

Advanced and Comfortable Tailor-made Medical  
Treatment based on Heart Simulator

# New Medical Treatment System in the Cloud

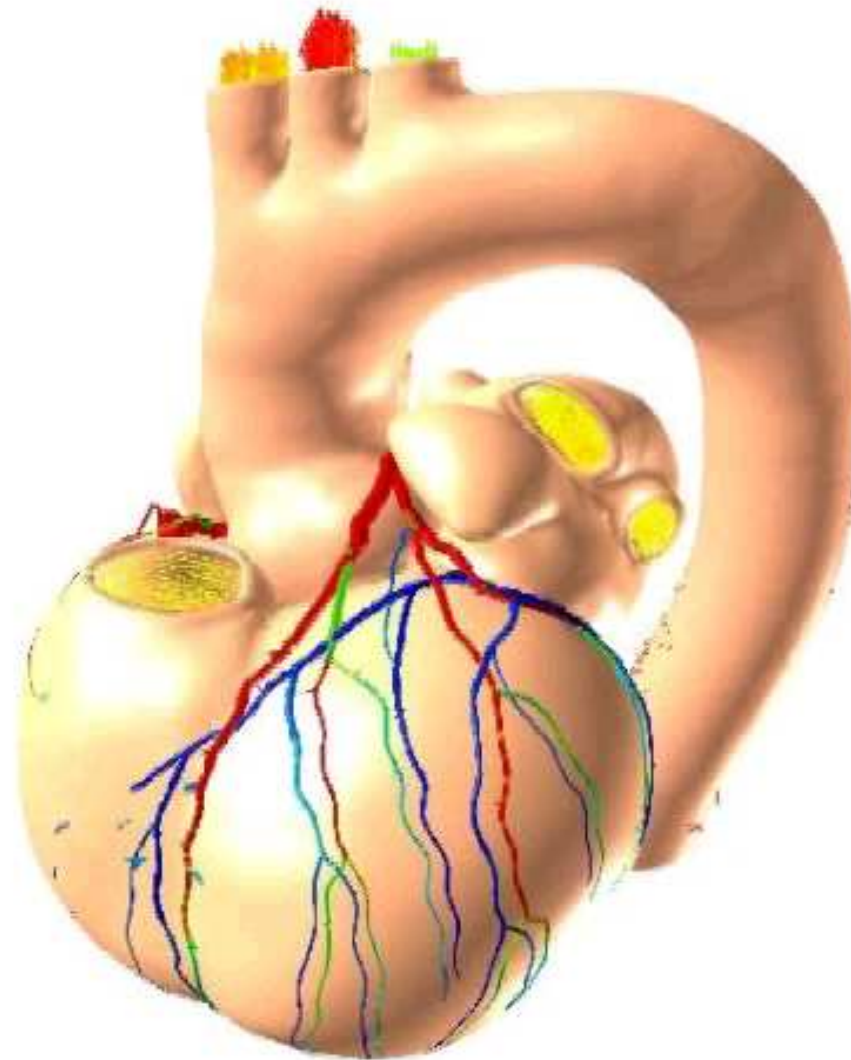
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Yoshimasa Kadooka, Ph.D. in Sci. Fujitsu Ltd.

- Collaborative research with Hisada Lab. of the University of Tokyo
- Supported by Japan Science and Technology Agency

