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Medical AI Challenges in Japan

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Corporate Information

About LPIXEL

Name	LPIXEL Inc.
Foundation	March 4, 2014
Headquarters	Otemachi 1-6-1, Otemachi Building 6F, Chiyoda-ku, Tokyo
Capital	100 Million JPY
Investors	SBI Investment Co., Ltd. / Olympus Corporation / CYBERDYNE INC. / CEJ Capital Inc.(subsidiary of CYBERDYNE INC.) / JAFCO Co., Ltd / TechMatrix Corporation / Today Engineering Co., Ltd. / TomyK (Tomihisa Kamada) / FUJIFILM Corporation / Mistletoe Inc.
Awards	J-Startup, RED HERRING GLOBAL 100, SWITCH
Employee	60

License	Registered Medical Device Manufacturer (No.13BZ201223) Second-class marketing license for medical devices (No.13B2X10317)
Patent	CARTA : Active learning software for automatic classification of biomedical images Area segmentation image generating method, device and computer program Image processing device and image processing method

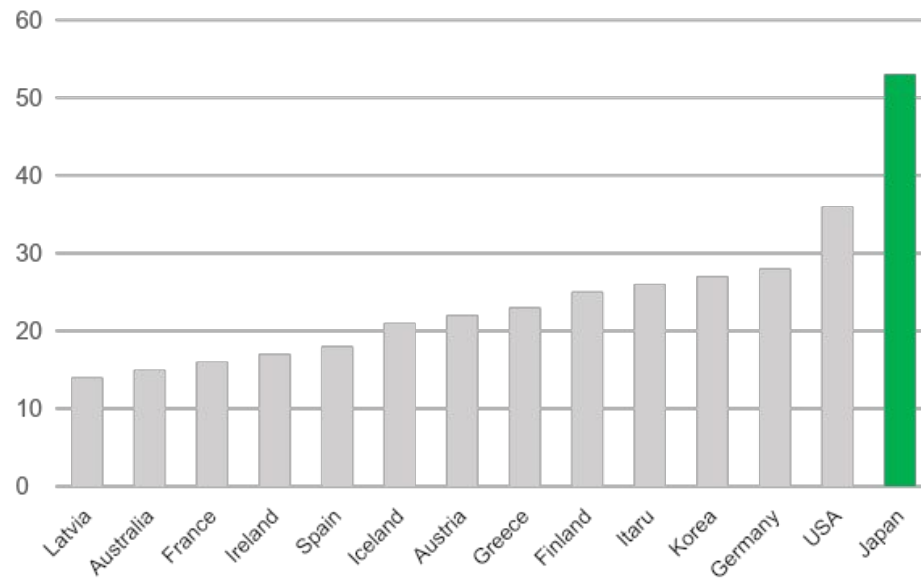**Investors**

OLYMPUS

Canon
CANON MEDICAL

CYBERDYNE

TechMatrix
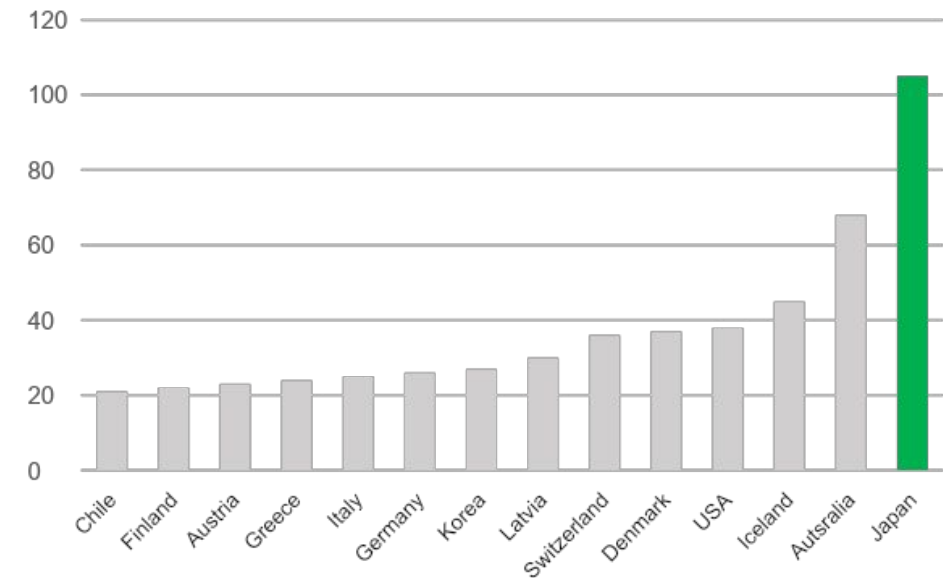
'TORAY'
Toray Engineering Co.,Ltd.

