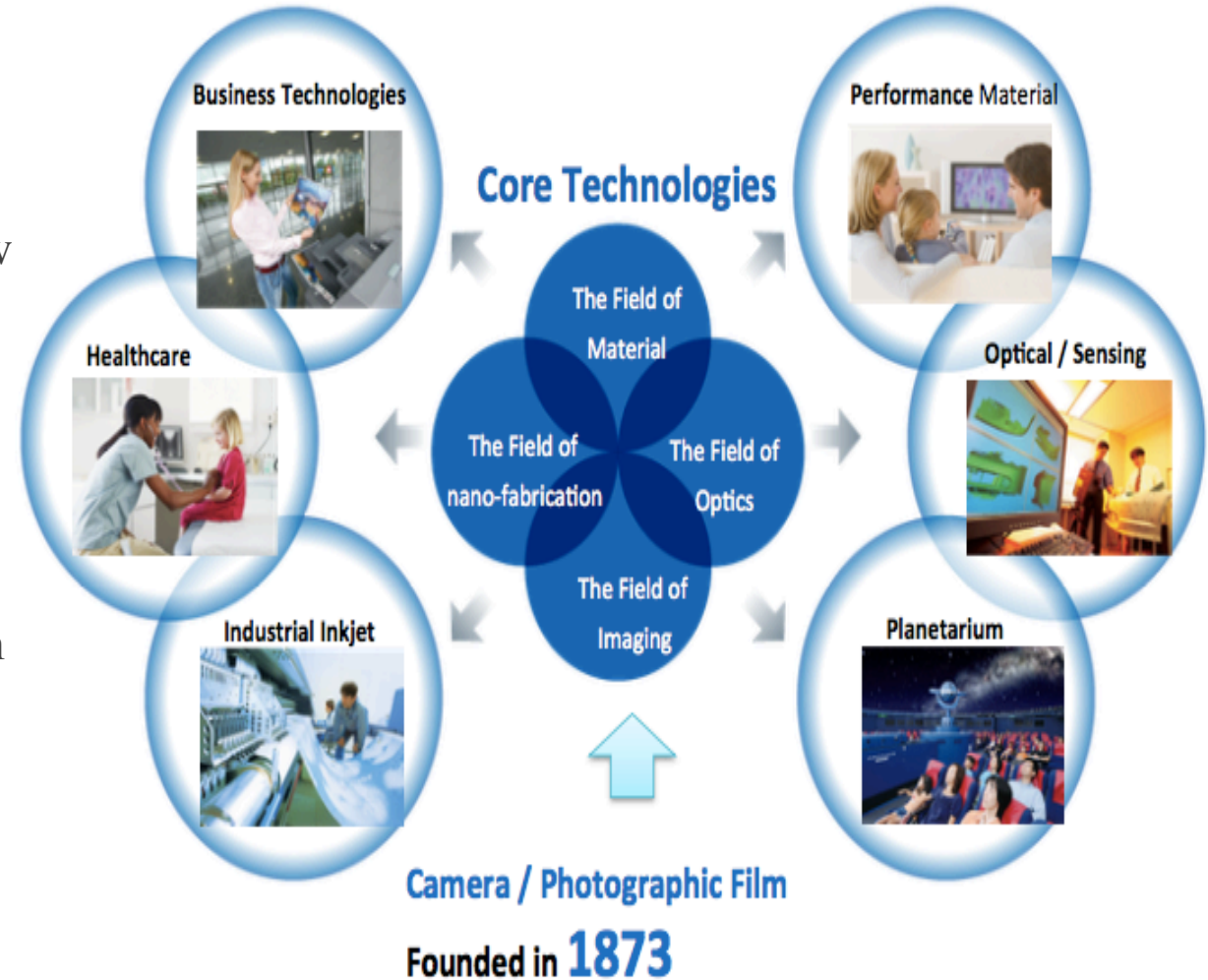# JICA Project SDGs
miup ✕ Konica Minolta

- Under the management philosophy of "Creating new value", we develop and apply various technologies from the core technologies related to camera / photographic film that we have cultivated since our foundation in 1873,

- We aim to realize a society of higher quality by developing business in various fields such as system and **healthcare** products.

- Our products/services include: **Medical imaging, data system, digital X-ray diagnostic system, diagnostic ultra sound system, medical cloud system**

TECHNOLOGIES & CURRENT BUSINESS ACTIVITIES

Business Technologies

Performance Material

Healthcare

Core Technologies

The Field of Material

The Field of nano-fabrication

The Field of Optics

Optical / Sensing

The Field of Imaging

Industrial Inkjet

Planetarium

Camera / Photographic Film

Founded in 1873

Introduction of miup and Konica Minolta

- miup is a start up company from the **University of Tokyo** established for the purpose of improving **medical access by utilizing ICT and AI** for people in lower class income in developing countries.

- **Bangladesh** is the first target country, we have conducted medical examination / software development in partnership with local doctors based on analysis of medical data using **machine learning and statistics** and service development.

- Using Japanese technology, we aim to develop **inexpensive and effective new health examination / medical model** from Bangladesh
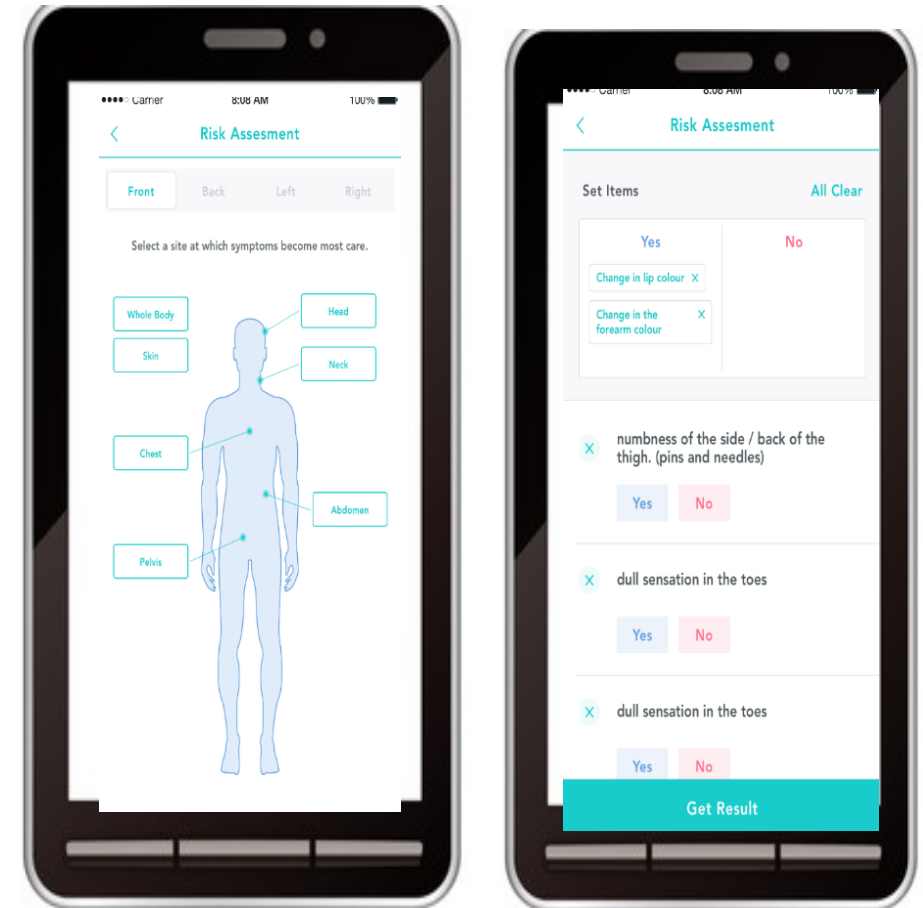
Introducing miup team

miup

JAPAN CORE MEMBERS

BANGLADESH TEAM

**Co-founder & CEO
MARI SAKO**

Mari spent more than 3 years in Bangladesh to build the project with passion to provide better health care for all including BOP. Master's degree in Agricultural science from The University of Tokyo where she was researching about poverty reduction.

