

Ambient SoC Enabling Future (CPSS Cyber-Physical “Social” Systems)

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Ambient SoC Enabling Future CPSS (Cyber-Physical “Social” Systems)

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Our Vision



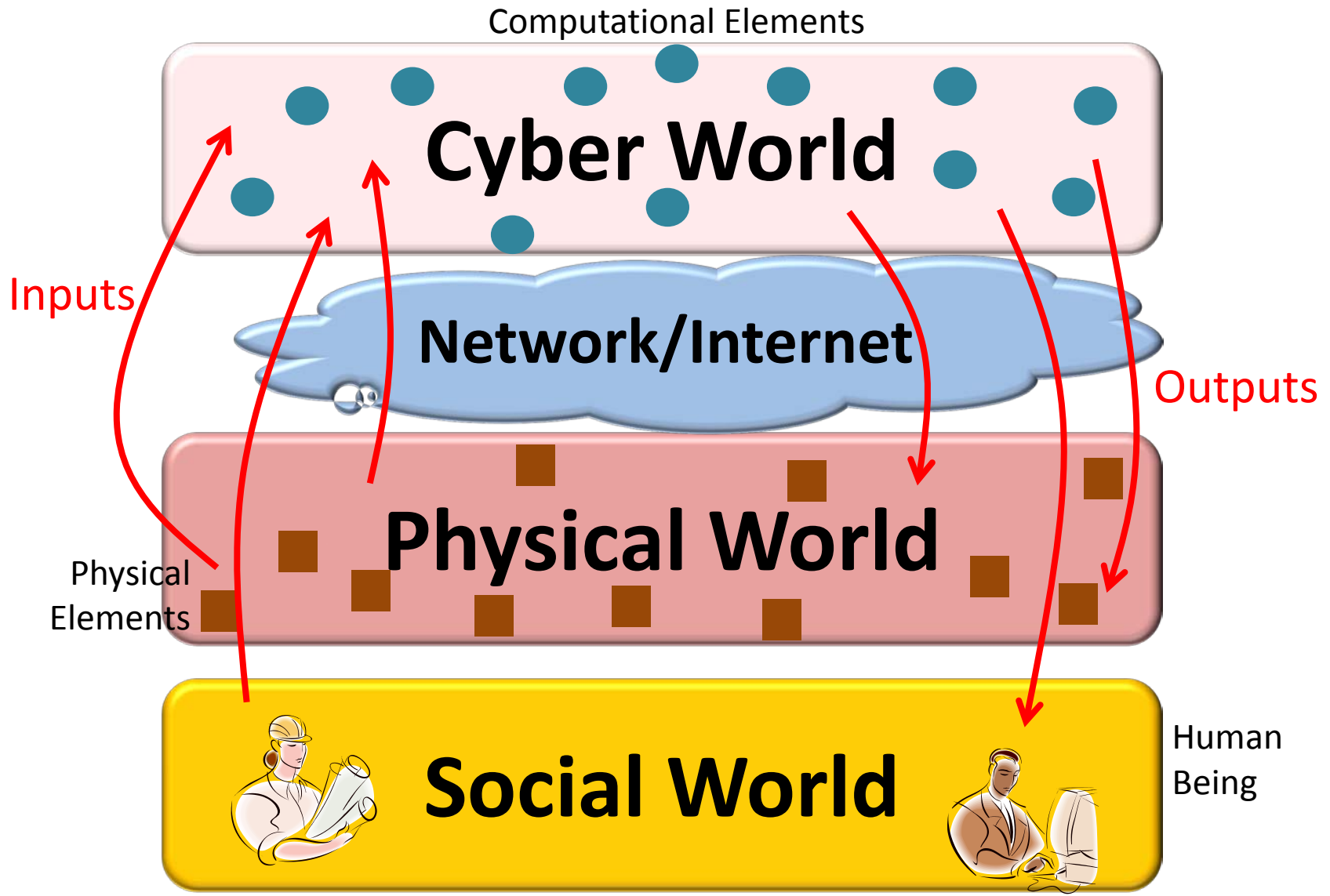
Vision: Optimize the whole earth by means of “CPSS” systematically!

Optimize the Whole Japan so as to Protect Tsunami Disasters!



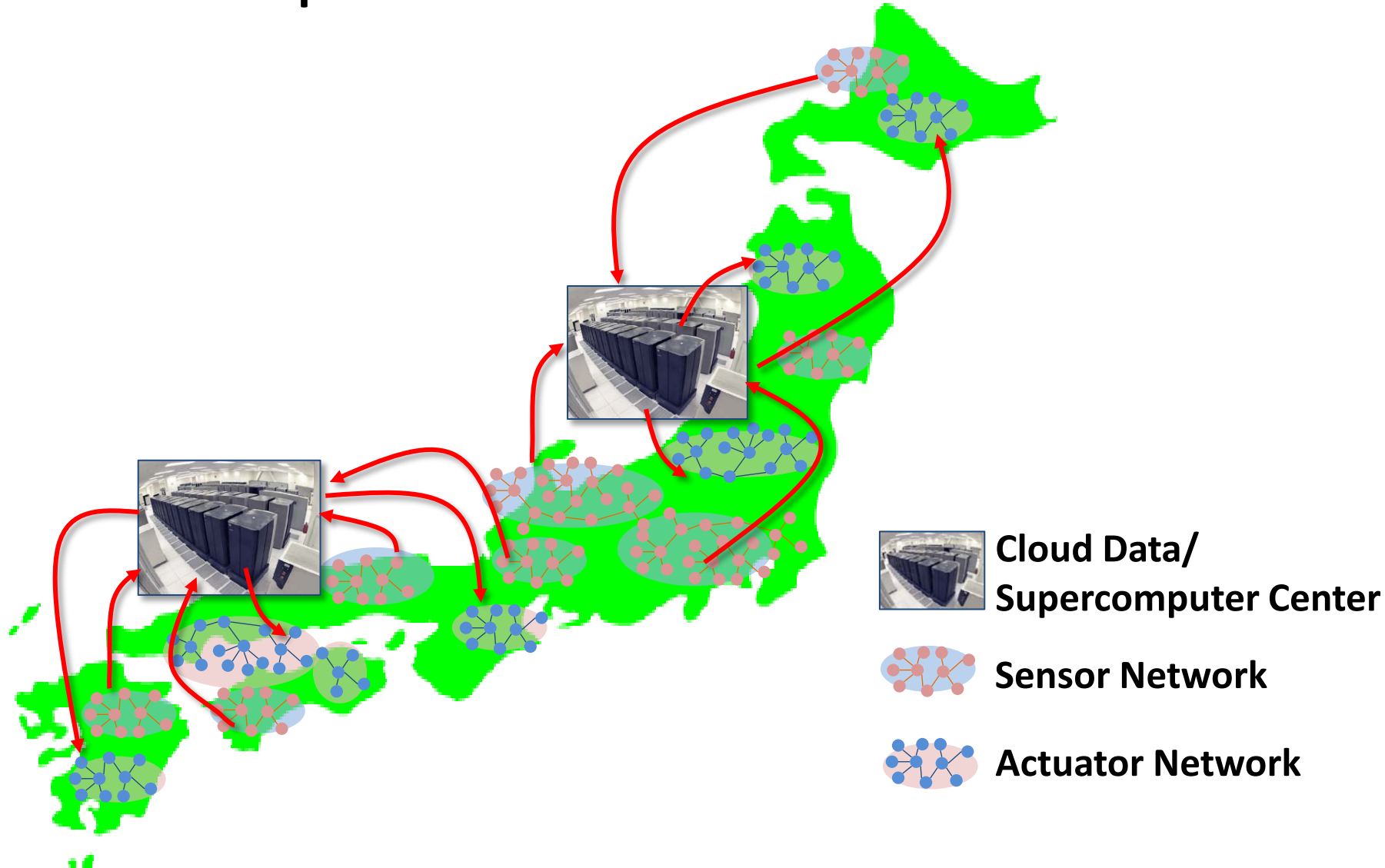
How Do We Optimize the Whole Earth?

