
**ITU Workshop on "Future Trust and Knowledge
Infrastructure", Phase 1
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Challenges for Trustworthy Social- Cyber-Physical Infrastructure

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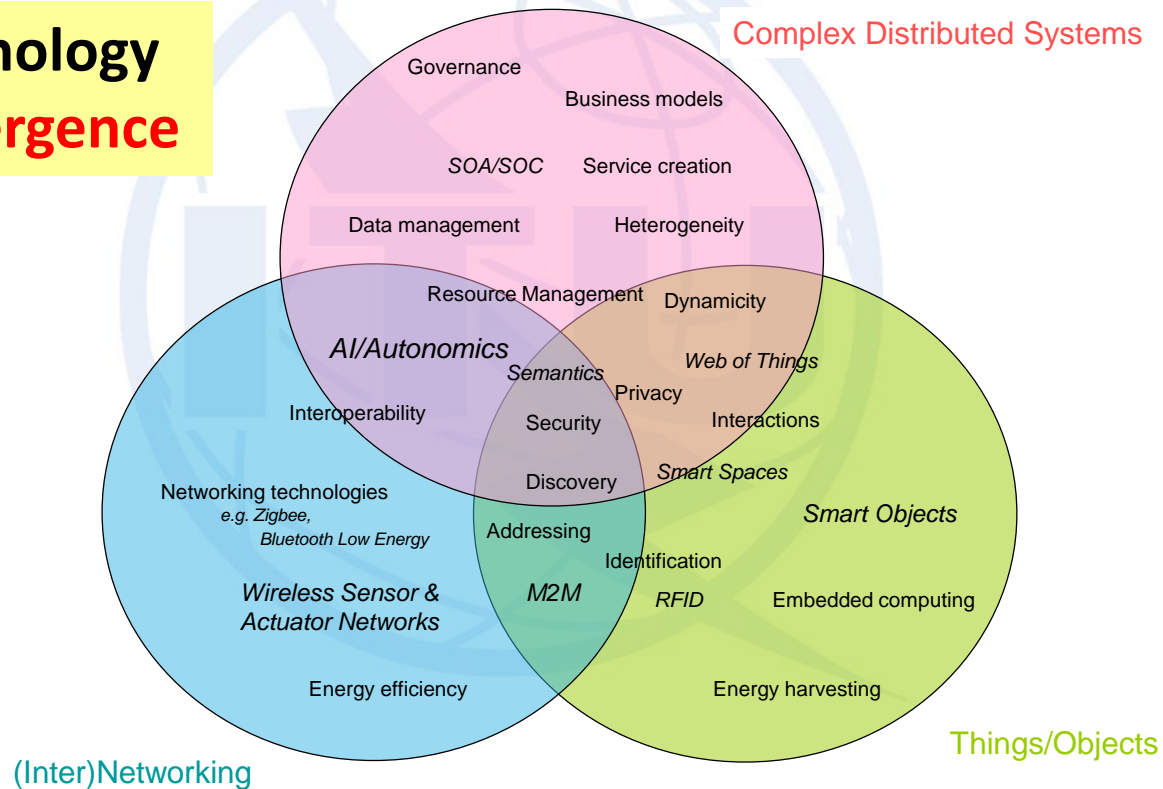
- Introduction
 - Internet of Things
 - **Social-Cyber-Physical Infrastructure**
- **Trust**
 - Concepts, key design principles
- **10 Challenges** for trustworthy ICT infrastructure
- Conclusion

Introduction

- **Towards Knowledge Society**
 - From data processing & information collection to **knowledge creation**
 - Human centric
- **Smart Connected World**
 - From living space to community space
 - Increase Intelligence → **Trust**