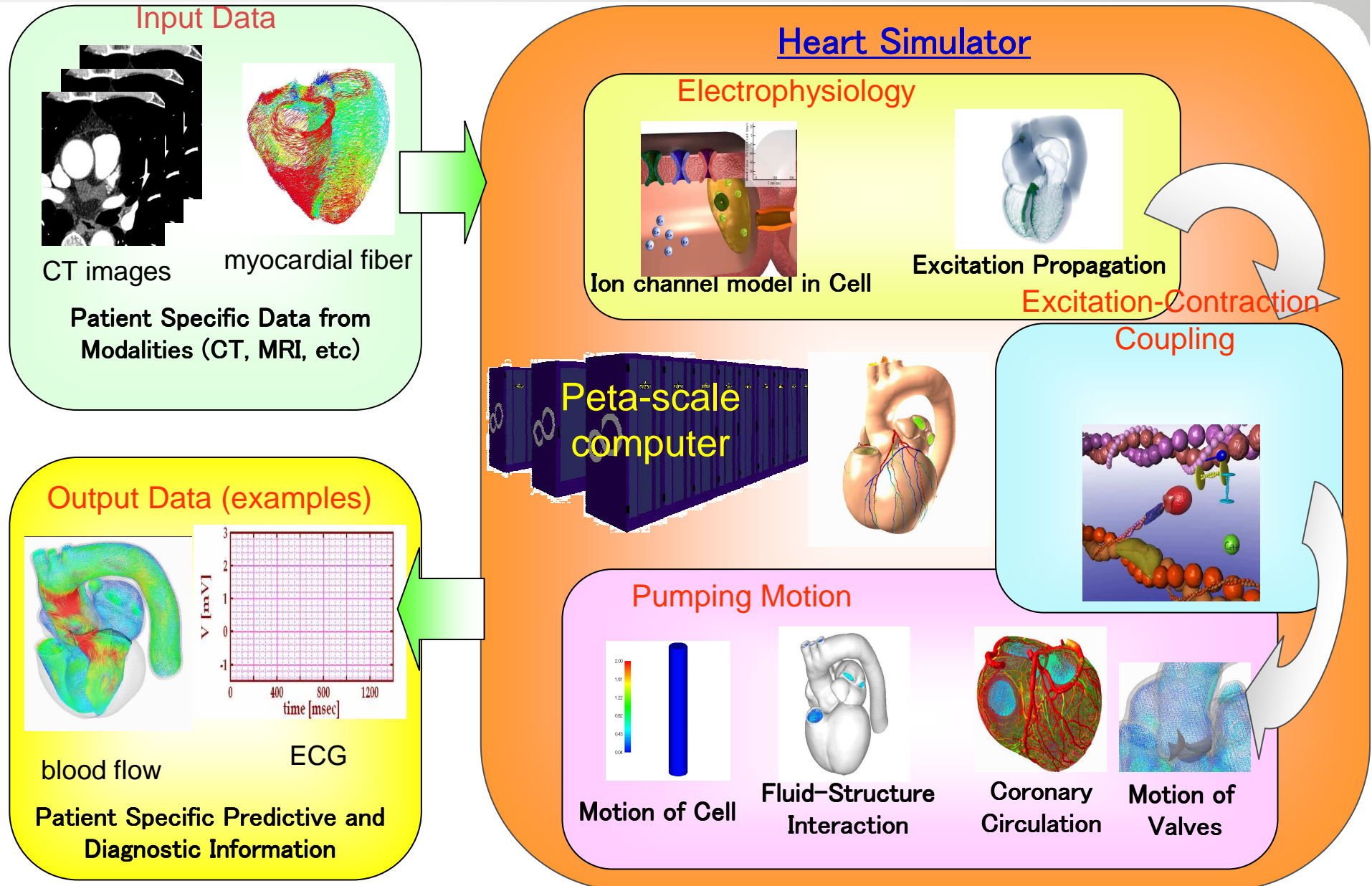
# Agenda

- Introduction of Heart Simulator
- Our Goal: New Medical Treatment System in the Cloud
- Expectation for Telco
- Conclusion