- CPSS (Cyber-Physical-Social System) -



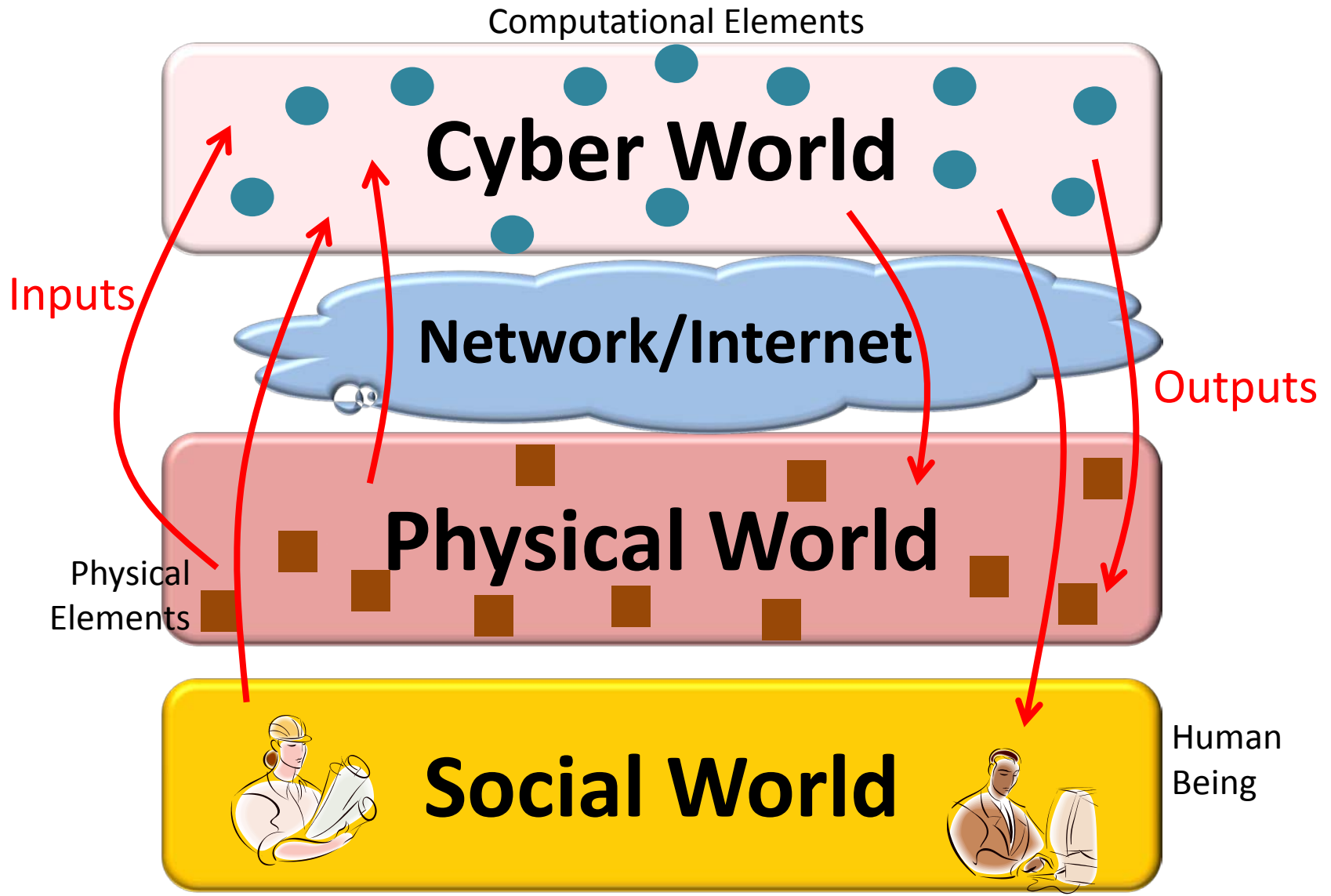
How Do We Optimize the Whole Japan?

- Japan National-wide CPSS-



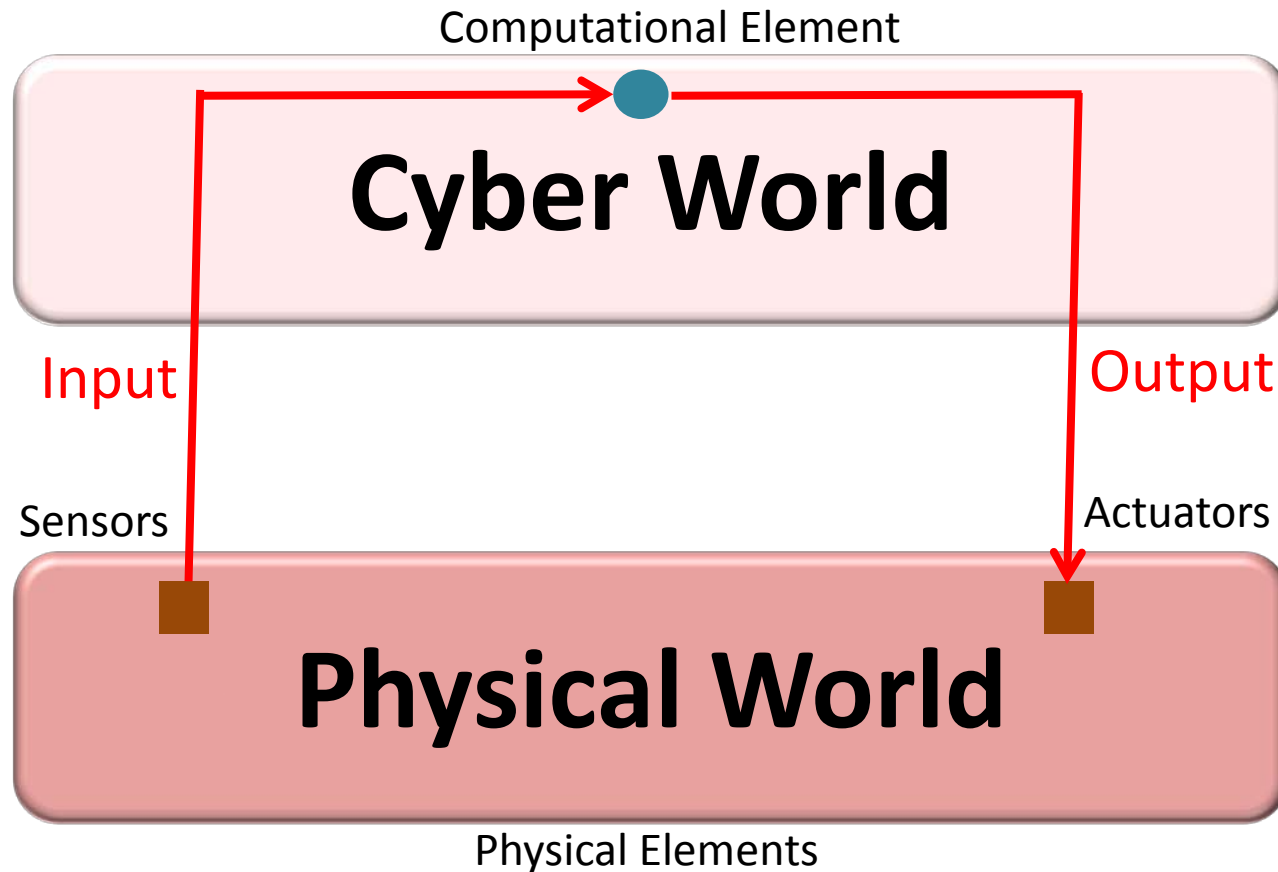
CPSS (Cyber-Physical-Social System)