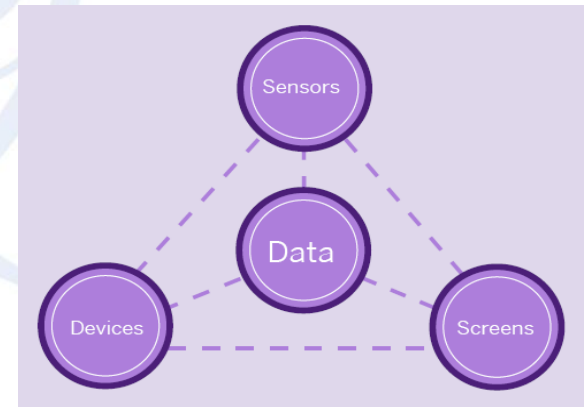
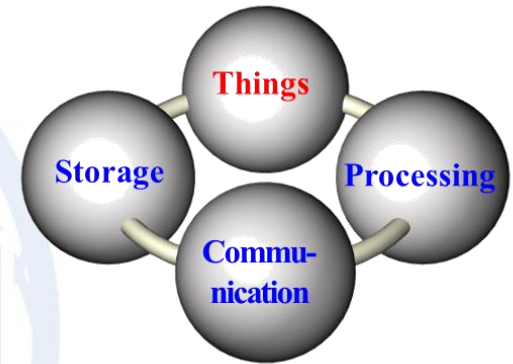
Internet of Things

**Technology
Convergence**



IoT Infrastructure

- Enhancements of networking/
service scope/capabilities
 - Extension of **service**
 - Extension of **network**
 - Extension of **end-user**

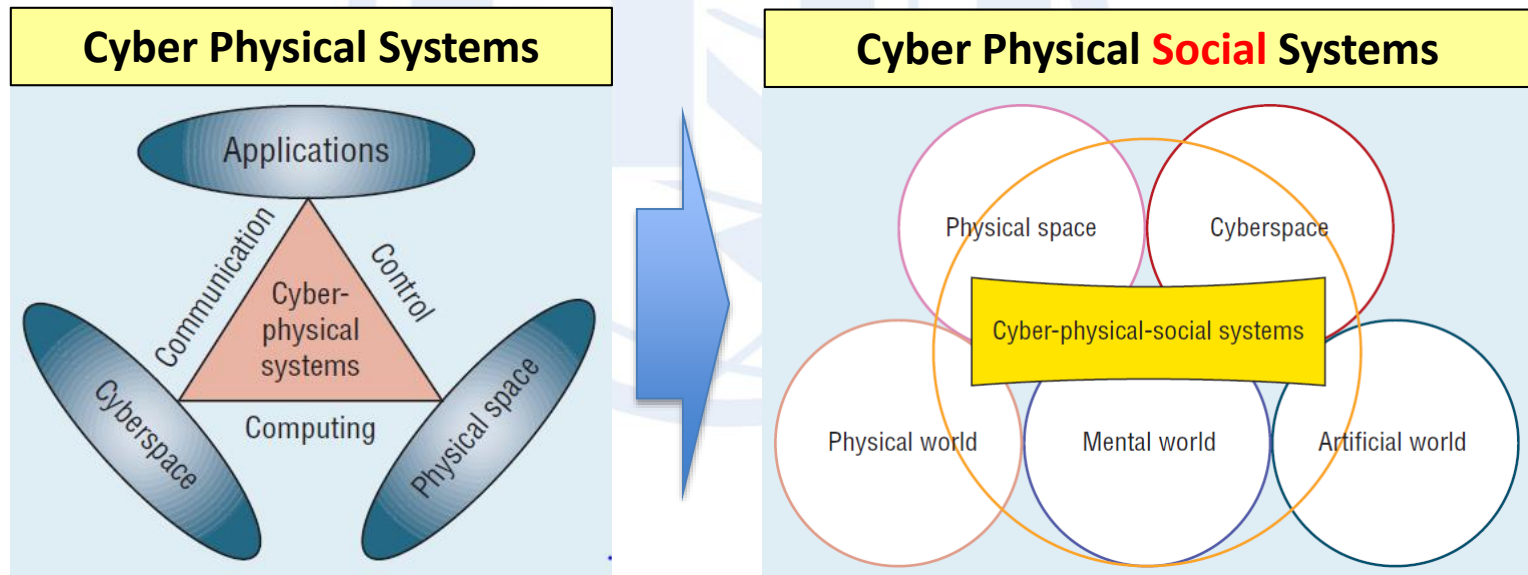


Source: Technology 2020 (The Future Company)