# What is Heart Simulator ?

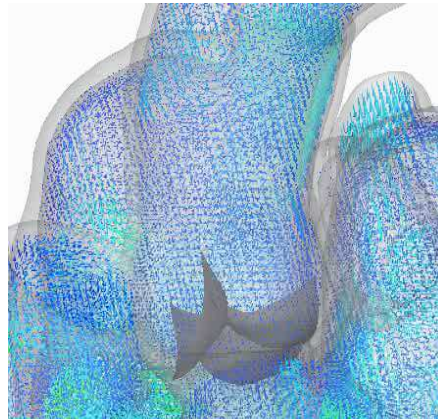


# Mechanisms of Heart Simulator

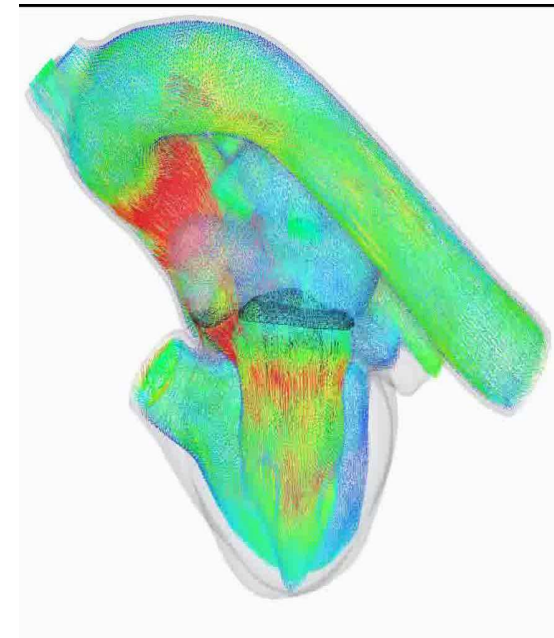
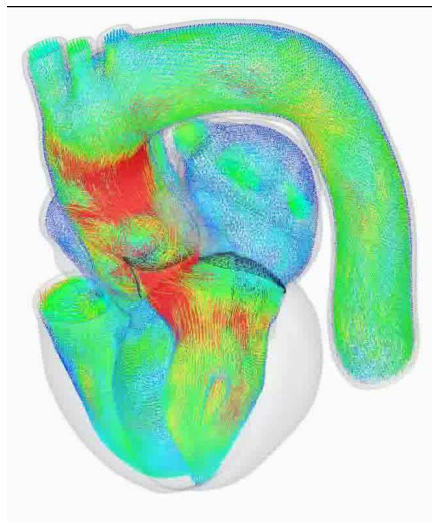
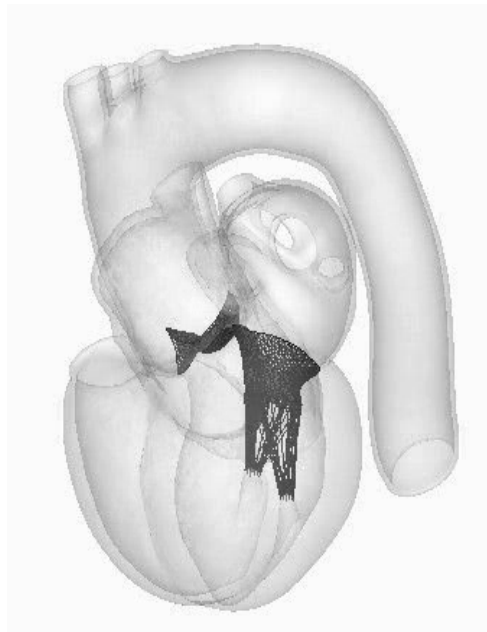




# Motion of Mitral and Aortic Valves



Aortic Valve (Slow motion)



Coupling Simulation for moving valves (Aortic, Mitral) , blood flow and myocardia

# Measurement of Echocardiograph (ECG)

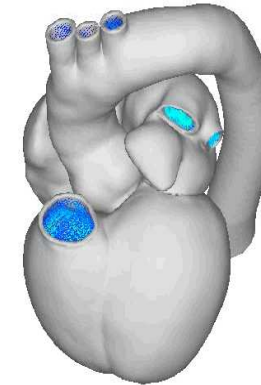
- Comparison of ECG measurement between heart simulator and human heart



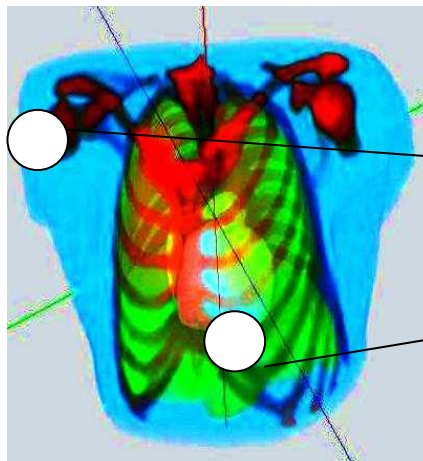
Potential Distribution on torso surface



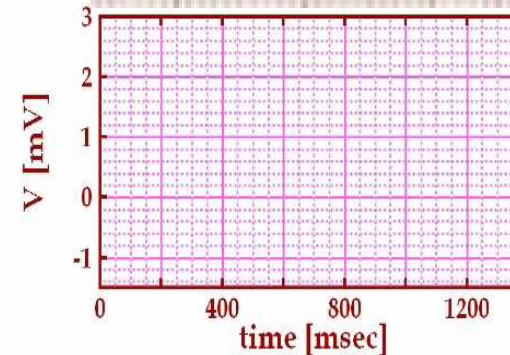
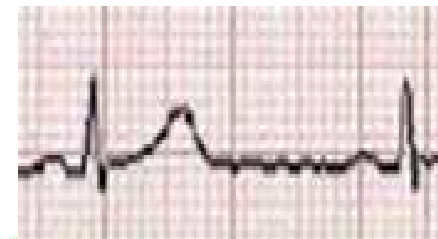
Cardiac Excitation



