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Implementation of a healthcare system integrated with devices and services using standards

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Background

- **Medical devices** are essential to support healthcare services.
- It's difficult to interconnect with different kind of devices.
- Using **information standards** is one of the best strategies to enhance interoperability.

- **Interoperability**
  - " the ability of two or more systems or components to exchange information and to use the information that has been exchanged"
  - Standardization and profiling focuses on the behavior across and amongst Interfaces and Behaviors required to ensure seamless integration

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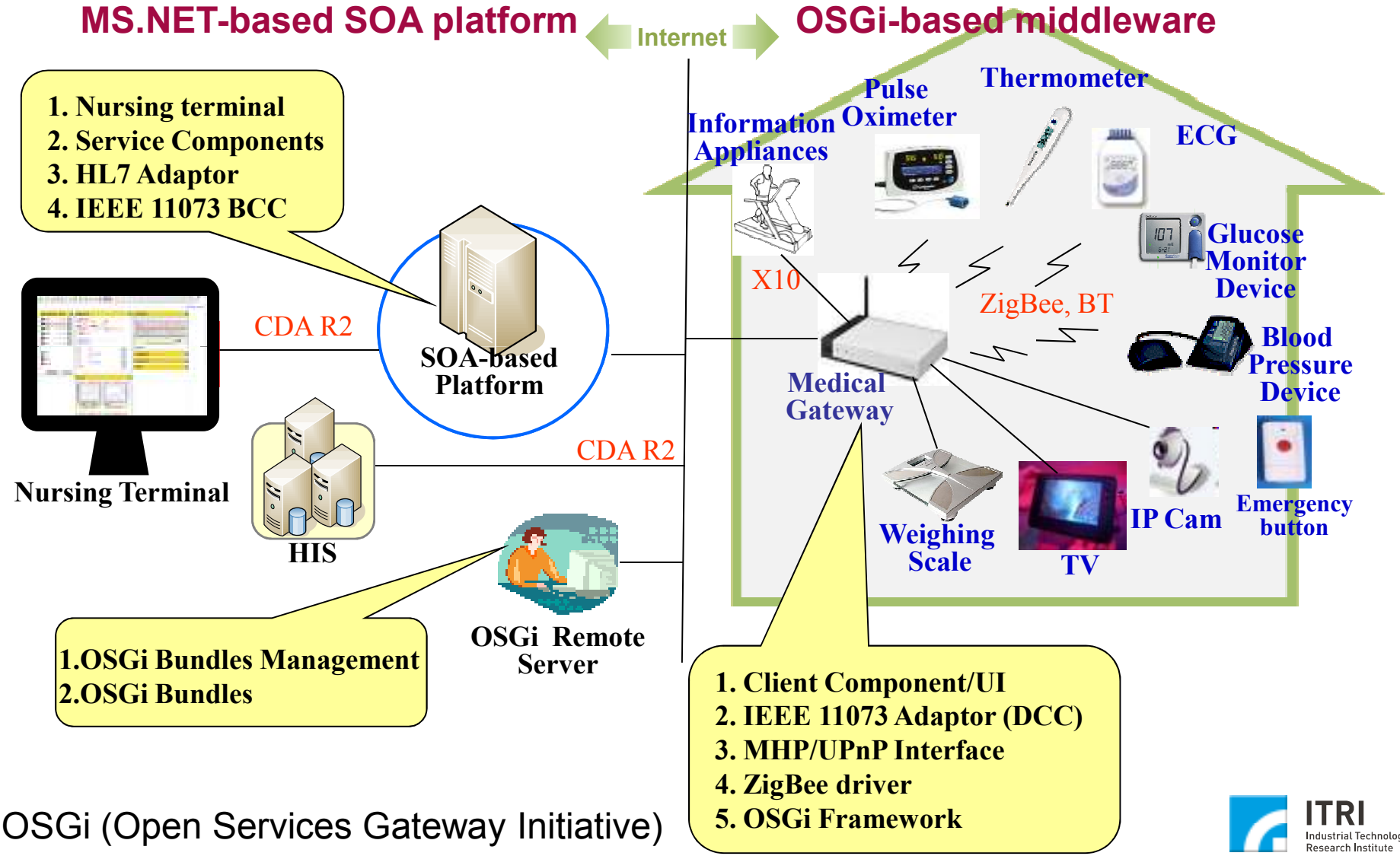
Healthcare system for point-of-care



OSGi (Open Services Gateway Initiative)