**Co-founder &
Collaborative Researcher:
TAKANORI HASEGAWA
（Ph.D）**

Assistant Professor of Health Intelligence Centre of the Tokyo University. PhD in Informatics from Kyoto University. Specialised in artificial intelligence development for health care, Computational Biology, and Genomic data assimilation.

**CTO:
TOMOYUKI YAMADA
（Ph.D）**

Founder of Genomedia Inc.. One of the leading genomic company. PhD in Science from The University of Tokyo. Expert of system integration, data mining, data cleansing for various type of data including medical of biological information. Research Associate of the university of Tokyo from 2003-2008.

**Medical Adviser :
TOMOHIRO MORITA
（M.D）**

Physician.Degree in Medicine from Graduate from the Tokyo university. Tainted at Kameda Medical Center .Working for Soma Central Hospital in Fukushima to support earthquake victims with pubric health mind..Well experienced in Community medicine as General Physician.

**COO & Bangladesh
Local miup CEO:
YUTARO YOKOKAWA**

Formerly worked at trading company in Asia then as consultant for Bangladesh business development for Japanese companies. Joined miup in 2016 Graduated from Nihon University.
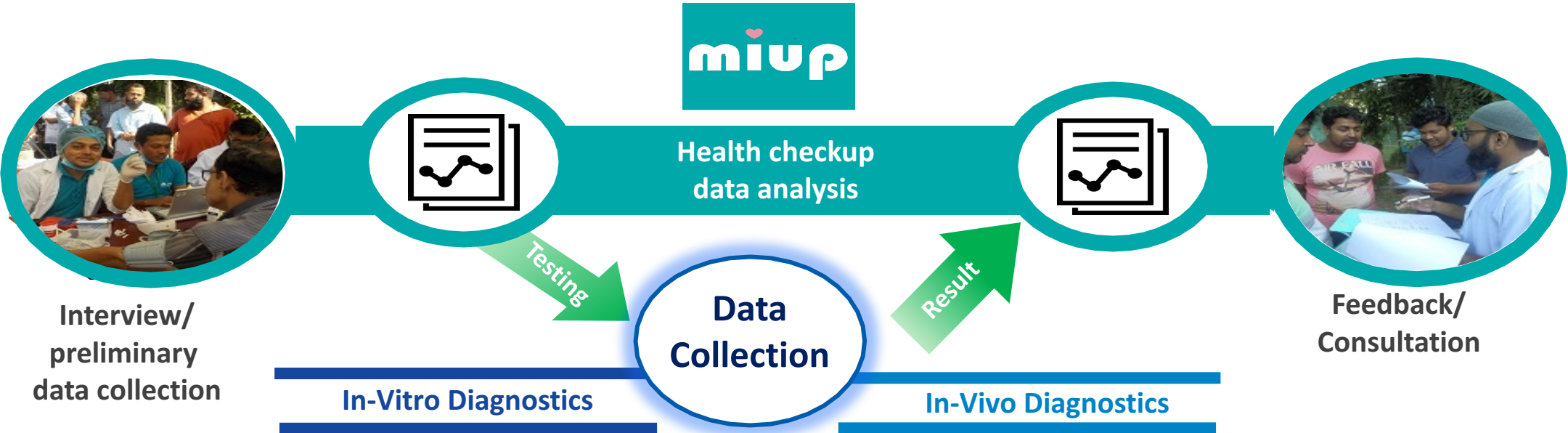
**Advisor:
Professor.
Abdur Rahman （M.D.)**

A professor at Jahanginagar University, Dhaka. A pioneer of the public health of Bangladesh . He has been working on many collaborative activities with Government, Non-Government and Private Organization internationally.

miup, Konica Minolta and Sysmex will collaborate for universal healthcare

Health checkup data analysis

Interview/ preliminary data collection

Testing

Data Collection

Result

Feedback/ Consultation

In-Vitro Diagnostics

In-Vivo Diagnostics

Hematology testing

Portable X-ray
Portable Ultra sound

- **Provide made-in-Japan products and local service & support**
- **Reinforce JICA project by hematology testing**

Instruments

Reagents

Software

R&D

Production

Sales

Service & Support

NCD IS AN INCREASING ISSUE GLOBALLY

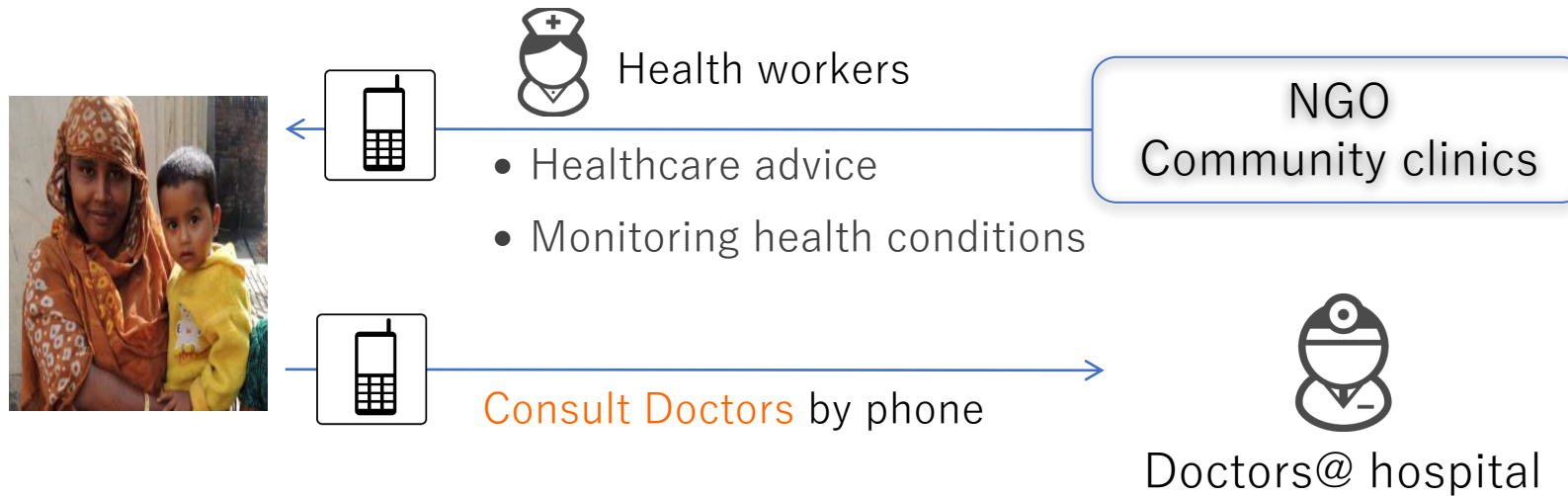Estimated number of people with diabetes worldwide and per region in 2015 and 2040 (20-79 years)

World
2015 **415 million**
2040 **642 million**

North America and Caribbean
2015 **44.3 million**
2040 **60.5 million**

Europe
2015 **59.8 million**
2040 **71.1 million**

Middle East and North Africa
2015 **35.4 million**
2040 **72.1 million**

Western Pacific
2015 **153.2 million**
2040 **214.8 million**

South East Asia
2015 **78.3 million**
2040 **140.2 million**

South and Central America
2015 **29.6 million**
2040 **48.8 million**

Africa
2015 **14.2 million**
2040 **34.2 million**

*IDF diabetes atlas

NCD ISSUES IN BANGLADESH

- Lack of:
  - Hospitals and physicians in rural areas
  - NCD Specialists
  - Healthcare professionals overall

- Root causes:
  - Education cost to develop health workers
  - Health check up cost
  - Physicians do not want to work in rural areas