- A Big Picture -



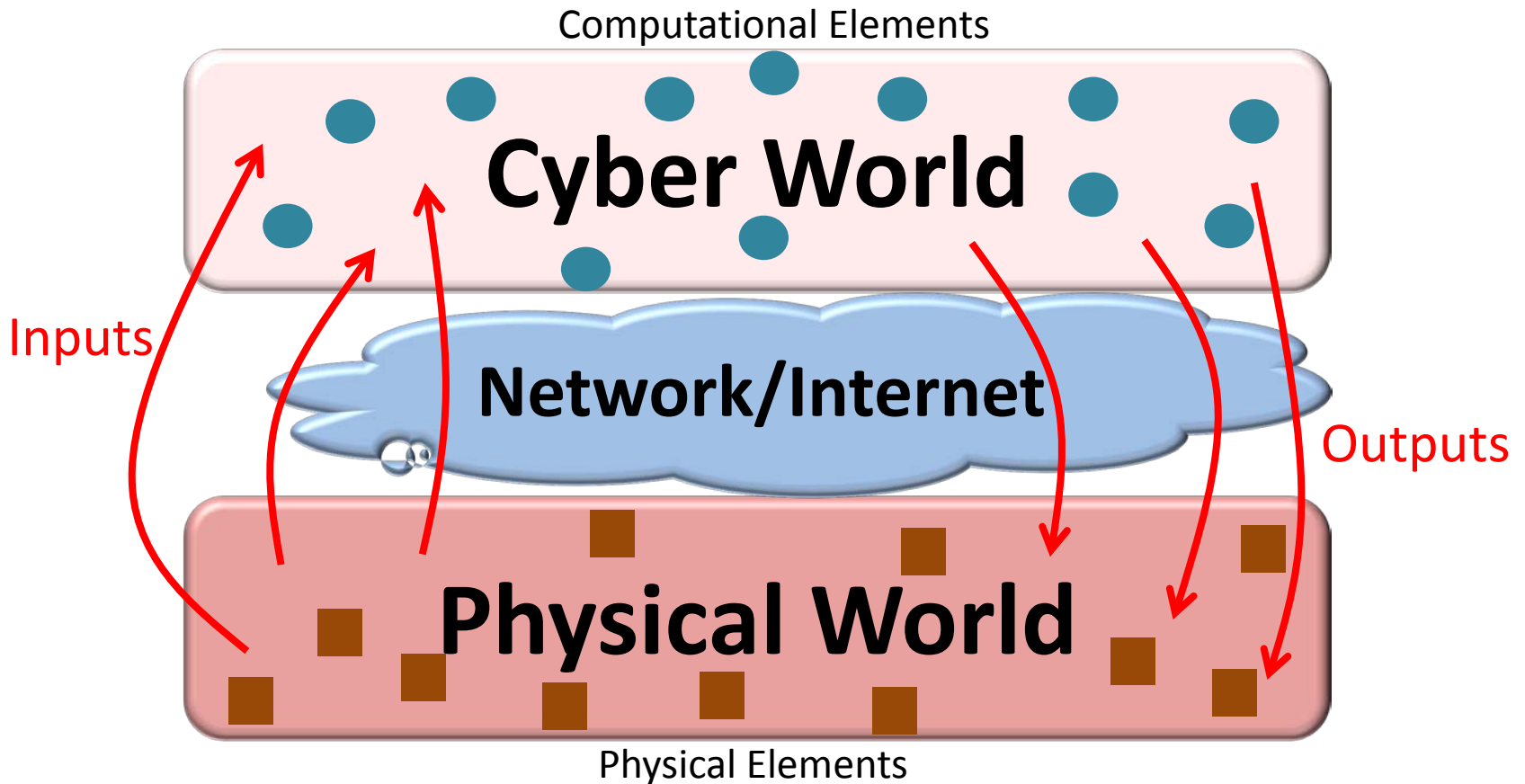
An Origin of CPSS

- ES (Embedded System) -



Another Origin of CPSS

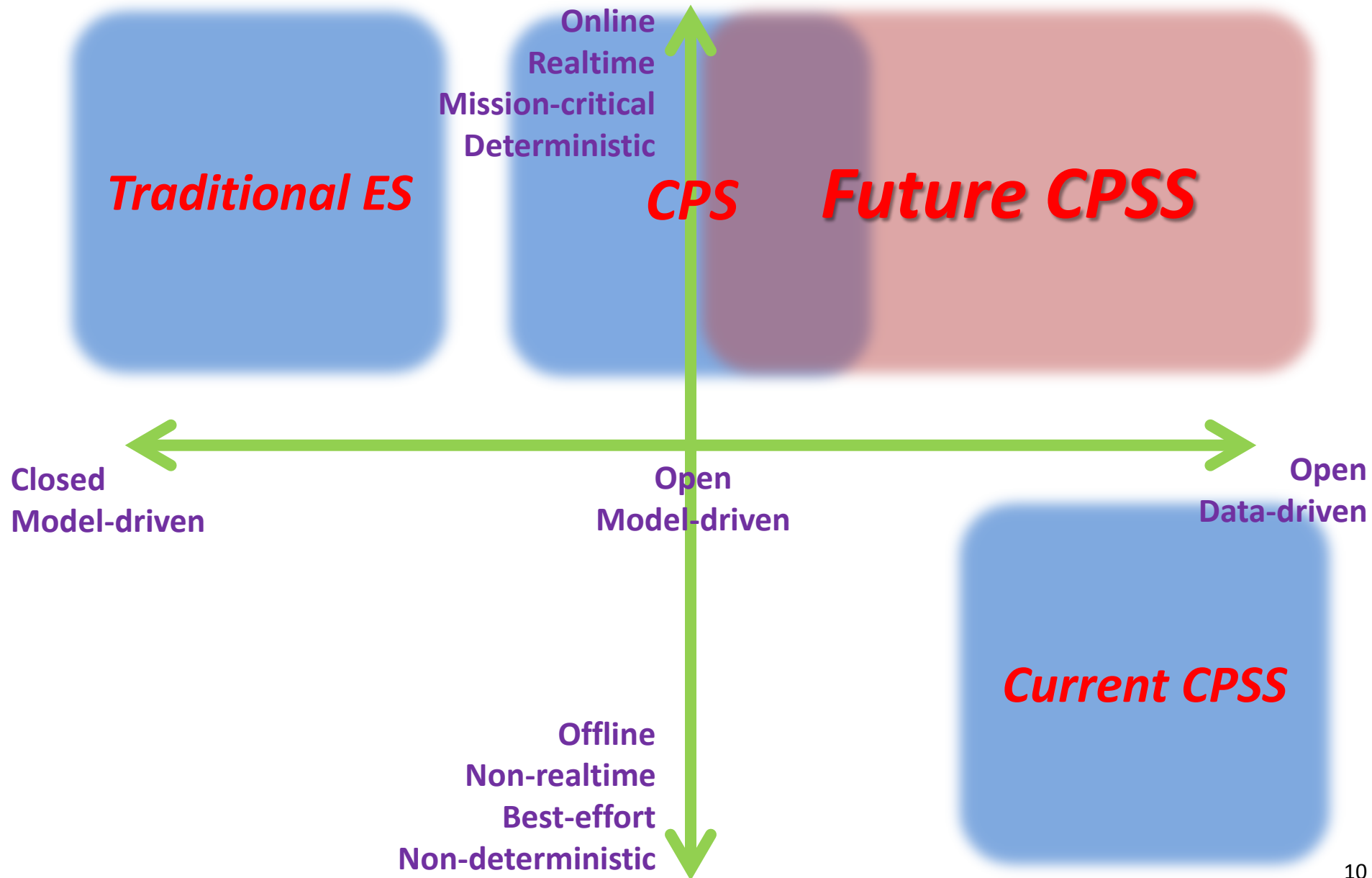
- CPS (Cyber-Physical System) -



Classifying ES, CPS, and CPSS

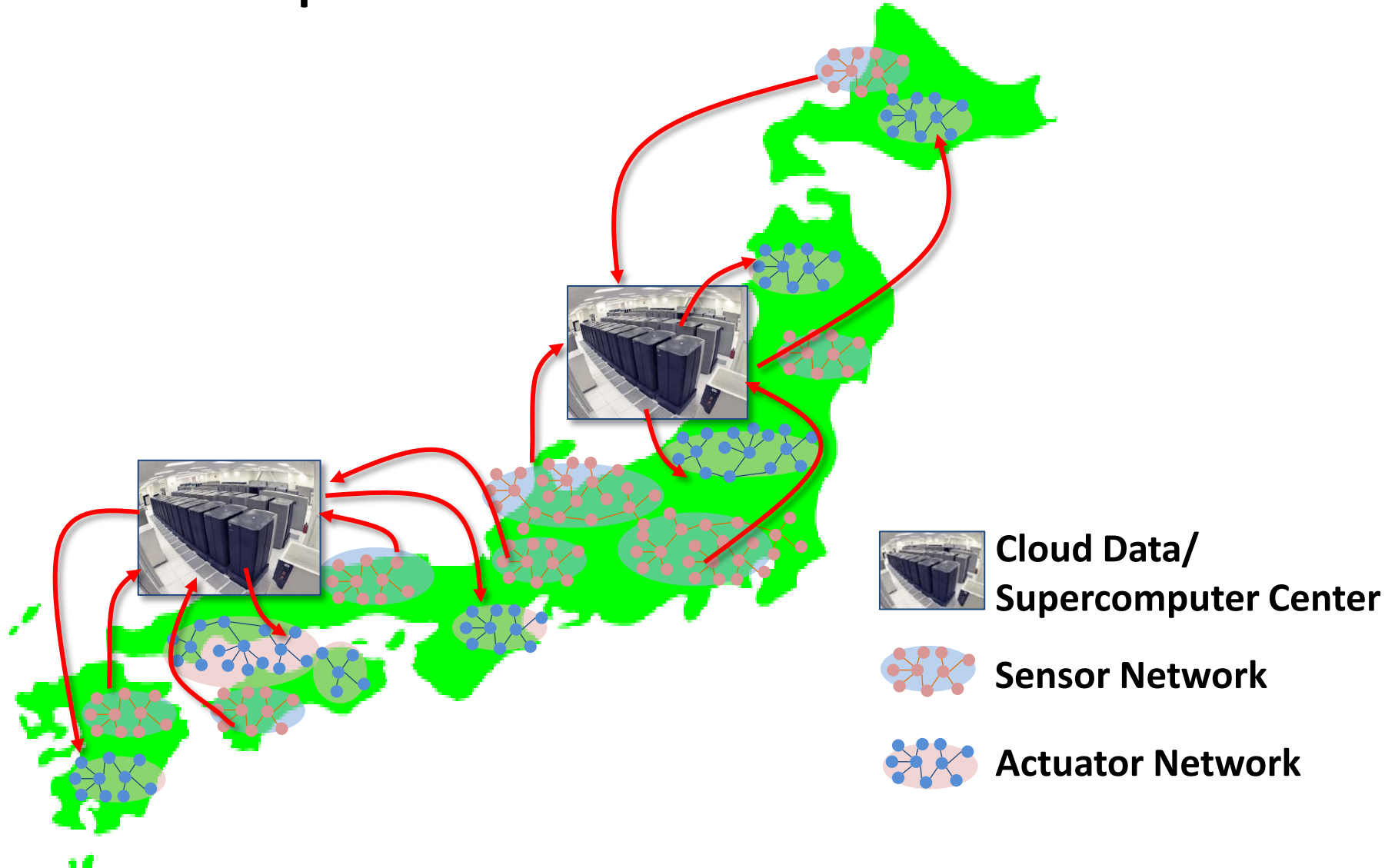
| Taxonomy | | ES | CPS | Current CPSS | Future CPSS |
|---------------------|------------------|----|-----|--------------|-------------|
| Feedback | Offline | | | ✓ | |
| | Online | ✓ | ✓ | | ✓ |
| Raeltimelessness | Non-realtime | | | ✓ | |
| | Realtime | ✓ | ✓ | | ✓ |
| System | Closed | ✓ | | | |
| | Open | | ✓ | ✓ | ✓ |
| Criticality | Best-effort | | | ✓ | |
| | Mission-critical | ✓ | ✓ | | ✓ |
| Control | Model-driven | ✓ | ✓ | | ✓ |
| | Data-driven | | | ✓ | ✓ |
| Effects of feedback | Nondeterministic | | | ✓ | |
| | Deterministic | ✓ | ✓ | | ✓ |