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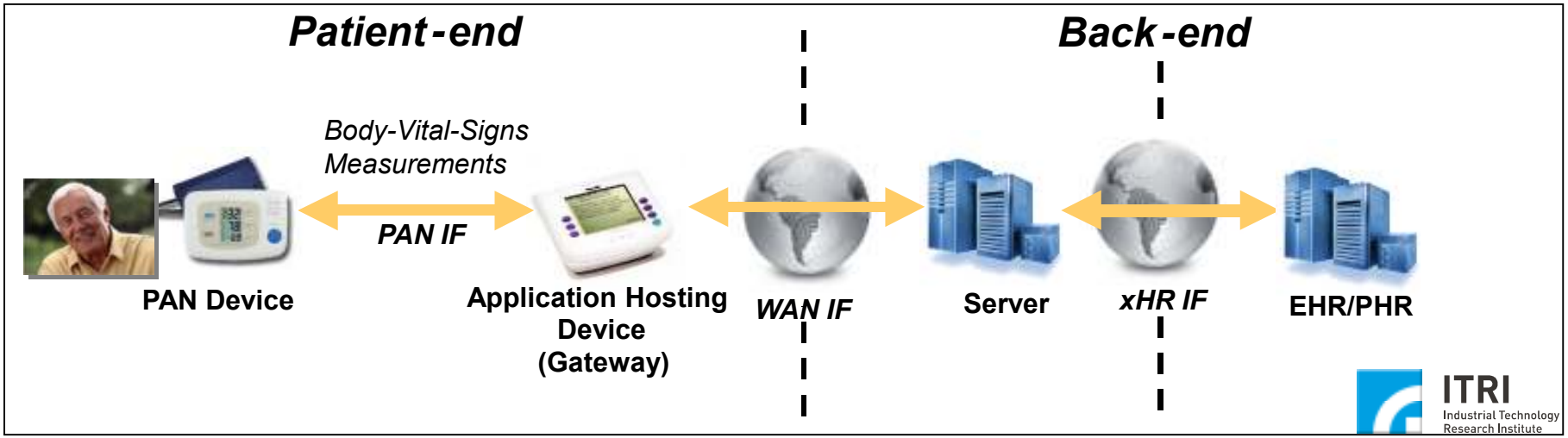
Continua Health Alliance

- A non-profit, open industry alliance of healthcare and technology companies in the world joining together in collaboration to improve the quality of personal healthcare.
- The mission is to establish an ecosystem of interoperable personal health system
- It released the **Design Guideline** v.1 for ensuring the interoperability of devices in October 2008.
  - Interface to Personal Area Network (**PAN**) health devices
  - Interface between WAN devices and EHR devices (**xHR**)



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Selected Standards

- **Continua Health Alliance Design Guideline v1**
  - Device: ISO/IEEE 11073 104XX & **20601**
  - Data: HL7 Personal Health Monitoring Report (**PHMR**)
  - PAN & LAN interface (DG v2)
  - IHE **XDR** (Cross-Enterprise Document Reliable Interchange) profile

- **Healthcare System for Point-of-care**
  - Device: ISO/IEEE 11073-104XX & **20101**
  - Data: CDA r2, annotated ECG, Continuity of Care Document (**CCD**)
  - Smart Home: **X10** protocol
  - IHE **XDS** (Cross-Enterprise Document Sharing) profile

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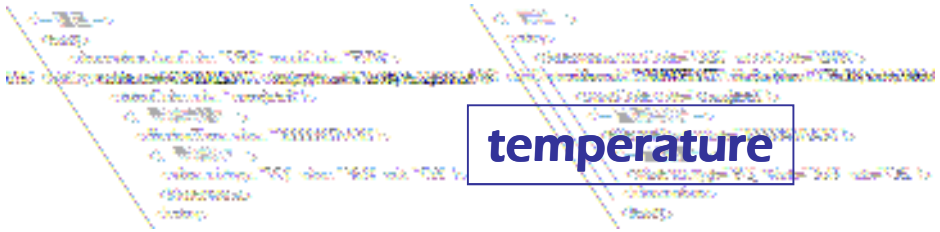
CDA r2 for Vital Signs



temperature

blood pressure

ECG

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<!-- 脈搏(LONIC) -->
<entry>
  <observation classCode="OBS" moodCode="EVN">
    <code code="8867-4" codeSystem="2.16.840.1.113883.6.1" codeSystemName="LONIC" displayName="Heart beat"/>
    <statusCode code="completed"/>
    <!-- 量測時間* -->
    <effectiveTime value="200004071430"/>
    <value xsi:type="RTO_PQ_PQ">
      <!-- 量測值* -->
      <numerator value="86"/>
      <denominator value="1" unit="min"/>
    </value>
  </observation>
</entry>
```

pulse

```
<!-- 血氧(LONIC) -->
<entry>
  <observation classCode="OBS" moodCode="EVN">
    <code code="2710-2" codeSystem="2.16.840.1.113883.6.1" codeSystemName="LONIC" displayName="Oxygen saturation"/>
    <statusCode code="completed"/>
    <!-- 量測時間* -->
    <effectiveTime value="200004071430"/>
    <!-- 量測值* -->
    <value xsi:type="PQ" value="98" unit="%" />
  </observation>
</entry>
```

SpO_2

```
<!-- 心跳 -->
<entry>
  <observation classCode="OBS" moodCode="EVN">
    <code code="364075005" codeSystem="2.16.840.1.113883.6.96" codeSystemName="SNOMED CT" displayName="Heart rate"/>
    <statusCode code="completed"/>
    <!-- 量測時間* -->
    <effectiveTime value="200004071430"/>
    <value xsi:type="RTO_PQ_PQ">
      <!-- 量測值* (次數/min) -->
      <numerator value="86"/>
      <denominator value="1" unit="min"/>
    </value>
  </observation>
</entry>
```

heart rate

Annotated ECG

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MEDIPHAR Taipei 2008

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Conclusion

- A healthcare system for point-of-care
  - To manage individuals' **homecare** needs in the community
  - To Integrate with **devices**, **information appliances**, **systems**, and **services**.
  - To utilize **standards**

- The trend in using main stream standards and profiles for integration, communication, and transport
  - ISO/IEEE 11073, HL7 V3, CDA R2, IHE Profiles, SNOMED CT, SOAP, …

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Thank you for your attention.

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