Current remote healthcare model in Bangladesh has limitations

CURRENT REMOTE HEALTHCARE MODEL

Health workers

- Healthcare advice
- Monitoring health conditions

NGO
Community clinics

Consult Doctors by phone

Doctors@ hospital

KEY ISSES

- Health workers can provide very limited services with limited knowledge
- No vital data with no medical device
- Cannot identify high risk or low risk
- High examination cost

We will provide low cost Universal Healthcare Service using A.I. and ICT for BOP Class in Bangladesh

miup

KEY ISSUES RELATED TO SDG

3 すべての人に健康と福祉を

- Increasing NSD caused by lifestyle
- Lack of medical institutions and professionals
- Lack of ability to afford medical costs for low income class

ORGANIZATION CAPABILITIES

- **X-ray/Ultra sound diagnostics** products and services
- Understanding of **demand for health check up** from examination business
- Development of **healthcare app/database** for Bangladesh market
- **Prediction and scoring of conditions** for diabetes, anemia, cardiovascular diseases based on **analysis of symptoms and vital data**
- **Machine learning/AI and statistical model**

KONICA MINOLTA

miup

JICA ジャイカ

東京大学 THE UNIVERSITY OF TOKYO   九州大学 KYUSHU UNIVERSITY

SDG BUSINESS

- Aim to decrease NCD related mortal rate in the outskirts of Dakka by providing a low-cost affordable health check up for low income people
- Combine **machine learning/AI** with **remote healthcare** using mobile medical equipment and ICT

Our solutions

① Low cost
health check up
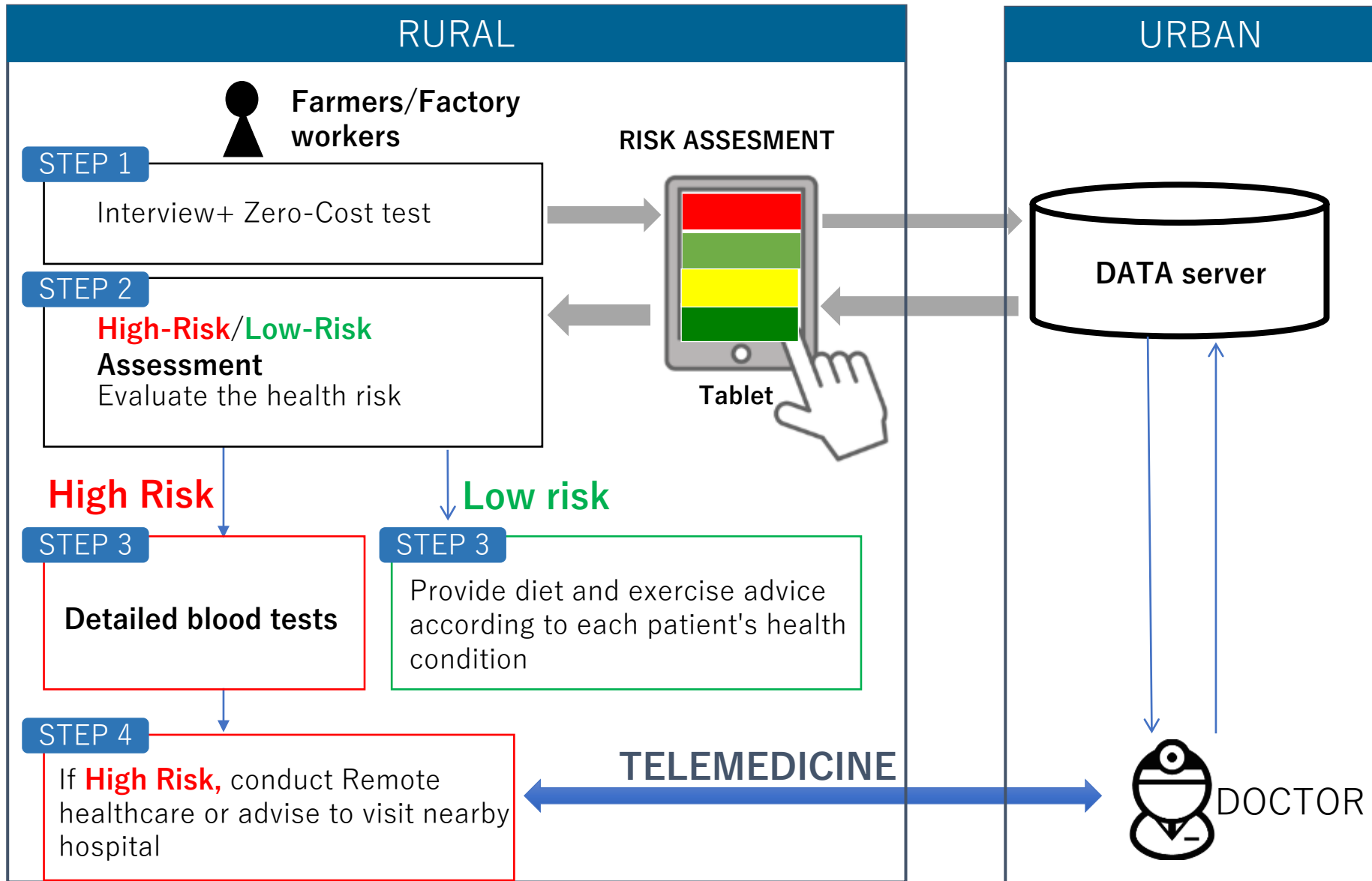
② Remote healthcare

③ Health Risk Alert
at anytime, anywhere
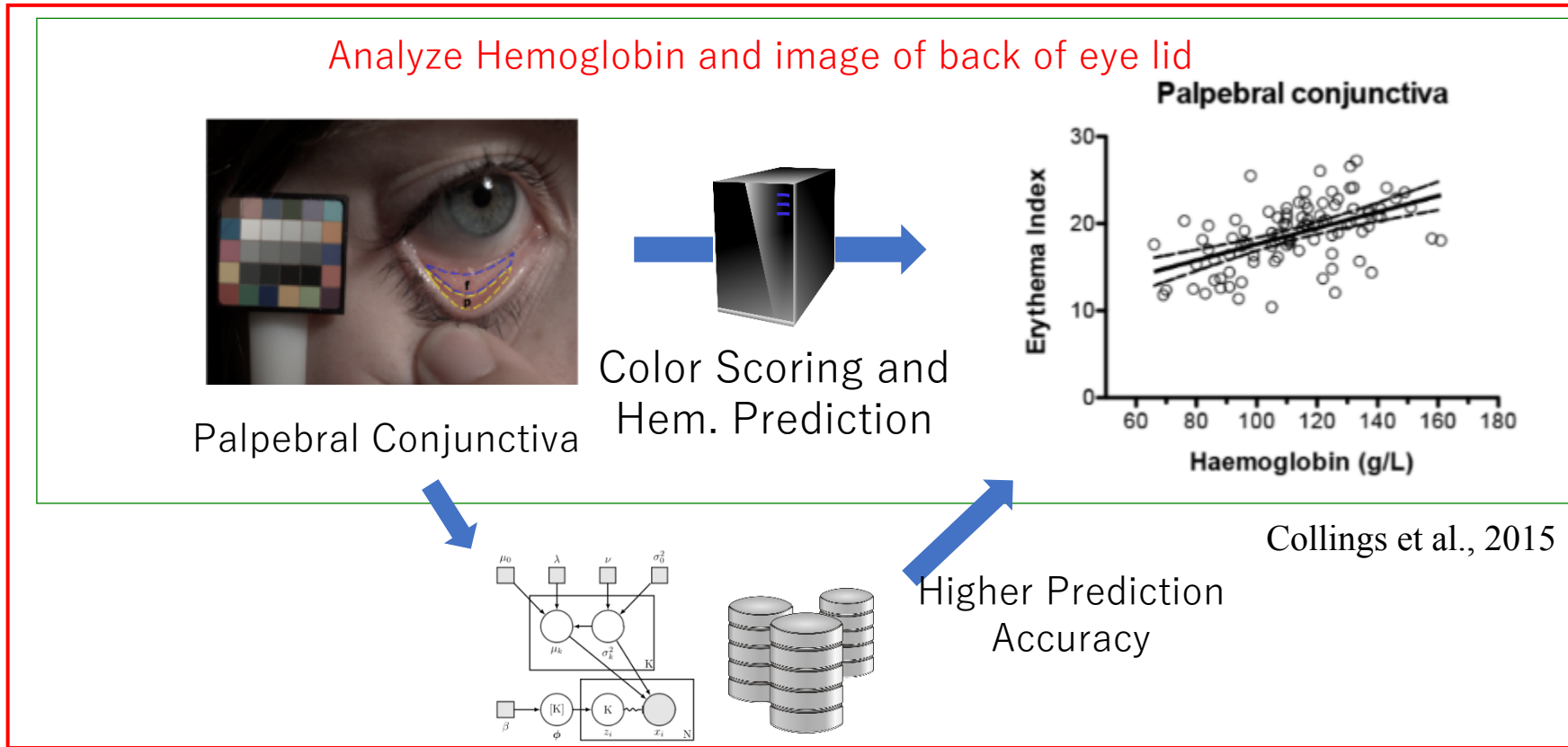
④ Share epidemiological
data by region