Classifying ES, CPS, and CPSS



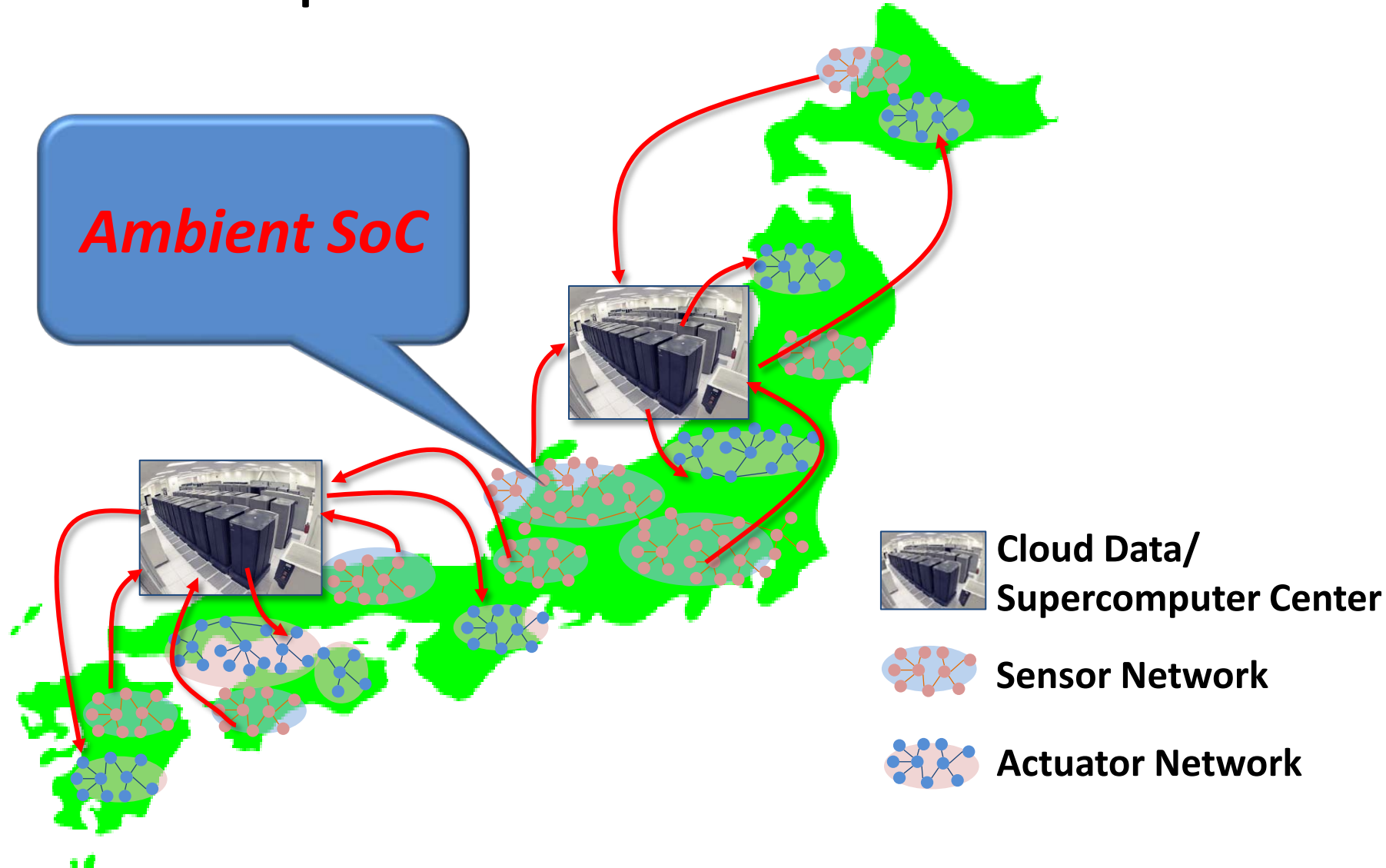
How Do We Optimize the Whole Japan?

- Japan National-wide CPSS-



How Do We Optimize the Whole Japan?

- Japan National-wide CPSS-



How Do We Optimize the Whole East-Asia?

- East-Asia Regional-Wide CPSS -



How Do We Optimize the Whole East-Asia?