Cardiac Pumping



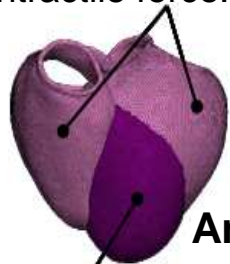
Lead II ECG



# Planning of Surgery for Dilatative Cardiomyopathy

## ■ Surgery Planning of “Batista” by Heart Simulator

Contractile force: 100%



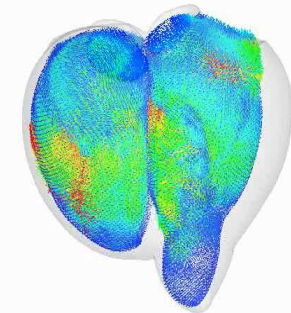
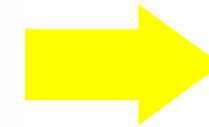
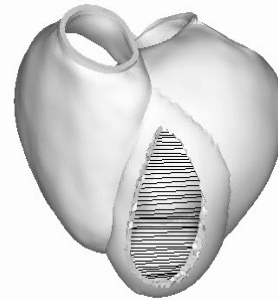
**Aneurysm**

Necrotic myocardium

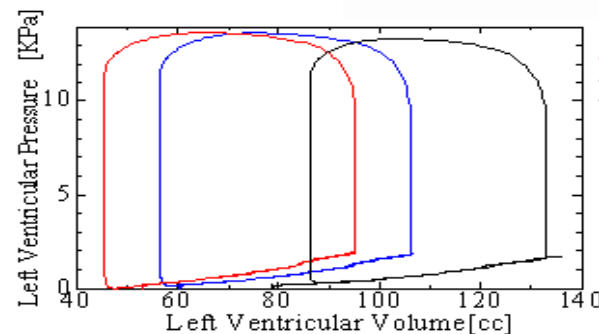
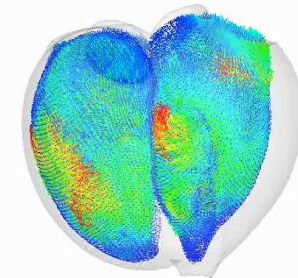
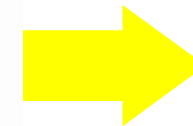
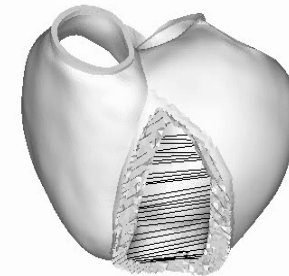
Contractile force: 30%