FUJIFILM

※ JAPANESE ALPHABETICAL ORDER

2

Japan is "*the* country of medical imaging"

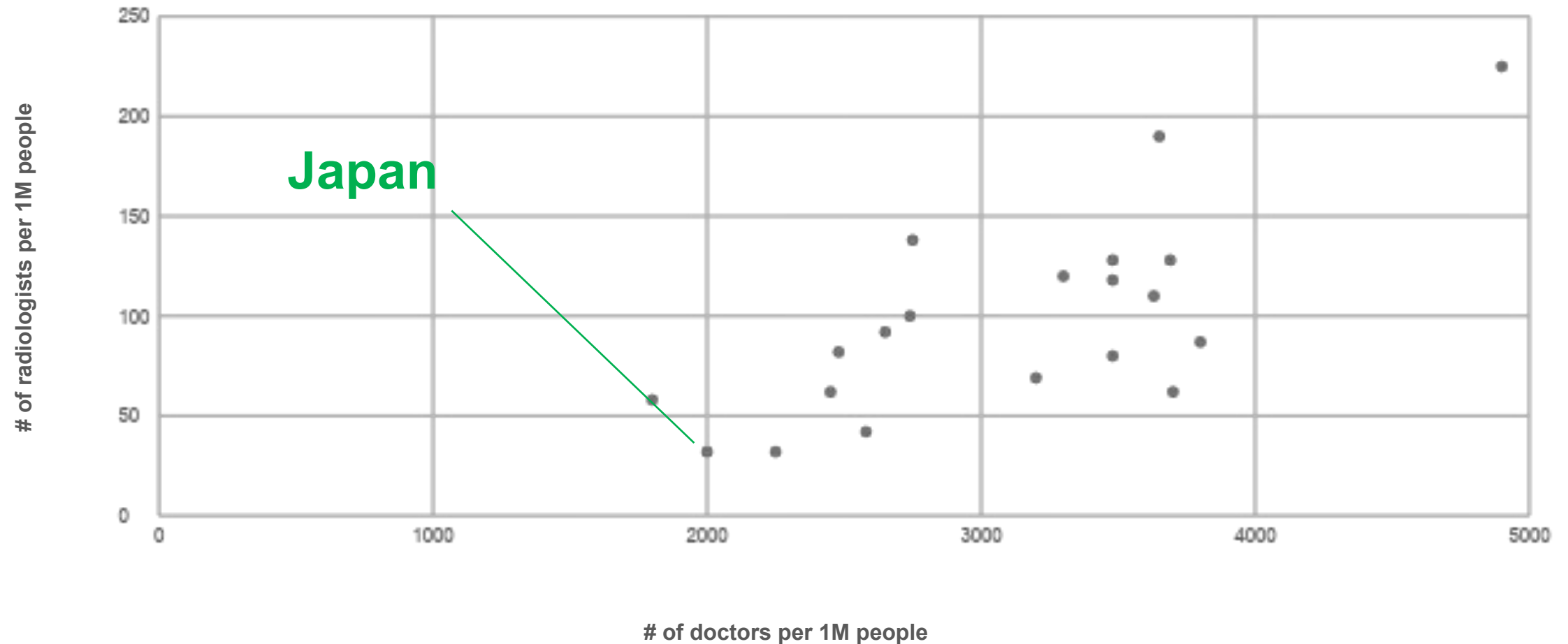## World's largest number of CT, MRI devices per capita

# of MRI devices per 1M people

# of CT devices per 1M people

Japan has the lowest number of radiologists per capita

of radiologists / doctors among OECD members

# of doctors per 1M people

EIRL overview

EIRL is designed to analyze images as well as other information necessary for diagnosis, and provide an environment where doctors can make an efficient and accurate diagnosis.

SOLUTION 01

Improved Accuracy

Provide doctors feedback to reduce overlooked lesions, by flagging suspicious areas.

SOLUTION 02

Enhanced Efficiency

Deliver products to improve the quality and efficiency of medical care, promoting patient satisfaction.

SOLUTION 03

Prognosis Prediction

Take advantage of AI to predict potential treatment outcomes and help doctors making informed decisions.