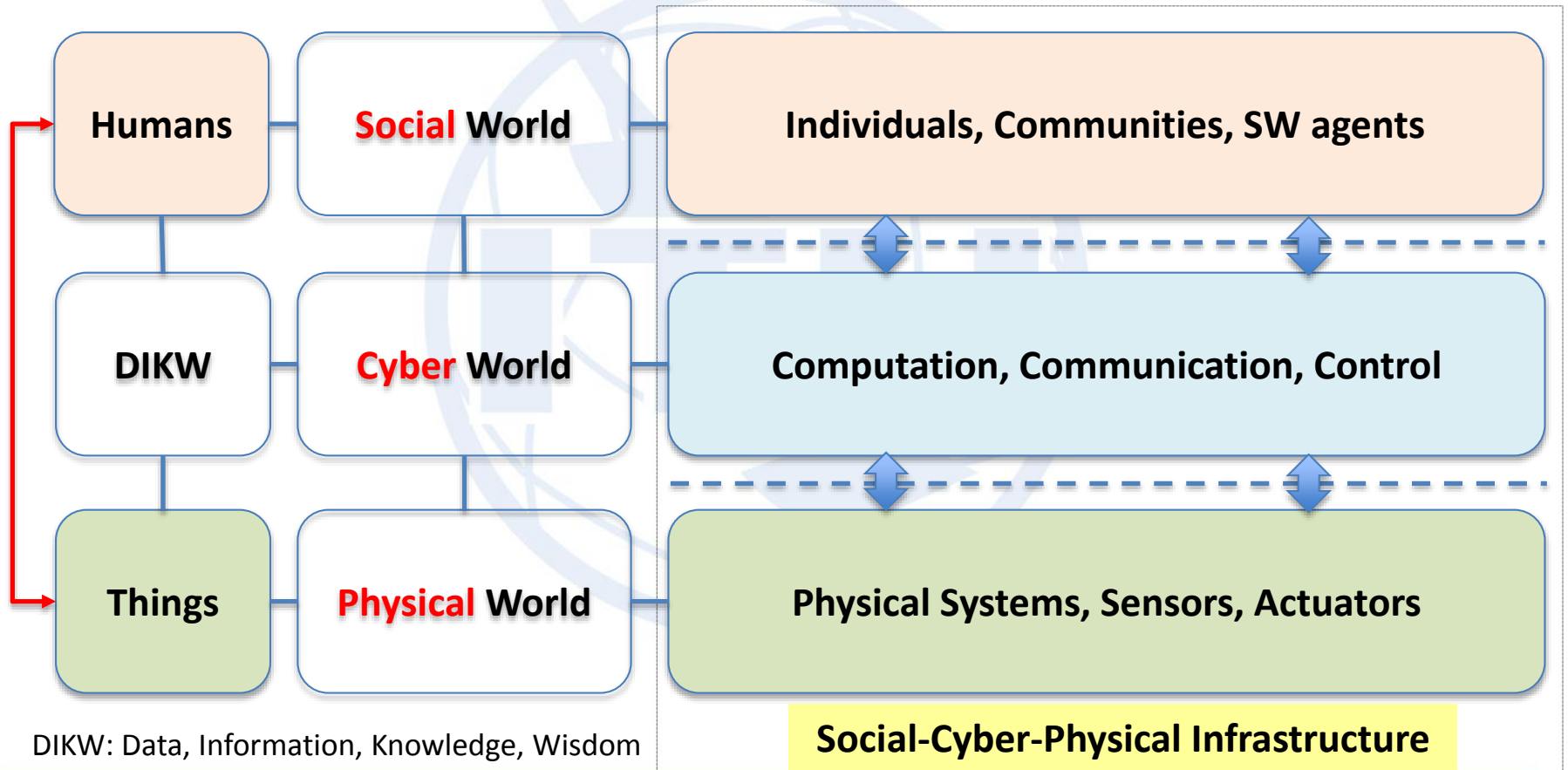
Challenges – readable, recognizable,
locatable, addressable and/or
controllable via the **Internet**

Internet of Things and People

- Use the Internet of Things to **connect people**
- **Collaborative Device Communities**