**Before surgery**

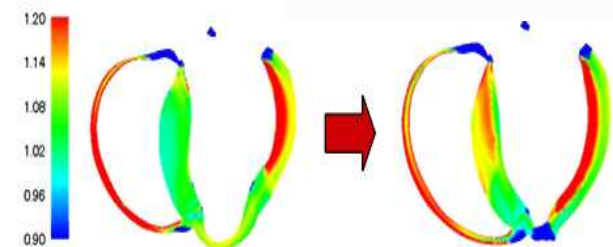
**Plan A**



**Plan B**



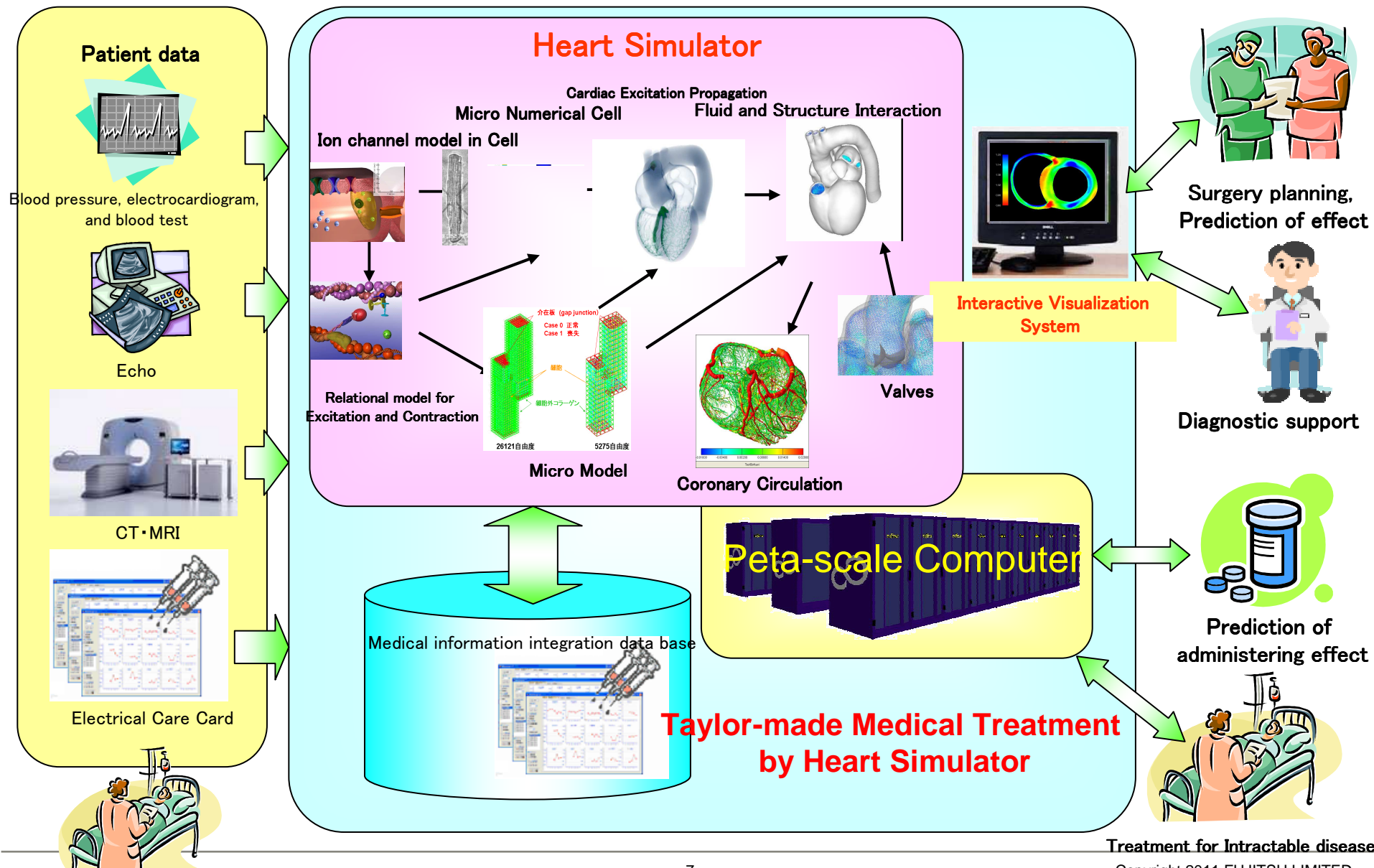
**Quantitative Prediction (QP) of Pressure - Volume**