![EIRL logo] **EIRL series supports doctors diagnosis**

5 products obtained regulatory approval and are currently used in
more than 200 institutions

Brain

● **Brain Aneurysm**   (PMDA approved)

Detection of cerebral aneurysm candidates from MRA

● **Brain Metry**   (3rd party certification)

Measurement of dementia-related indices and grading of white matter hyperintensities in MRI

● **Brain Segmentation**   (3rd party certification)

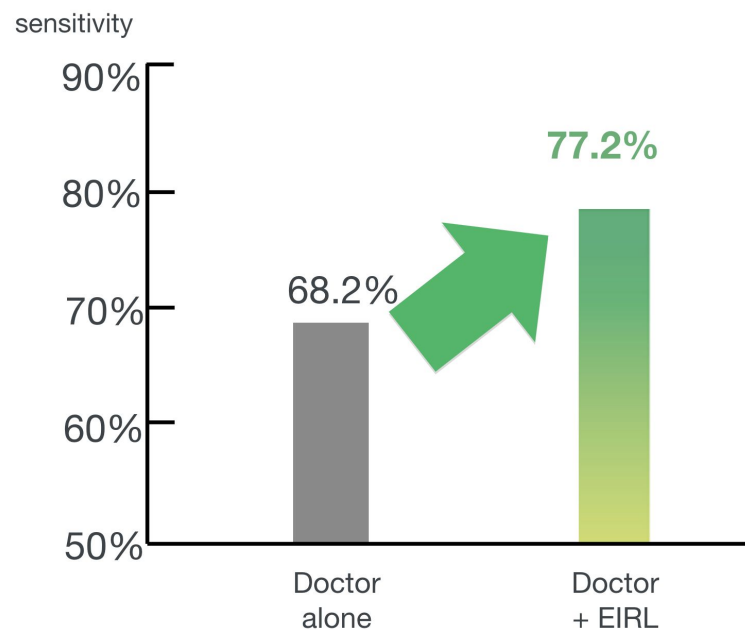**Extraction of high intensity areas from brain CT**

Chest

● **Chest Nodule**   (PMDA approved)

 Detection of nodule candidates from chest X-ray

● **Chest Metry**   (3rd party certification)

Measurement of pleural area, CTR, CP angle etc from chest X-ray
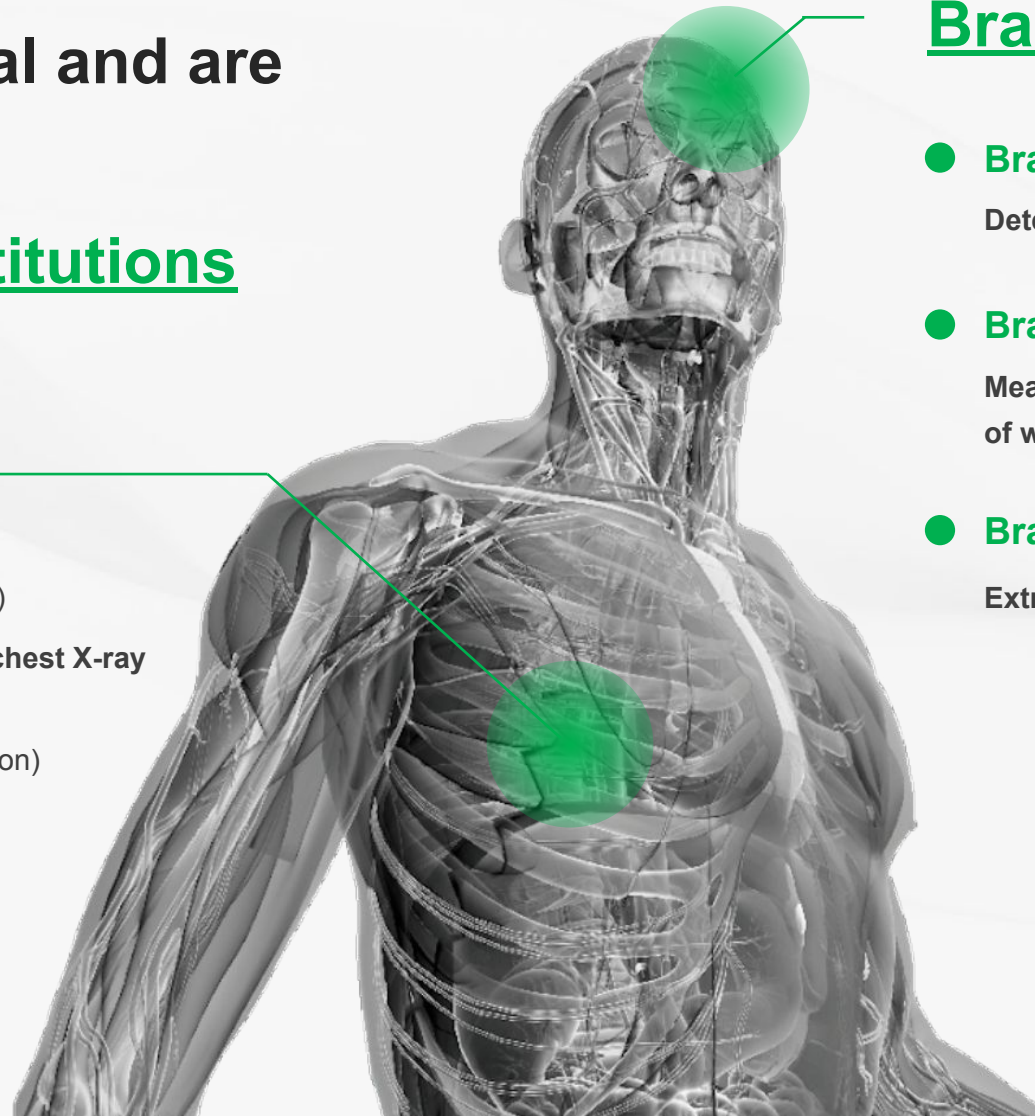
販売名：医用画像解析ソフトウェア　EIRL Aneurysm、承認番号：30100BZX00142000／販売名：医用画像解析ソフトウェア　EIRL basic、製造販売認証番号：230AGBZX00107000／販売名：医用画像解析ソフトウェア　EIRL Brain Segmentation、製造販売認証番号：303AGBZX00043000