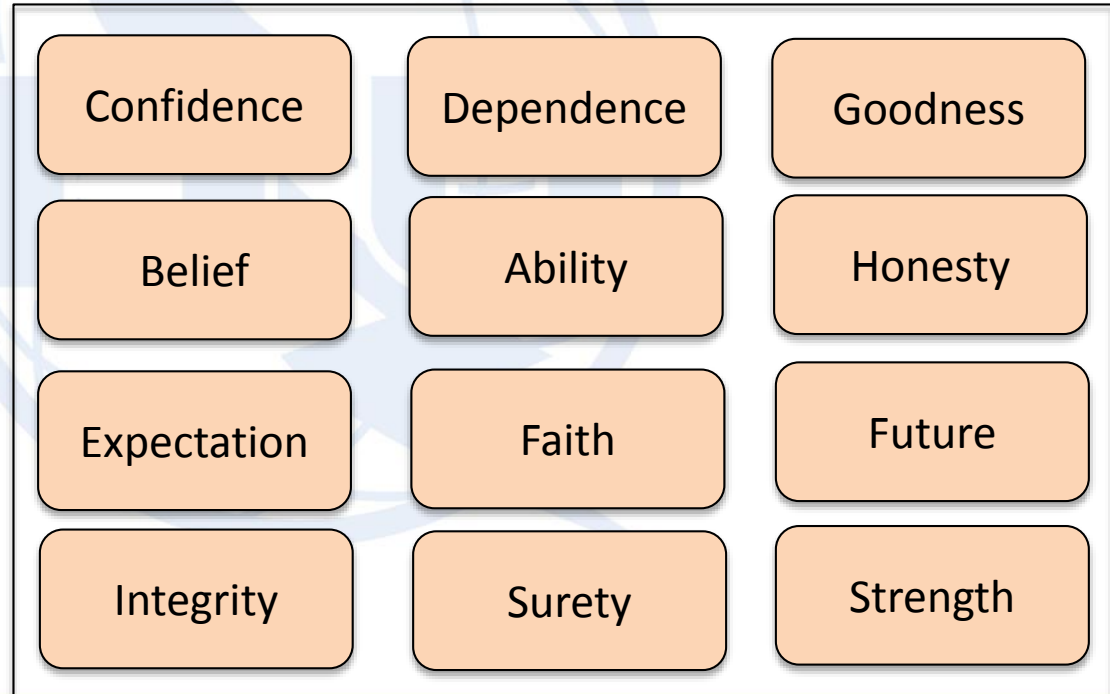
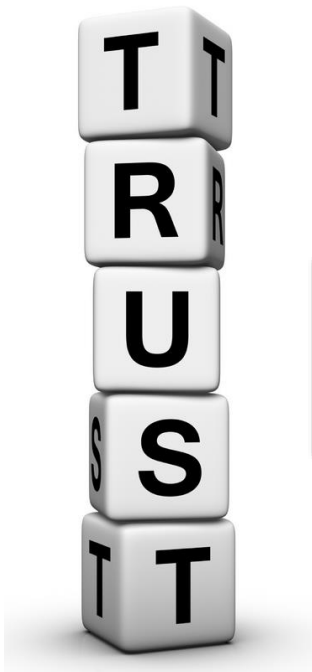