**QP of Stress – Strain**

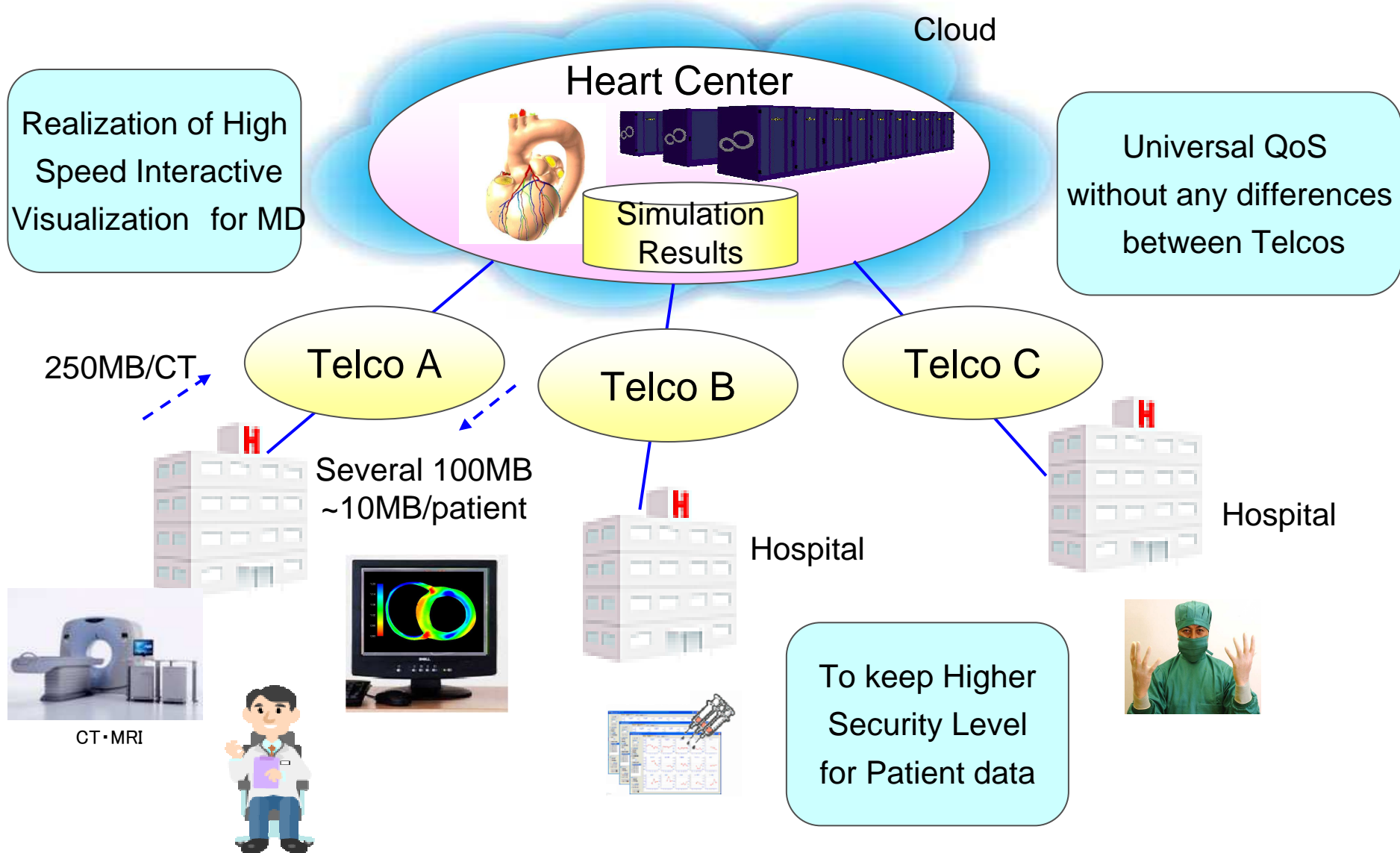


# New Medical System to realize Tailor-made Medical Treatment in the Cloud



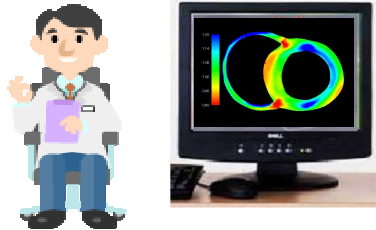


# Expectation for Telco



# High Speed Interactive Visualization

Medical Doctor



Heart Center

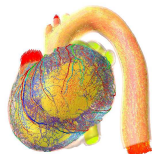
Data Request

Several Min.



New Data Request: rotate

Several Min.