販売名：医用画像解析ソフトウェア　EIRL X-Ray Lung nodule 、承認番号：30200BZX00269000／販売名：医用画像解析ソフトウェア　EIRL Chest Metry、製造販売認証番号：302AGBX00101000

EIRL Brain Aneurysm

Diagnostic support for detecting cerebral aneurysms from brain MRA

sensitivity

77.2%

68.2%

90%

80%

70%

60%

50%

Doctor alone

Doctor + EIRL

CAD analysis result: 5 candidates found

※ Product name: Medical Image Analysis Software, EIRL aneurysm
   Certification Number: 30100BZX00142000

EIRL Chest Nodule

Detection of "lung nodule" candidate areas from chest X-ray images

Radiologist → + 9.9%

Non - specialist → + 13.1%

※ Product name: Medical Image Analysis Software, EIRL Chest X-ray lung nodule
Certification Number: 30200BZX00269000
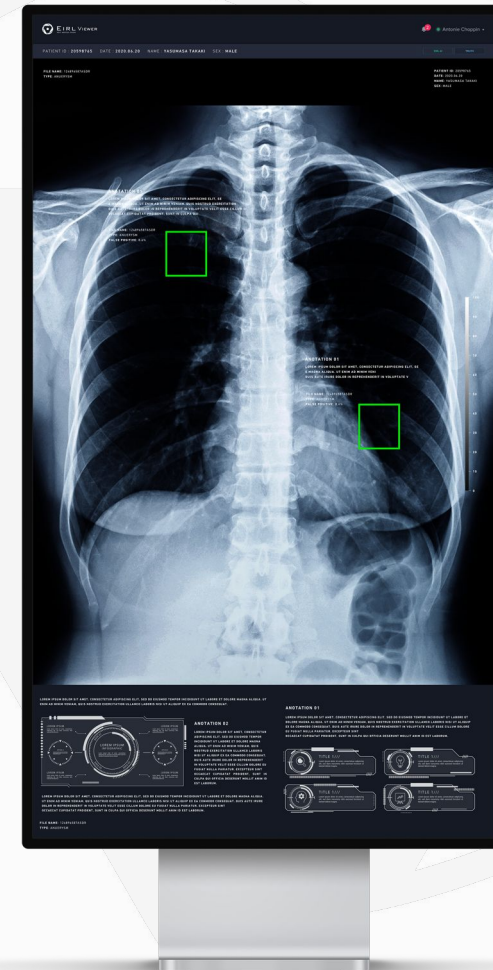
EIRL Chest Nodule detection performance