① Screen examinees whether **low or high health risk**
Recommend to examinees
  - For high risk: **doctor consultation**
  - For low risk: **diet and exercise**

② Support doctor's diagnosis by **symptom checker**
and **image processing**
Video/phone consultation with doctor

③ Notify patients **future or current health risks** by
analyzing accumulated health data

④ Provide epidemiological analysis results to public
sector using **accumulated health data**

Analyze Hemoglobin and image of back of eye lid

Palpebral Conjunctiva

Color Scoring and Hem. Prediction

Higher Prediction Accuracy

Collings et al., 2015

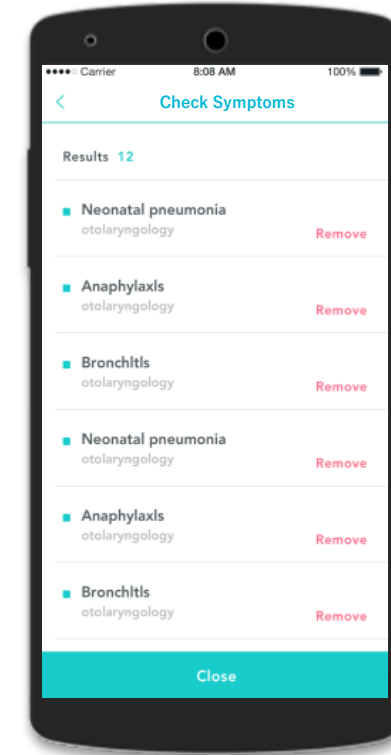**miup model**

Big Data from Bangladesh

① Choose

Choose the body part where they have a symptom

② Answer
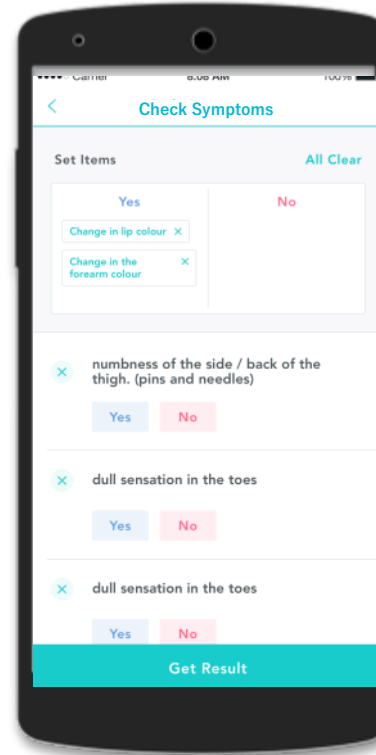
Answer the medical questionnaire

③ Result

A list of probable diseases displayed. If urgent an alert is sent to see a doctor.
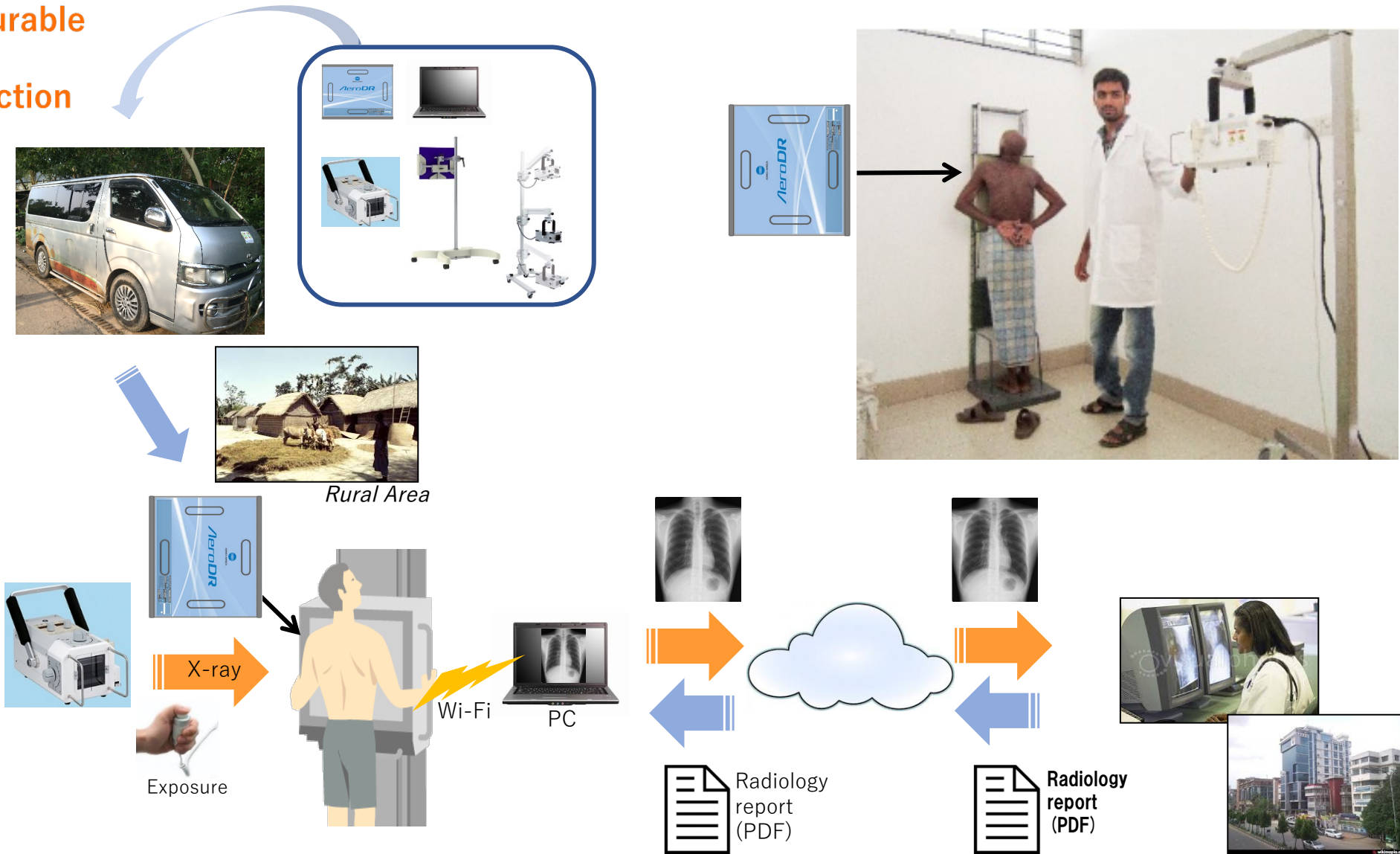
Video consulting
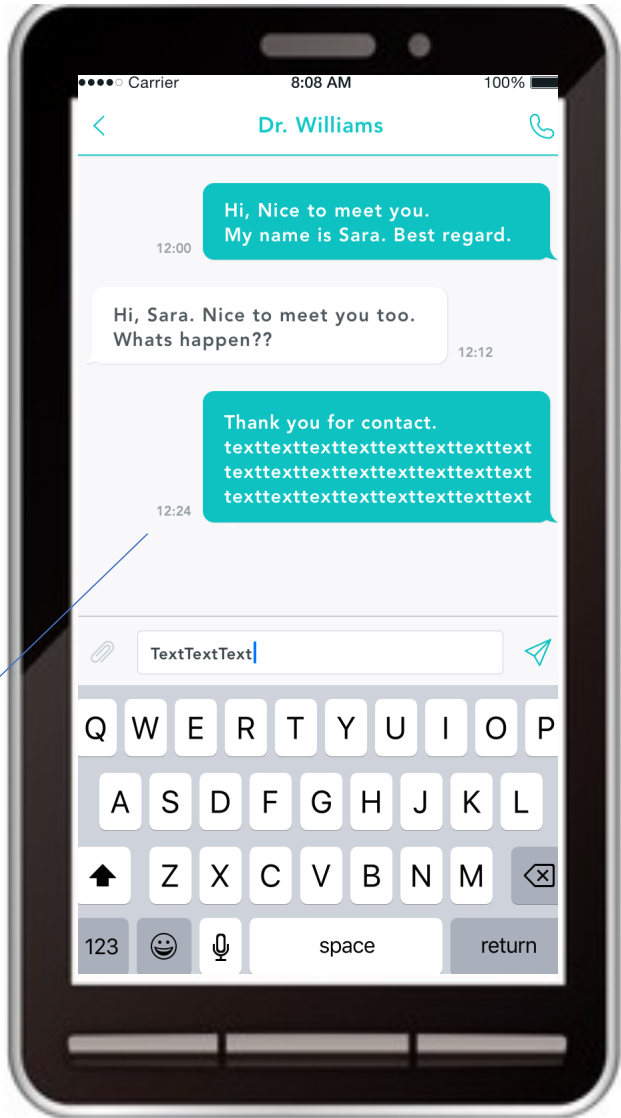
Chat functions to ask questions to doctor.