Social-Cyber-Physical Infrastructure

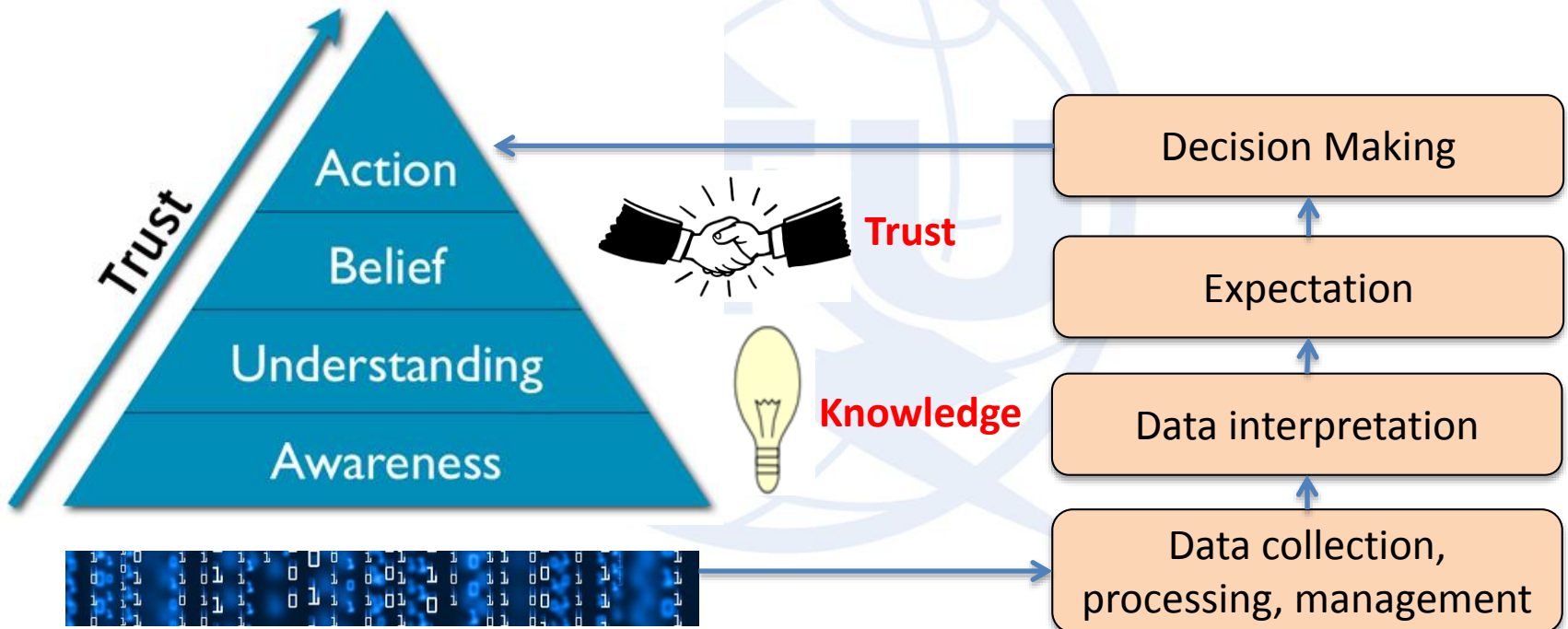


Trust

- **Reliance** on another person or entity



Knowledge & Trust

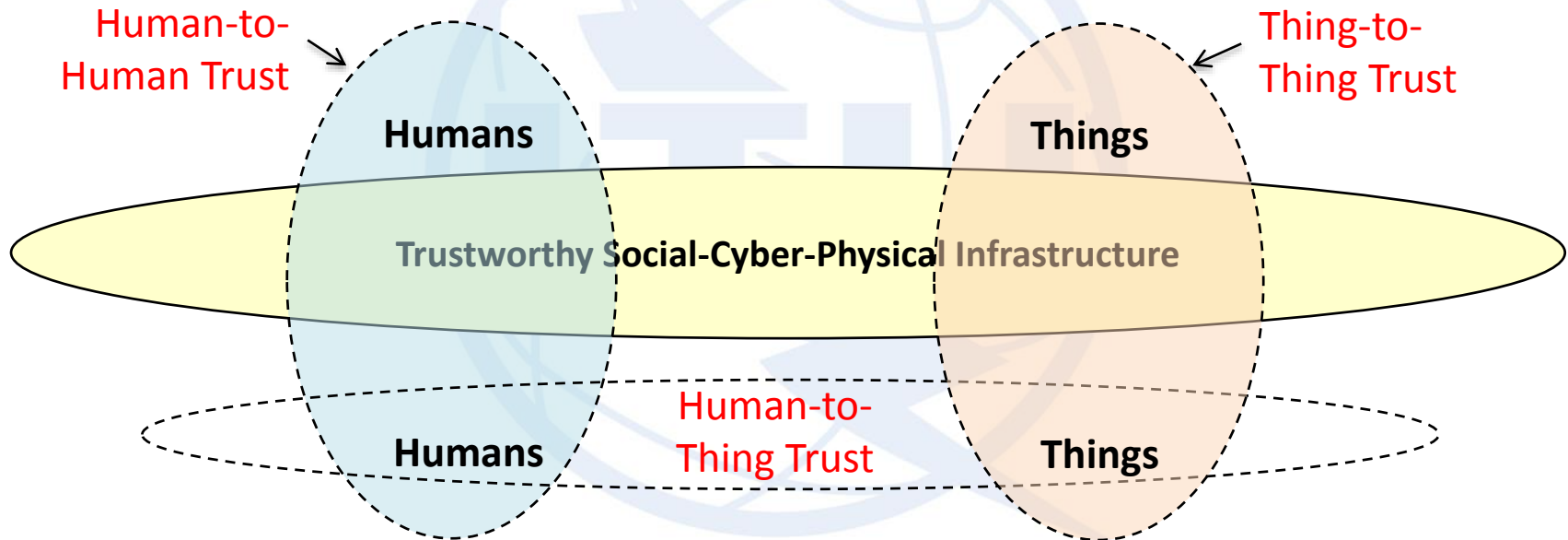


(Source) Trust pyramid

<http://www.johnhaydon.com/how-make-people-trust-your-nonprofit/>

Trust Relationships

- **Social** trust among humans and things



- From **individual** trust to **community** trust

Key Design Principles