- East-Asia Regional-Wide CPSS -

Ambient SoC



Optimize the Whole Earth by means of CPSS Systematically



Smart ITS



**Preventive Medical
Service System**

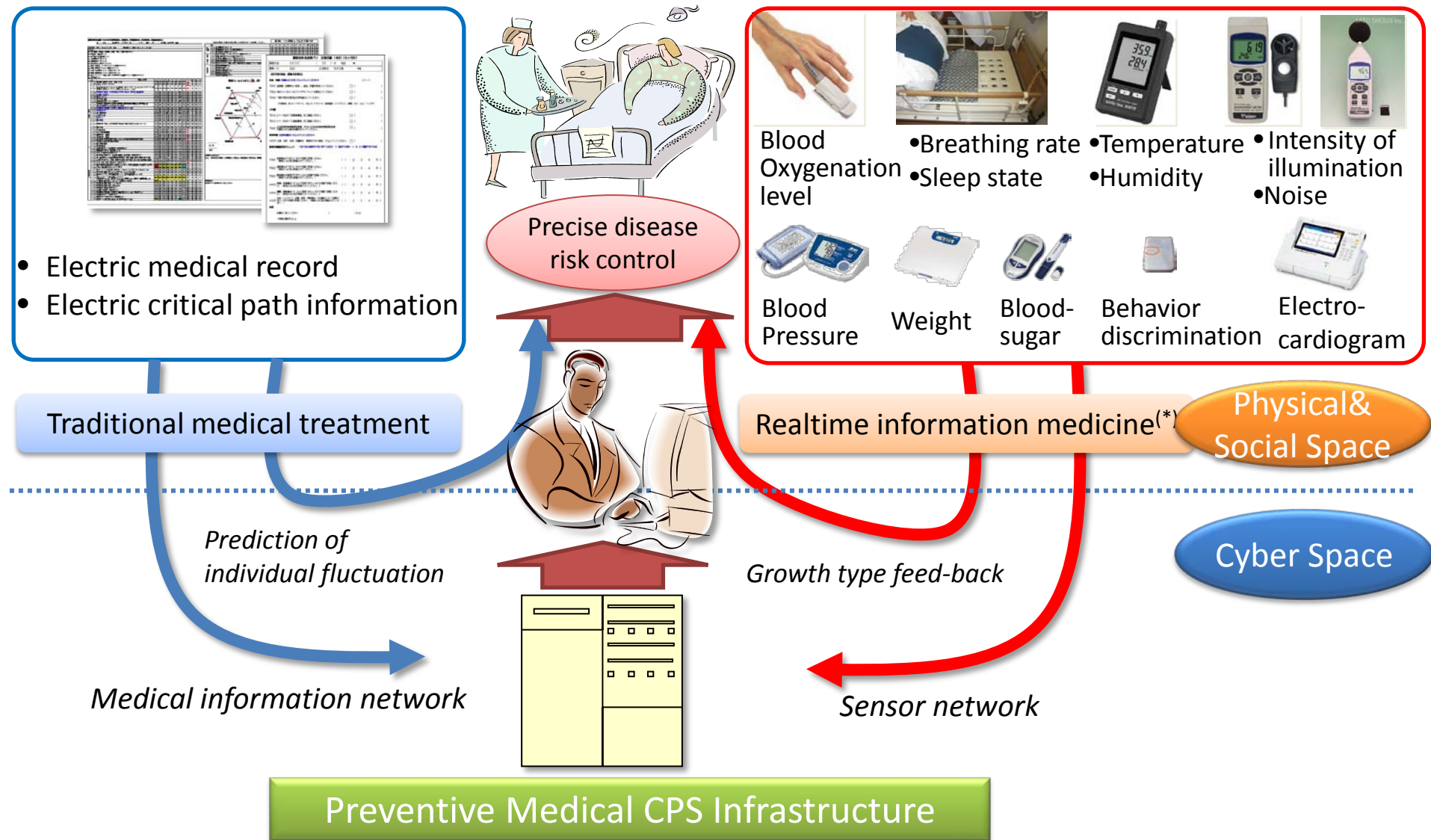


Smart Grid



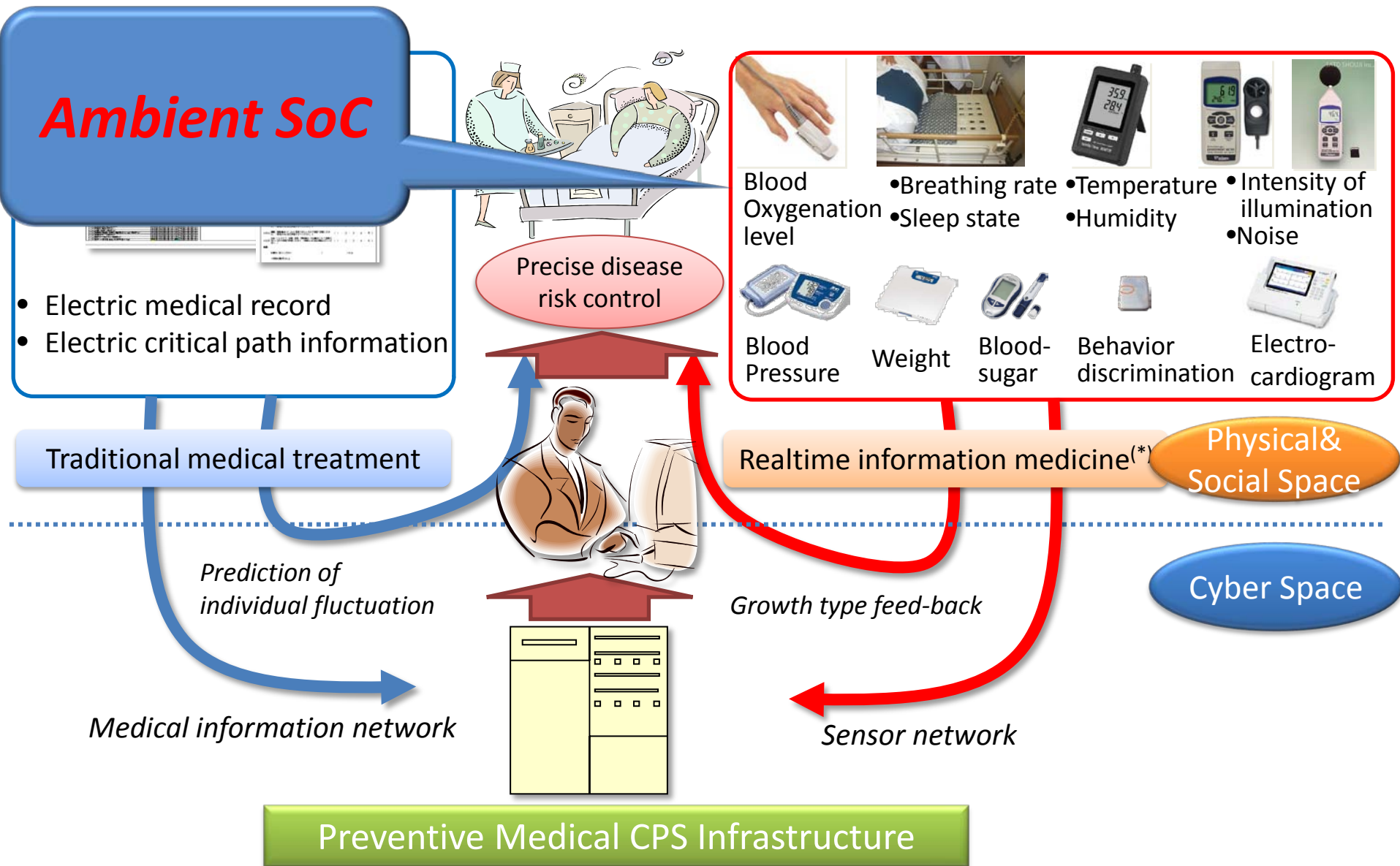
Smart Cities

Preventive Medical Service System



(*): Information Medicine: A concept provide right information at right timing to improve health

Preventive Medical Service System

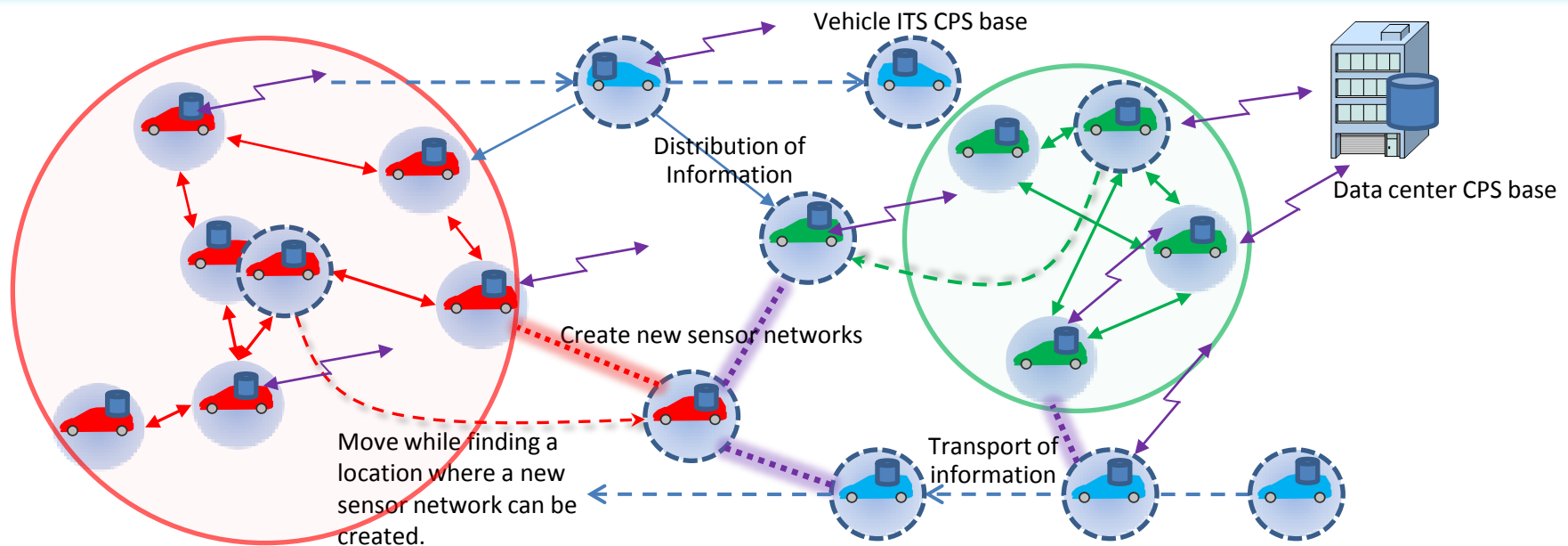


(*): Information Medicine: A concept provide right information at right timing to improve health

Smart ITS: Sensor-Networked ITS

Concept:

- ① Collect data using various sensors on vehicles, and send them via WAN to data centers. The data is analyzed for traffic conditions or other status. Then the analyzed data is used to guide vehicles for efficiency and safety.
- ② At the same time, the analyzed data in the data center is shared using vehicle to vehicle communication. It is used to improve own traffic information, and it also improves traffic efficiency and safety.
- ③ The vehicle-to-vehicle communication can be used to create sensor network which provide minimum communication capability in an emergency condition.