Dr. Williams

Hi, Nice to meet you. My name is Sara. Best regard.
12:00

Hi, Sara. Nice to meet you too. Whats happen??
12:12

Thank you for contact. texttexttexttexttexttexttexttext texttexttexttexttexttexttexttext texttexttexttexttexttexttexttext
12:24

TextTextText

Q W E R T Y U I O P
A S D F G H J K L
Z X C V B N M
123 space return

- **Lightweight & Durable**
- **Lower Doses**
- **Auto X-Ray Detection**

Rural Area

X-ray

Exposure

Wi-Fi

PC

Radiology report (PDF)

Radiology report （PDF）

Urban Area

KONICA MINOLTA

Basic Applications
Faster Triage

Fluid Localization
e.g. FAST Scans, Abdominal

Gross Anatomy
e.g. Liver, Kidneys, Spleen, Gall Bladder

Pregnancy Confirmation & Fetal Presentation

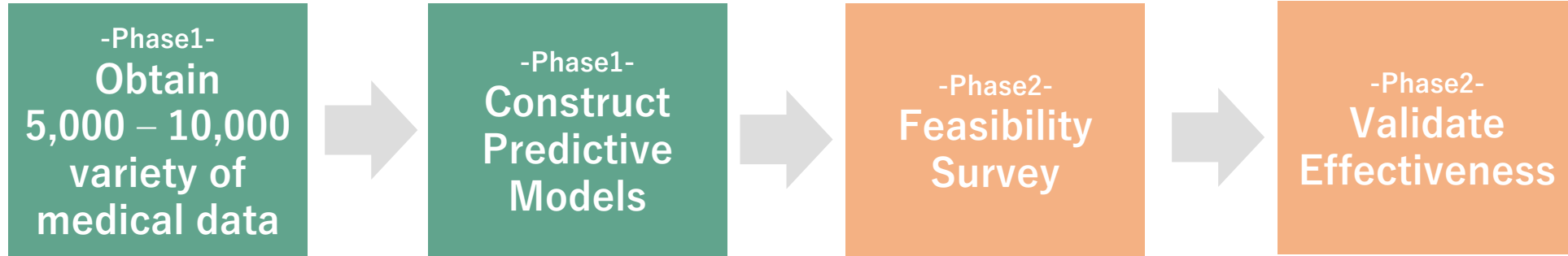Lungs – Fluid, Pneumothorax

Bladder & Catheter Evaluation   Lump Analysis

| -Phase1-
Obtain 5,000 – 10,000 variety of medical data | → | -Phase1-
Construct Predictive Models | → | -Phase2-
Feasibility Survey | → | -Phase2-
Validate Effectiveness |

Medical Doctors

Construct Predictive Modeling Estimate Parameter Values

Urban Area 1250- persons

Factory Area 1250- persons

Rural Area 2500- persons

-Phase1-
Obtain 5,000 – 10,000 variety of medical data

-Phase1-
Construct Predictive Models

-Phase2-
Feasibility Survey

-Phase2-
Validate Effectiveness

Propose Effective Nationwide Health Check-up!!

Simulation Result

Predictive Model

False Negative Rate (FNR)

Relative_Cost

Cost

Data Server

Rural Area About 10 villages（500 persons）
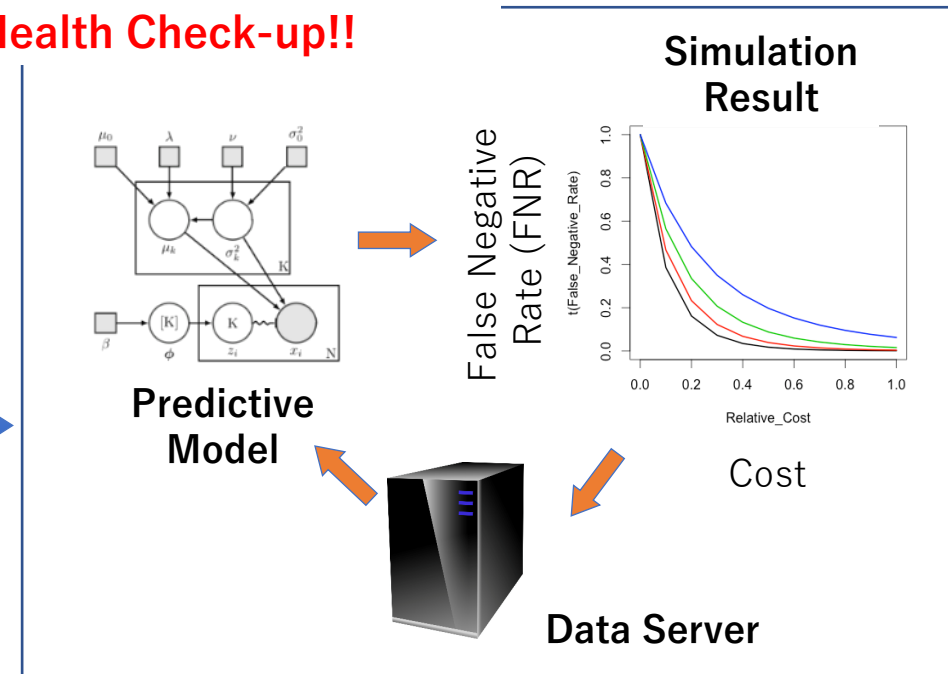
In summary, miup+KM service model enables "Universal health coverage"