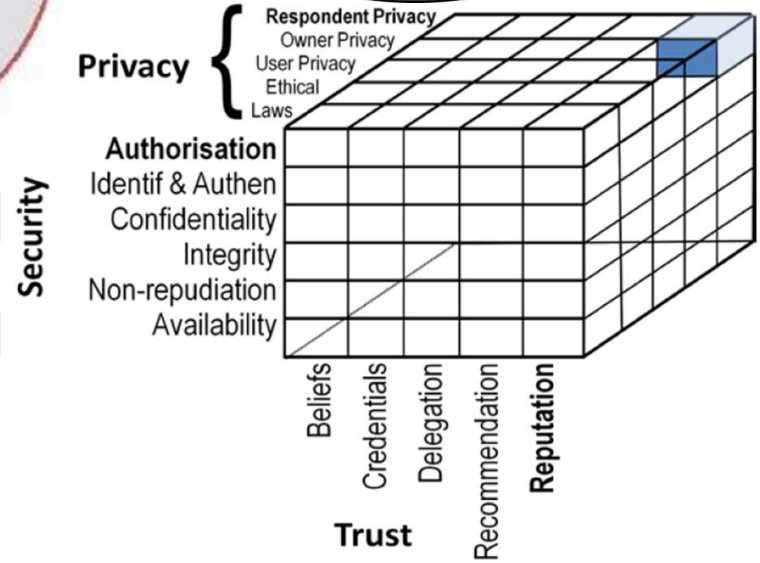
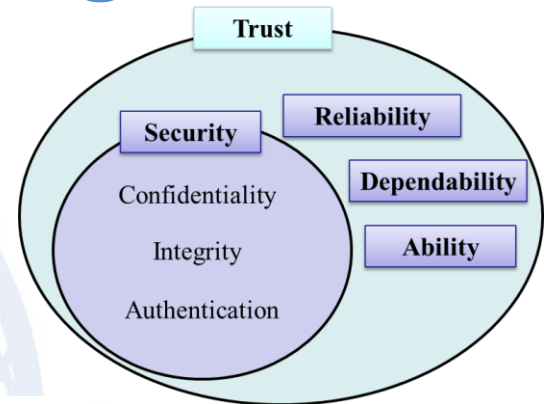
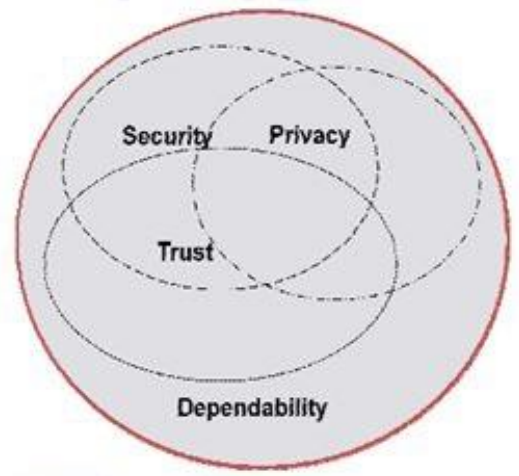
Consider **Trust** as a Key Component for Future ICT Infrastructure

- Interactions and relationships among Social/Cyber/Physical worlds
- Trustable intelligent services based on data convergence and mining
- Trustworthy environment for correct operations
- Enhanced security and privacy