86MB

86MB

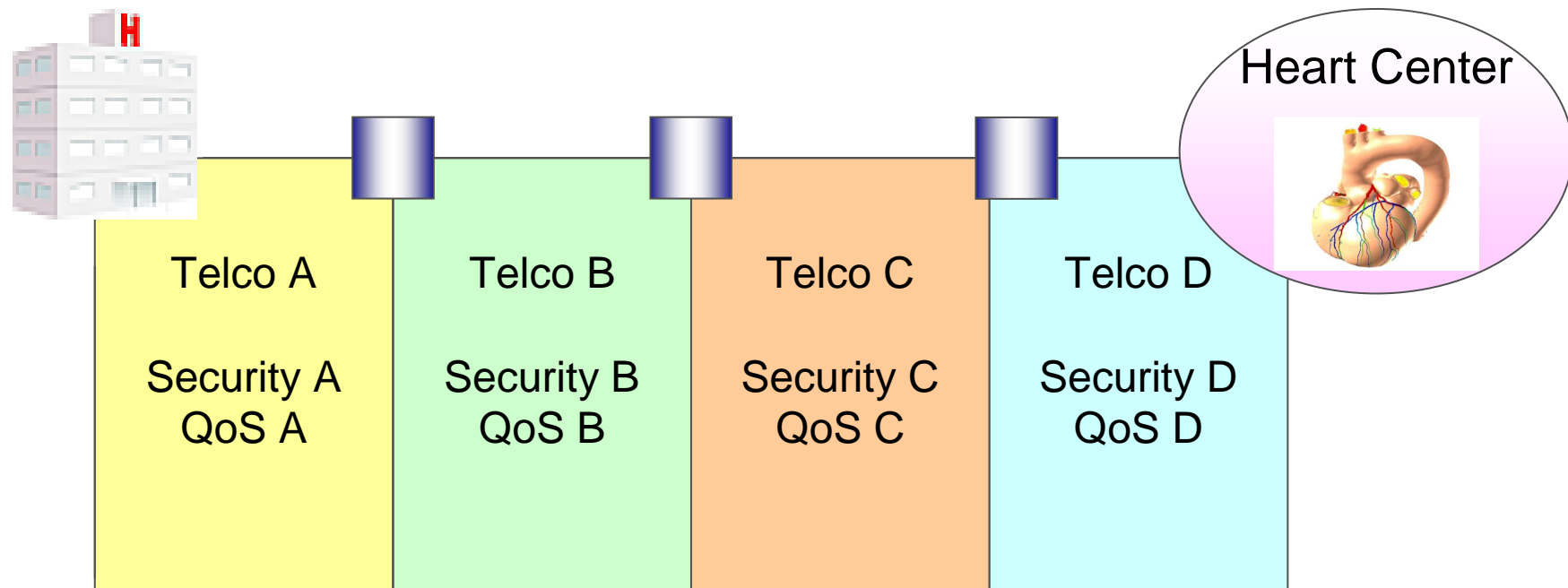
How to reduce the data transmission time  
: from **Several Min.** to **Several Sec.**

# Security Level and Universal QoS

## ■ Protection for DoS Attack

- To guarantee Persistent Service and Emergency Response without any service interruption

## ■ To guarantee the minimum security level and QoS for all Telcos

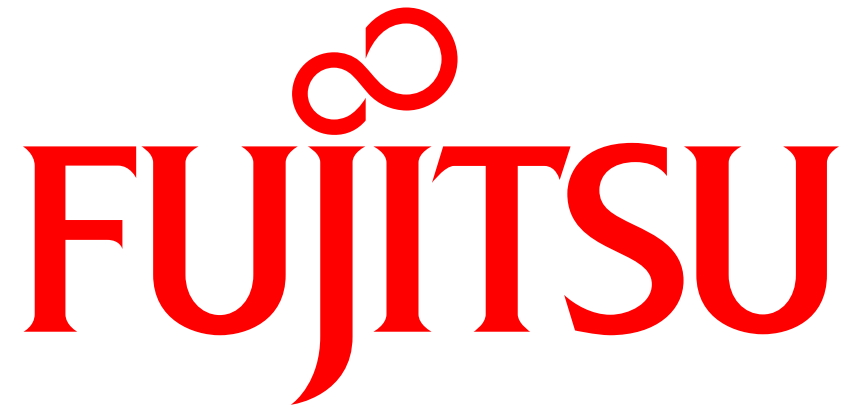


## ■ International Leased Line Service

- The University of Tokyo and FUJITSU have realized Multi-scale/Multi-Physics Heart Simulator which contributes to the advanced and comfortable tailor-made medical treatments;
  - Surgical planning, Patient-specific ICD, Side effect check, Informed consent
- We expect for Telco to solve some issues to realize these phenomena
  - High level Interactive communication, Security Level and Universal QoS
- FUJITSU will contribute to the society by realizing new medical treatment system in Cloud
  - Telco services, Simulation technologies and Cloud are key elements to realize this system



Thank you!



shaping tomorrow with you

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