Medical institution
AI learn diagnosis results by EMR system

Diagnosis
Video chat with doctor
Hospital appointment service

Prevention
Risk screening and health advise by simple health check device and AI

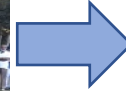**Symptoms**
Interview system to identify diseases
Triage system
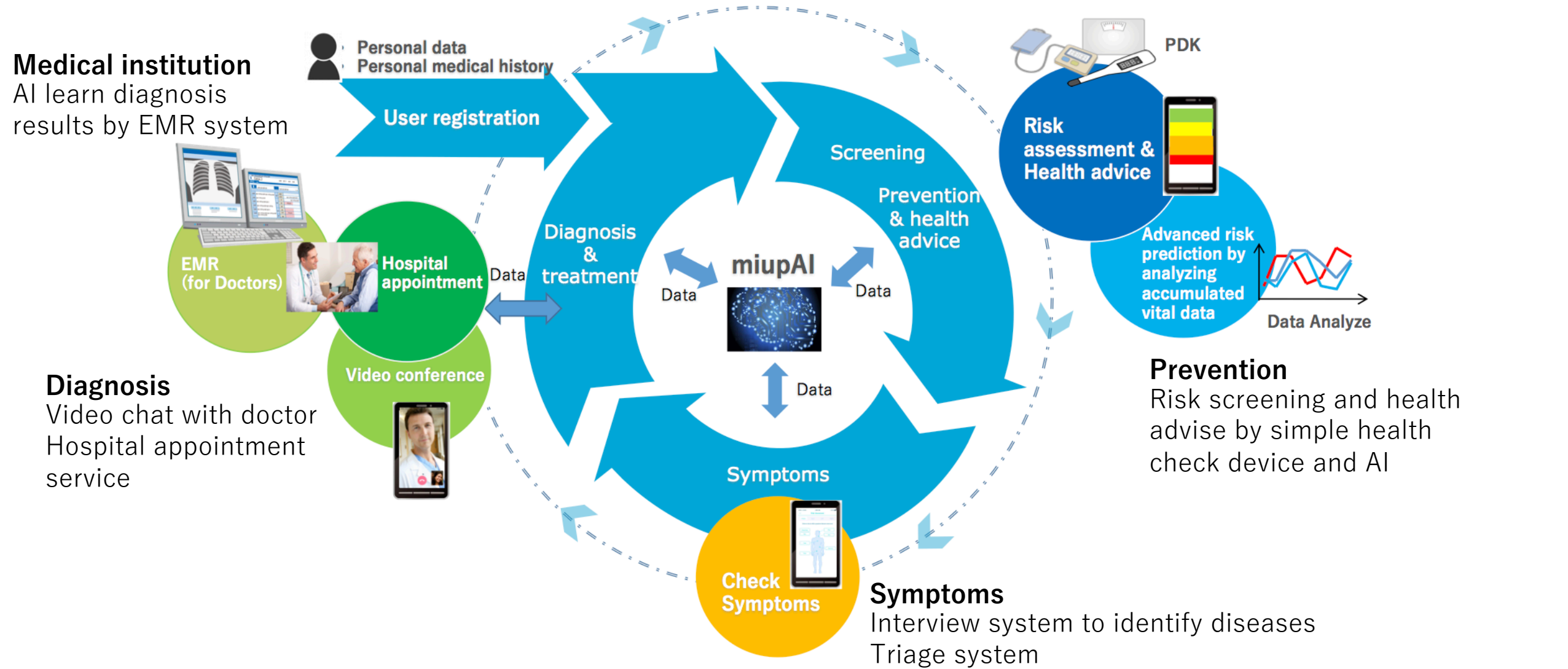
Make tent as tent manual
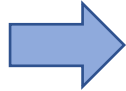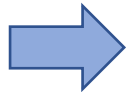

Two tent 4 MT & 4 Supporter
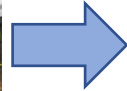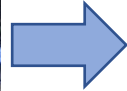

Make one line for male
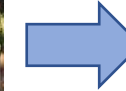

Make another line for female

Getting ready all of staff

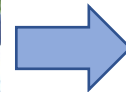Measure Hight & weight after give token for ladies

Measure Hight & weight after give token for gents

Supporter put customer information & MT provide BP, Body Temperature, Blood Glucose, Blood Haemoglobin
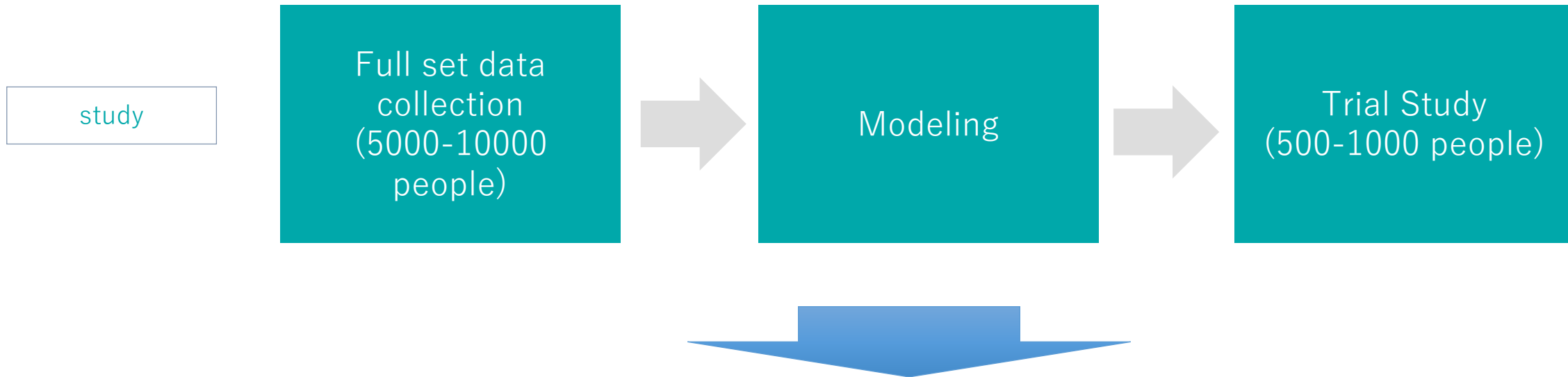

Printing report at a time & give to the customer

Customer get consult from Doctor after getting report

study

Full set data collection (5000-10000 people)

→ Modeling → Trial Study (500-1000 people)

Expand it Nationally

Collect 5000-10000 people's detailed health data

EXSAMINATION

Yeast cells	HBV
VLDL	Glucose
Urobilinogen	GGTP (Gamma GT)
Triglycerides, Serum	Epithelial cells
Transparency	Crystals
Sugar	Creatinine, Serum
Specific gravity	Colour
SGPT ALT	Cholesterol-Total, Serum
SGOT AST	CHOL/HDL RATIO
Red blood cells	Cast
Pus cells (Leukocytes)	BUN Urea Nitrogen, Serum
pH Urine	Bilirubin Total, Serum
Non - HDL Cholesterol, Serum	Bacteria
Nitrate	Anti-HCV
LDL/HDL RATIO	Alkaline Phosphatase, Serum
LDL Cholesterol -Direct	Albumin
LDH	X-ray
Hemoglobin Hb (simple)	Ultra-sound
HDL Cholesterol Direct	
HDL / LDL Cholesterol Ratio	