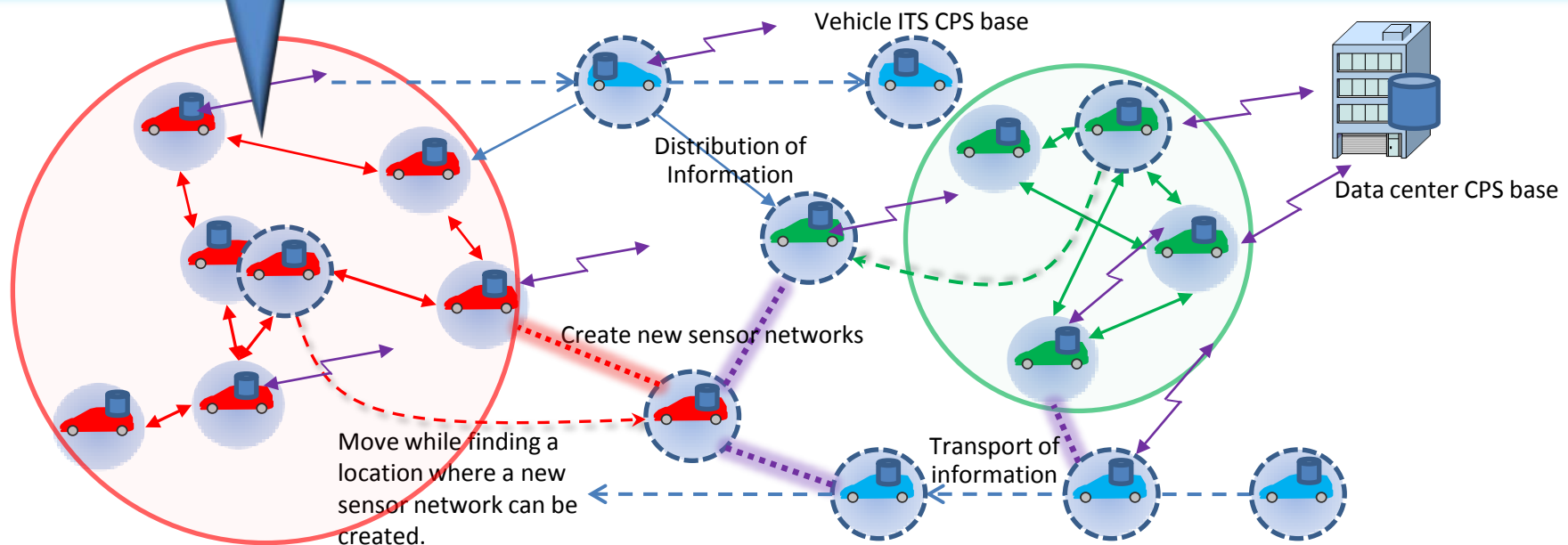


Vehicle sensing data: location, velocity, acceleration, load condition, temperature, rainfall, visual image, battery/fuel condition

Smart ITS: Sensor-Networked ITS

Ambient SoC

- sensors on vehicles, and send them via WAN to data centers. The data is used to monitor traffic conditions or other status. Then the analyzed data is used to guide vehicles for efficient travel.
- ③ The vehicle-to-vehicle communication can be used to create sensor network which provide minimum communication latency in an emergency condition.



Vehicle sensing data: location, velocity, acceleration, load condition, temperature, rainfall, visual image, battery/fuel condition