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Evaluation on JSRT dataset（Japan Society of Radiological Technology）

difficulty ↓

Difficulty	Doctor sensitivity	EIRL sensitivity	Description (by doctors who created the dataset)
5：Obvious	99.58 %	**100.0 %**	・obvious lesion that should never be overlooked ・can be detected even by non-doctor
4：Relatively Obvious	92.6 %	**97.4 %**	・intermediate level, between Obvious and Subtle
3：Subtle	75.7%	**90.0%**	・specialist would find it; could be missed by non-specialists ・should not be missed in a lung cancer screening exam
2：Very Subtle	54.7%	**62.1%**	・should ideally be found, but likely to be missed
1：Extremely Subtle	29.6%	16.0%	・can be found when also looking at CT images ・even specialist could miss it

specificity	80.9%	**87.0%**	ratio of normal cases correctly classified as normal

＊ Chest X‐ray dataset provided by the Japan Society of Radiological Technology http://db.jsrt.or.jp/eng.php

EIRL Chest Metry

Solution for automatic measurement in chest X-ray images

EIRL Chest Metry can automatically segment and measure the area of air contained in the chest cavity, compute the cardiothoracic ratio, CP angles and the mediastinum and aortic bulb width to make it easier for doctors to detect abnormal findings regardless whether the patient notices symptoms.

※ Product name: Medical Image Analysis Software, EIRL Chest Metry
   Certification Number: 302AGBZX00101000

EIRL Colon Polyp

Diagnosis support for detecting colon polyps from colonoscopy image

Aiming at decreasing the number of overlooked lesions, this technology analyzes the colonoscopy movie in real time and displays the areas similar to polyps. It also can discriminate between tumor or non-tumor lesions.