Please Feel Free to Contact Us !
Email Address: info@miup.jp
Web site: http://www.miup.jp/
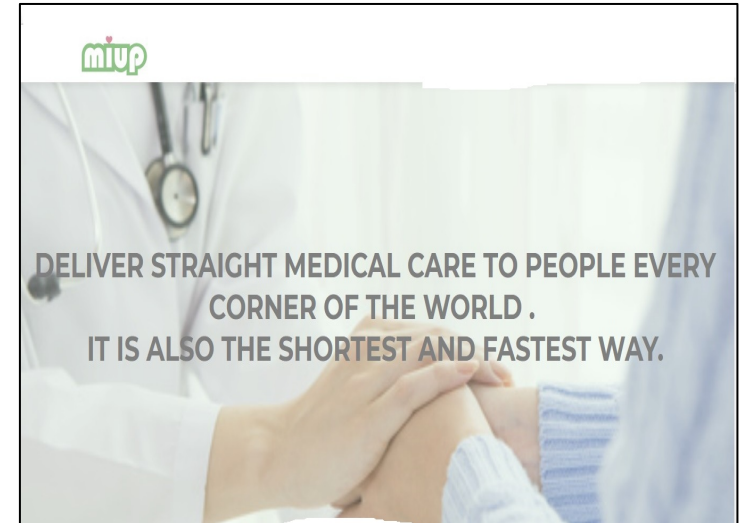
*miup Inc. HOMEPAGE
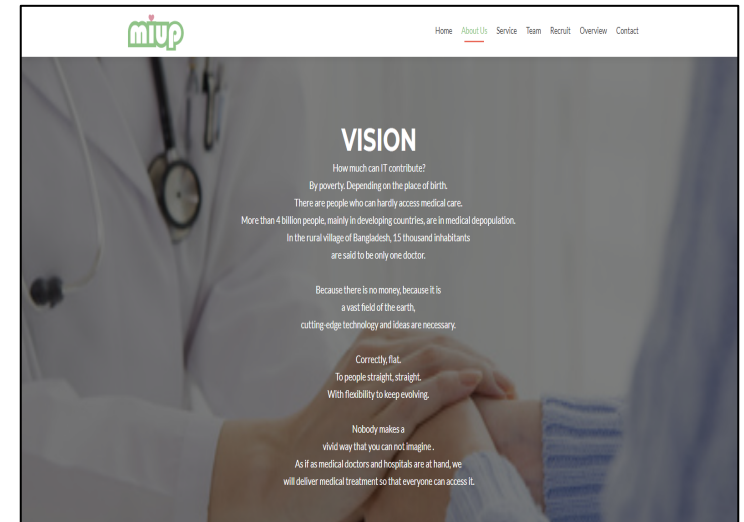
医師が診断するときは、これまで**学習してきた事**と**経験**を総合判断し、病気を絞り込んでいき診断を下す。

医師が診断を考えるフロー

Calculate All Pairs of Disease / Symptoms

Disease C	Yes	No
Disease B	Yes	No
Disease A Symptom 1	Yes	No
Symp. Positive	#True-Positive	#False-Positive
Symp. Negative	#False-Negative	#True-Negative

$$Sensitivity = \frac{TruePositive(TP)}{TP + FalsePositive}$$

$$Specificity = \frac{TrueNegative(TN)}{TN + FalsePositive}$$

テキストや論文などからの知識と経験を各医師のインサイトにより病気を絞り込む

テキスト・論文
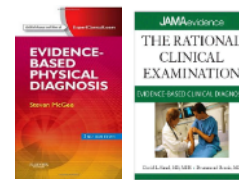
EVIDENCE-BASED PHYSICAL DIAGNOSIS

JAMAevidence THE RATIONAL CLINICAL EXAMINATION

Medical Diagnostic Table of Each Doctor

	Fever	Headache	Cough	…
Disease A	0.3	0.1	0.01	…
…	…	…	…	…

Ex. Medical Diagnostic Flow

Given Symptoms 1, 2, 8 Given No-Symptoms 3, 5

Prob. of Dis. A is 0.3 Prob. of Dis. D is 0.2…

Symptom 4 is critical to classify Dis. A between D.

Ask Symptom 4

⋮

Rank Possible Diseases

miup
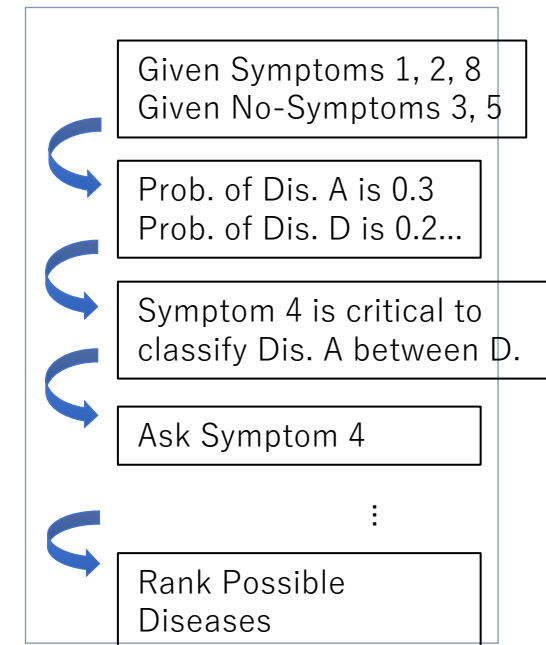
医師の診断の思考プロセスをモデル化し、テキストや論文の情報、医師の診察経験と確定診断データに基づいてパラメータを学習することで、症状やバイタル値から疾患を推定するシステム。

Bayes Modeling
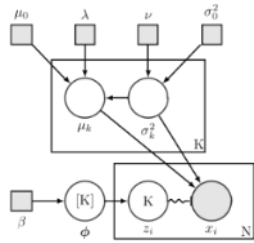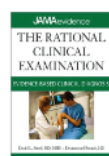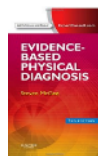
Machine Learning
Update by Complete Diagnosis

0.1	0.05	0	0	0.7	0.2		0.002
0.3	0.2	0	0.05	0	0.9		0.0003
0.2	0.82	0.08	0	0	0		0.04
0	0.8	0.2	0.6	0.15	0.8		0.0000002

Accumulation of Sensitivity/Specificity

Prior Probability of Diseases

0.1	0.05	0	0	0.7	0.2		0.002
0.4	0.2	0	0.1	0	0.9		0.0003
0.2	0.8	0.1	0	0	0		0.04
0	0.8	0	0.6	0.1	0.8		0.0000002

Public Database, Research Papers
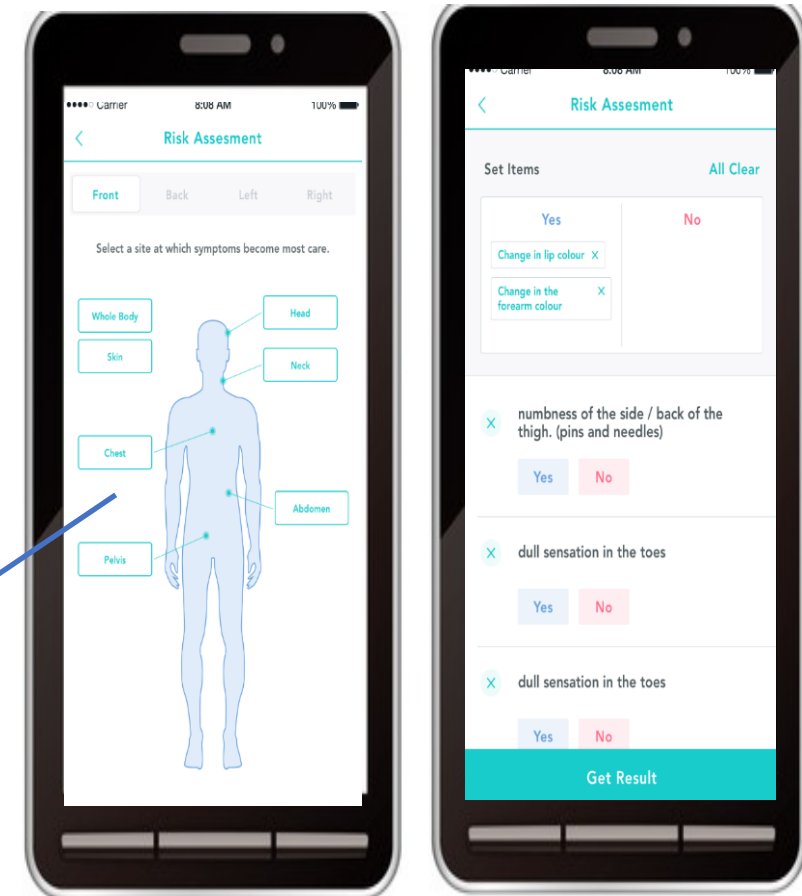
- Input
  - Patient's Symptoms
  - Age, Weights, Height, Sex, etc...