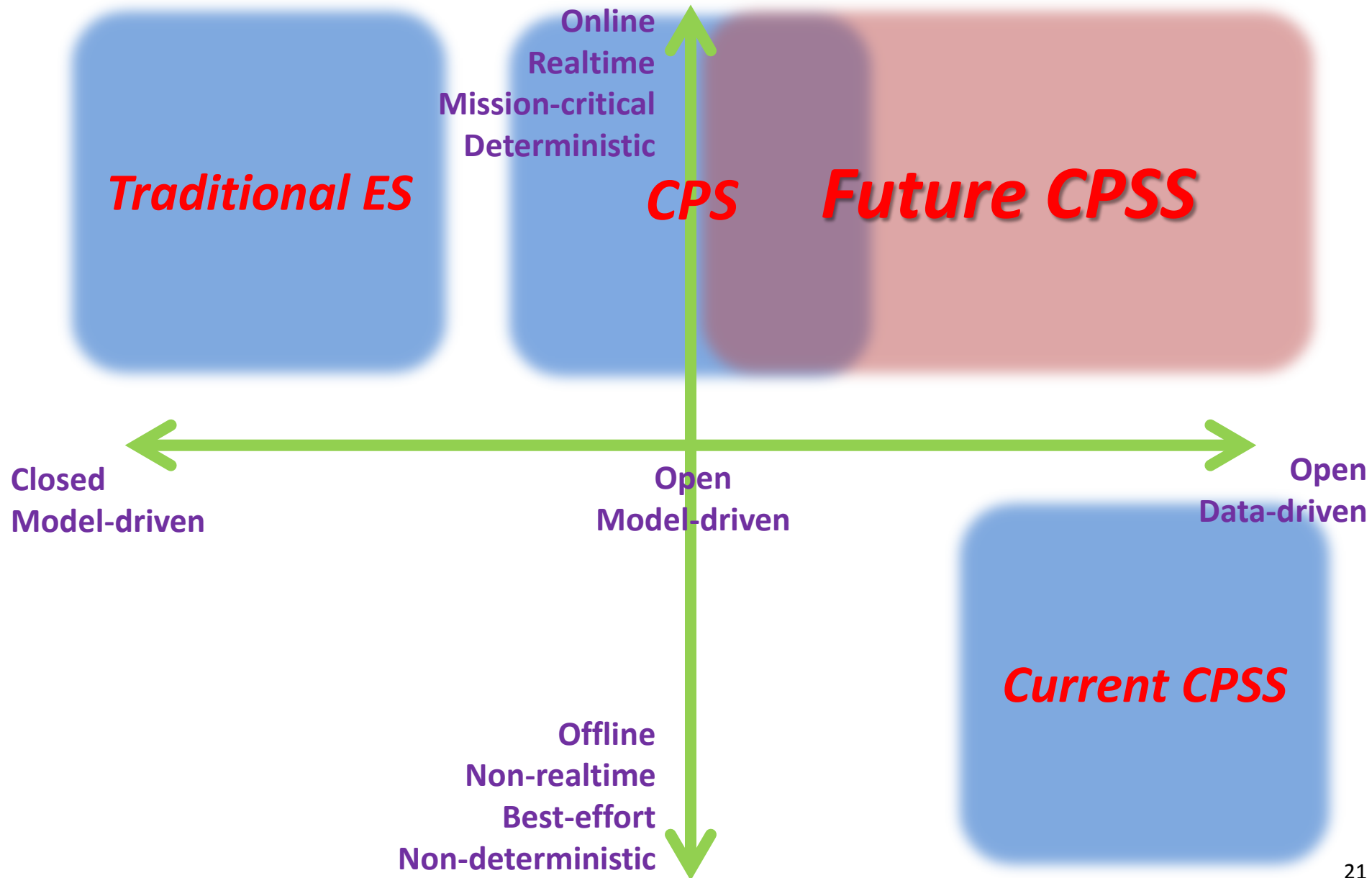
Our Vision and Mission



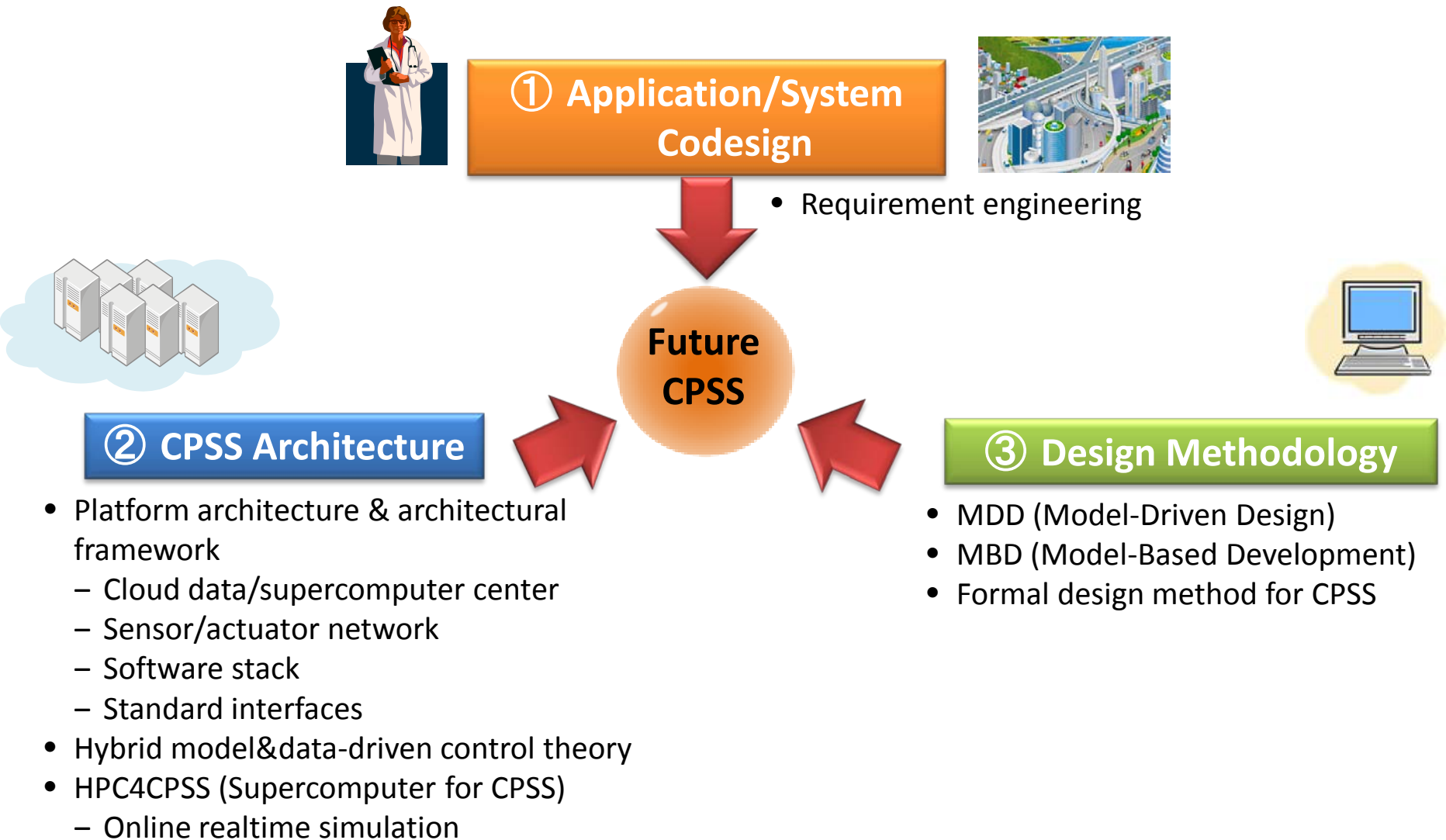
Vision: Optimize the whole earth by means of “CPSS” systematically!

Mission: Develop technologies enabling future “CPSS”!

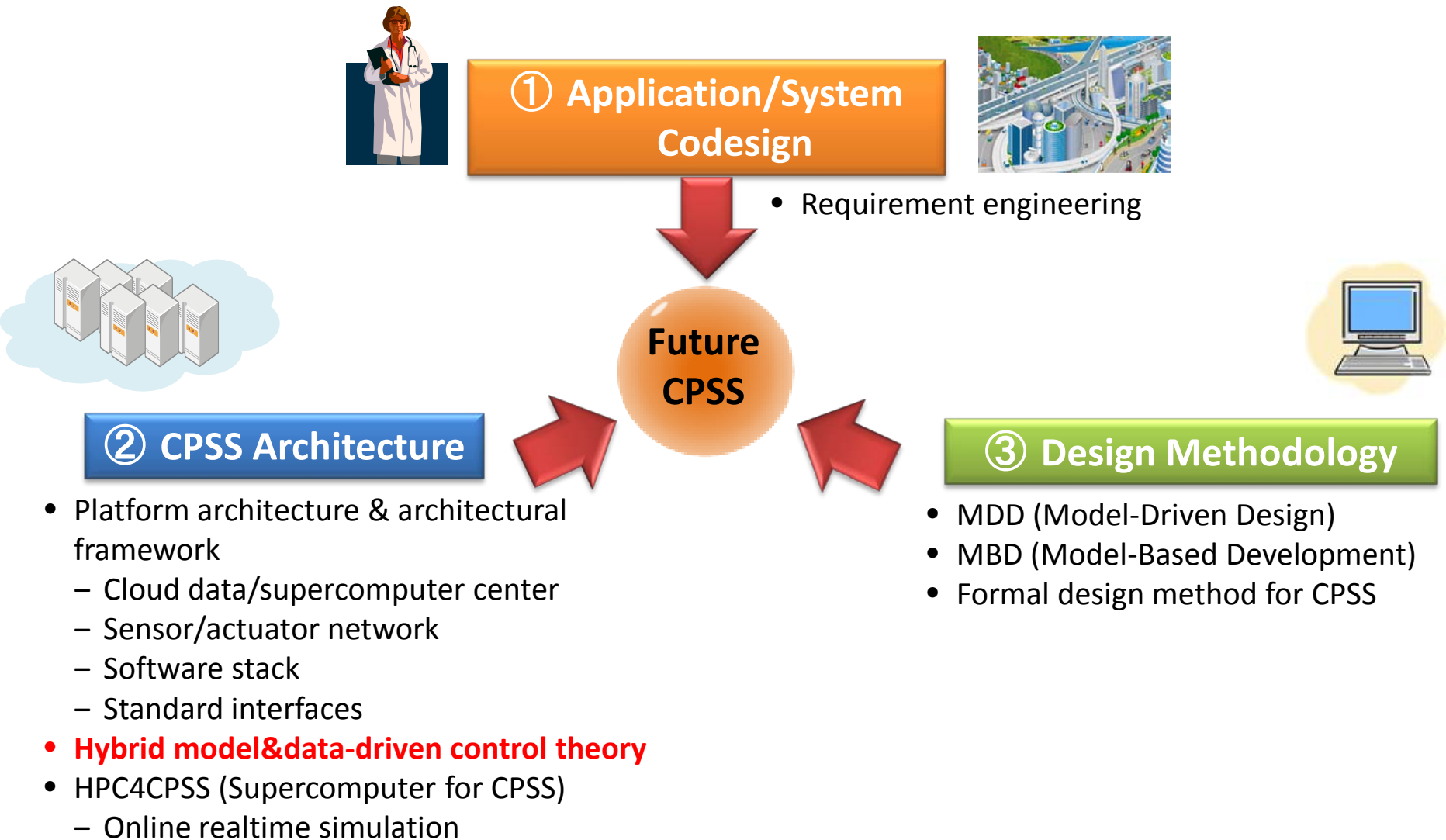
Classifying ES, CPS, and CPSS



Technologies Enabling Future CPSS



Technologies Enabling Future CPSS



Hybrid Model&Data-Driven Control Theory

Hybrid Model & Data-Driven

Model-Driven

- Traditional control theory
 - Feedback
 - Feedforward
- Simulation

Data-Driven

- Data mining
- Data assimilation

Technologies Enabling Future CPSS