84%

■ neoplastic
■ non-neoplastic

FPS(detection): 24
FPS(display): 24
0:00:37
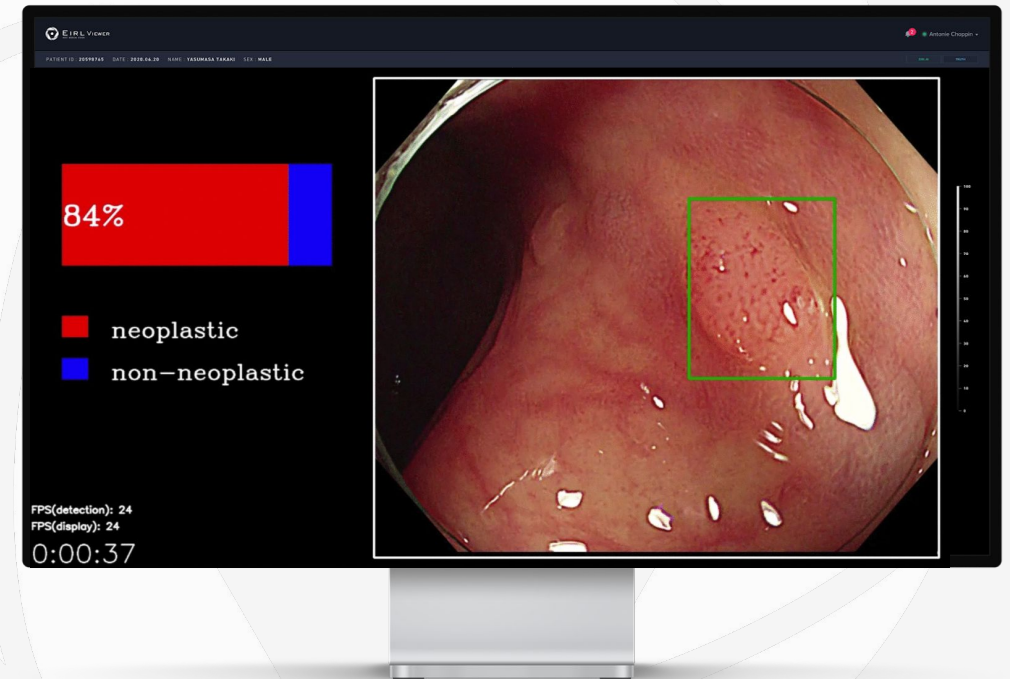
※Unapproved medical device
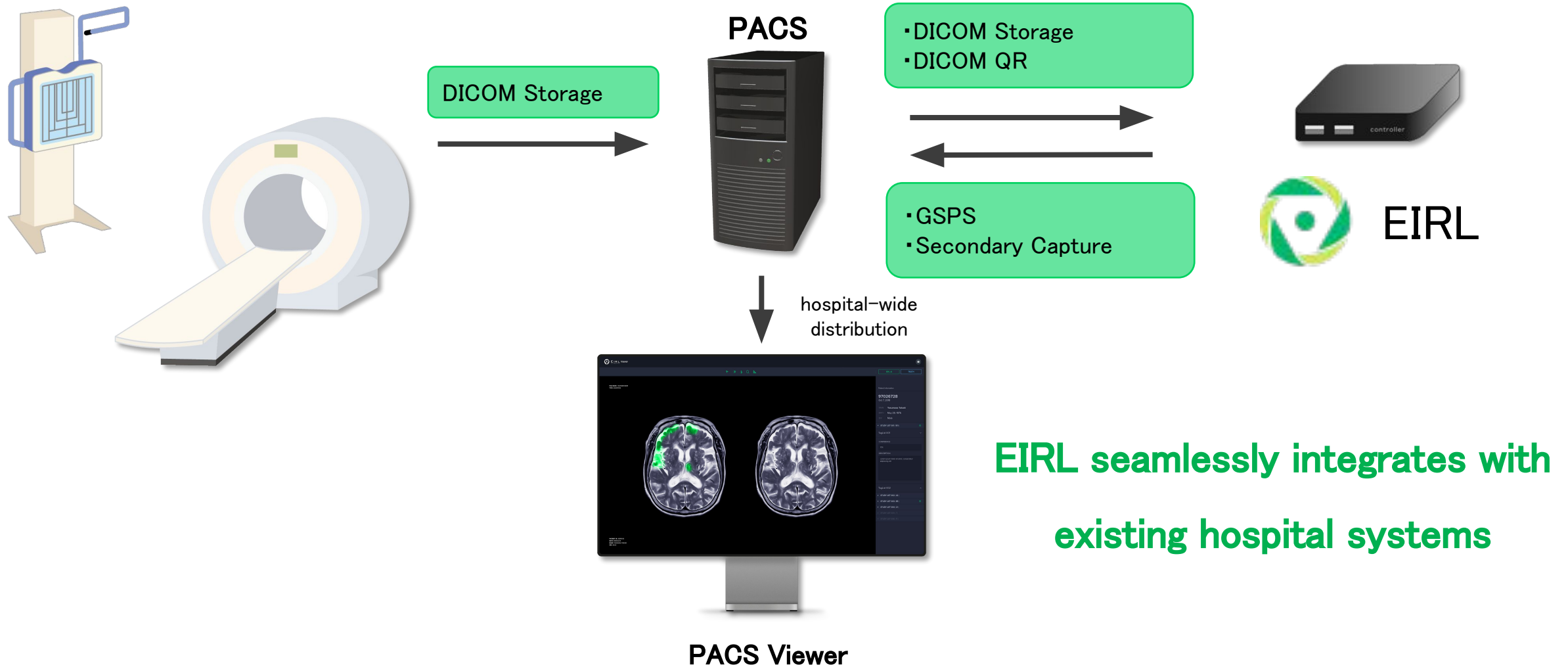
Support reading

I am relieved when using AI and since it helped me in some cases, I cannot work without it.

Prevent over-looked findings

It does detect small nodules (less than 10 mm) or difficult to find lesions, so it really helps preventing overlooking findings.
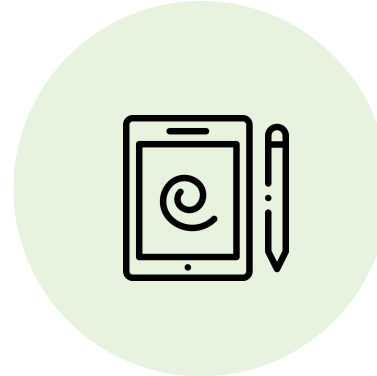
Fill experience gap

When reading difficult cases without consultation, checking AI results helps lowering the stress of having to make a decision.

Challenges in developing EIRL

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CHALLENGE 01

Access to Data

AI requires a large amount of high-quality data, ideally from many different institutions. Privacy makes data collection a complex process.

CHALLENGE 02

High-Quality Annotation

The performance of the AI algorithm strongly depends on the quality of the annotations. Doctors don't always agree about how to interpret image findings.

CHALLENGE 03

Regulatory Approval

Medical device regulatory approval in Japan is time-consuming and can be an obstacle to quickly deploy new technologies to support the medical workforce.