OUTPUT

- Posterior Probability of diseases
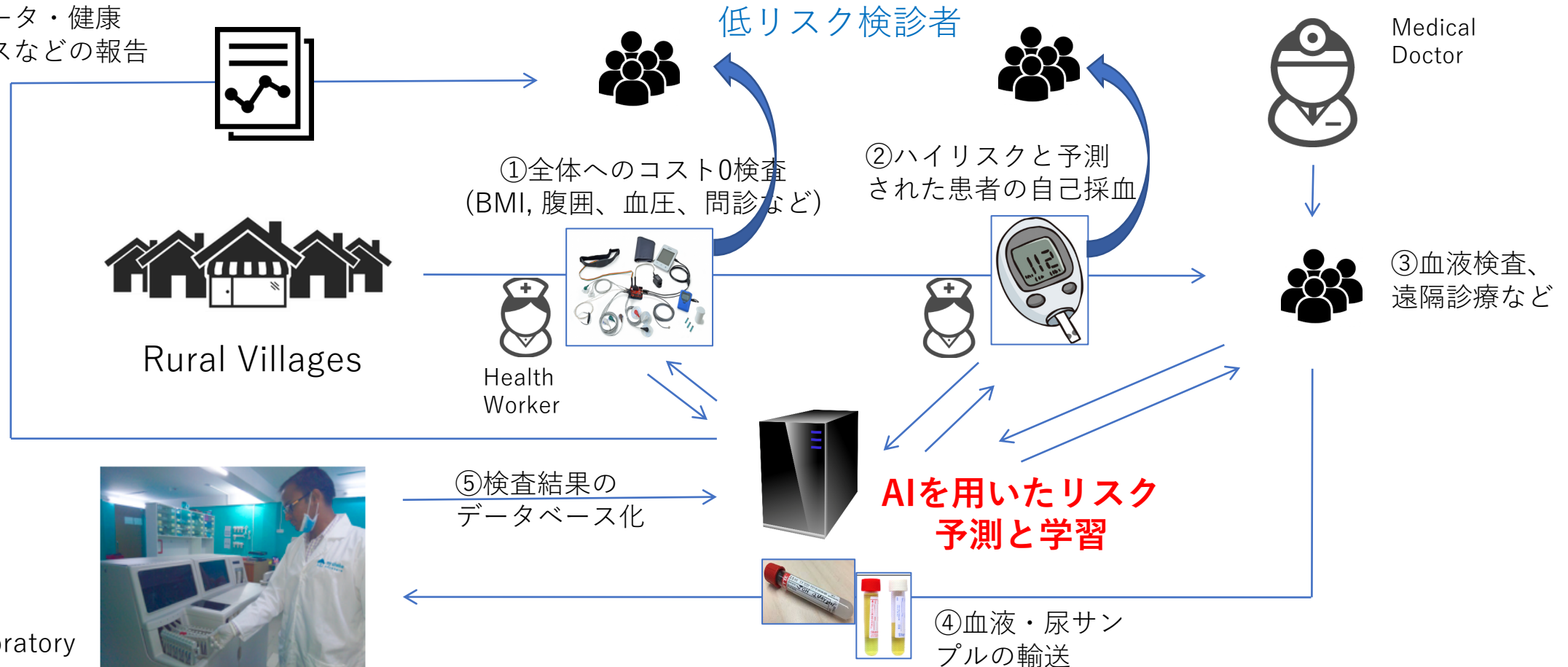- Significant questions to detect disease

- **Symptom checker gives you a list of possible diagnosis based on the information user have entered.**
- **The information includes the user-expressed symptoms, age, gender, and series of questions about the symptoms.**

Select the body parts for your symptom

Questionnaires to evaluate potential disease risk from your Symptoms

Rural persons are firstly separated into row, middle, and high risk groups by no-cost medical tests such as BMI, BP, and symptoms. A.I. analyzes the data and separate them into row or high risk persons, and only high risk patients are taken their blood by themselves. Finally, high risk patients are remotely connected to medical doctors and will be taken their blood.

⑥結果データ・健康アドバイスなどの報告

低リスク検診者

Medical Doctor

①全体へのコスト0検査（BMI, 腹囲、血圧、問診など）

②ハイリスクと予測された患者の自己採血

Rural Villages

Health Worker

③血液検査、遠隔診療など

⑤検査結果のデータベース化

AIを用いたリスク予測と学習

Medical Laboratory

④血液・尿サンプルの輸送

A.I. based Medical Triage and Emergency Detection for Health-care Persons

miup

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Symp. Positive	#True-Positive	#False-Positive
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$$Sensitivity = \frac{TruePositive(TP)}{TP + FalsePositive}$$

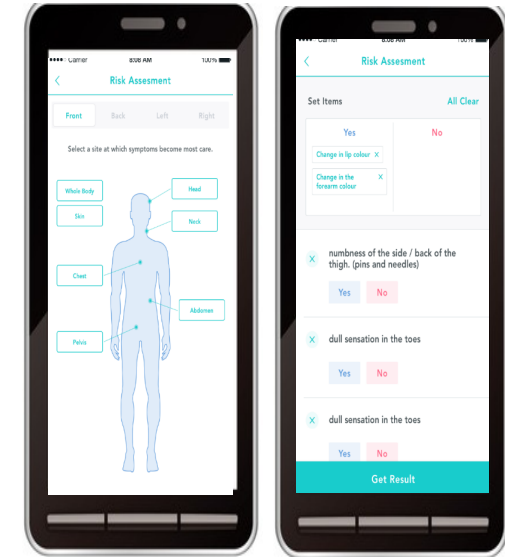$$Specificity = \frac{TrueNegative(TN)}{TN + FalsePositive}$$

テキスト・論文

EVIDENCE-BASED PHYSICAL DIAGNOSIS

THE RATIONAL CLINICAL EXAMINATION

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Prob. of Dis. D is 0.2…

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Ask Symptom 4

⋮

Rank Possible Diseases

Next Step

	2017					2018												2019					
8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7

調査

投資・ビジネス・市場環境調査
- ✓ 経済・社会情勢の状況
- ✓ 保健省の将来方針
- ✓ 規制、法制度、許認可
- ✓ 競合環境分析
- ✓ 病院・患者等のステークホルダー分析

事業計画策定
- ✓ 資機材の調達計画
- ✓ 売上計画
- ✓ 要員計画・人材育成計画
- ✓ 資金調達計画
- ✓ 事業リスク調査
- ✓ 財務分析
- ✓ スケジュール策定

事業化答申
・事業計画書作成
・事業化へ向けた社内での議論等

事業が創出する開発効果/SDGs貢献への効果検討
- ✓ 対象国・地域の概況
- ✓ 開発効果指標設定、シナリオ策定
- ✓ ベースライン調査
- ✓ 開発効果検証

JICA との連携可能性の検討

事業立ち上げへ

パイロット

保健省との提携事業を通じたデータ収集

保健省との事前交渉・準備

パイロット実施・マーケティング

コストリダクション事業の検討

パイロット準備

パイロット実施・結果分析

保健省への報告

開発

医療データ活用検討
- ✓ 予防医療と医療費削減の関係を分析した文献の調査
- ✓ パイロットで収集した患者データの蓄積・分析
- ✓ 健診アプリの開発
- ✓ 保健省によるデータ活用方法の検討