Challenge 1 – Understanding of Trust

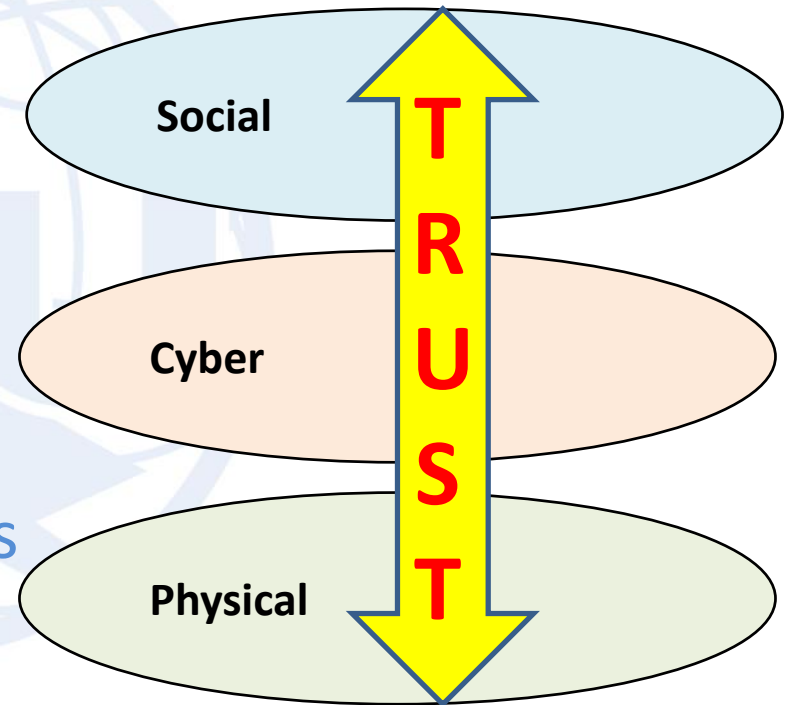
- Definitions
- Attributes
- Features
- IoPTS
 - Internet of People, Things and Services
(**Privacy, Trust, Security**)

Different views on Trust



Challenge 2 – Trust Relationships

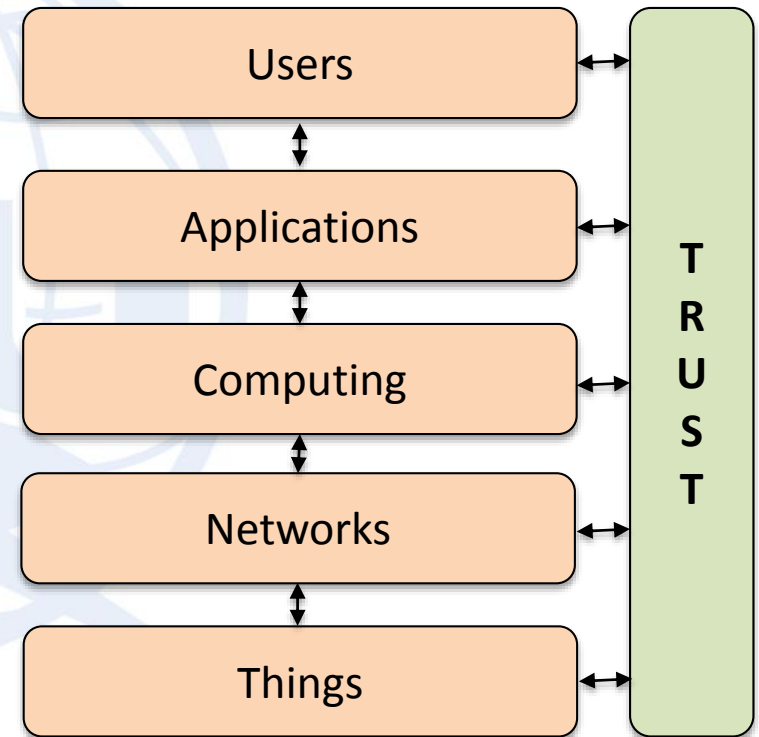
- **Social-Cyber-Physical Relationships**
 - Co-existence
 - Connectivity
 - Interactivity
 - Spatio-temporal situations
- **Human-Thing Relationships**



Trust as a cross domain relationship

Challenge 3 – Trust Management

- **Identity** management
- Trust management
 - Reputation
 - Recommendation
- Dynamics
 - Adaptive knowledge based control



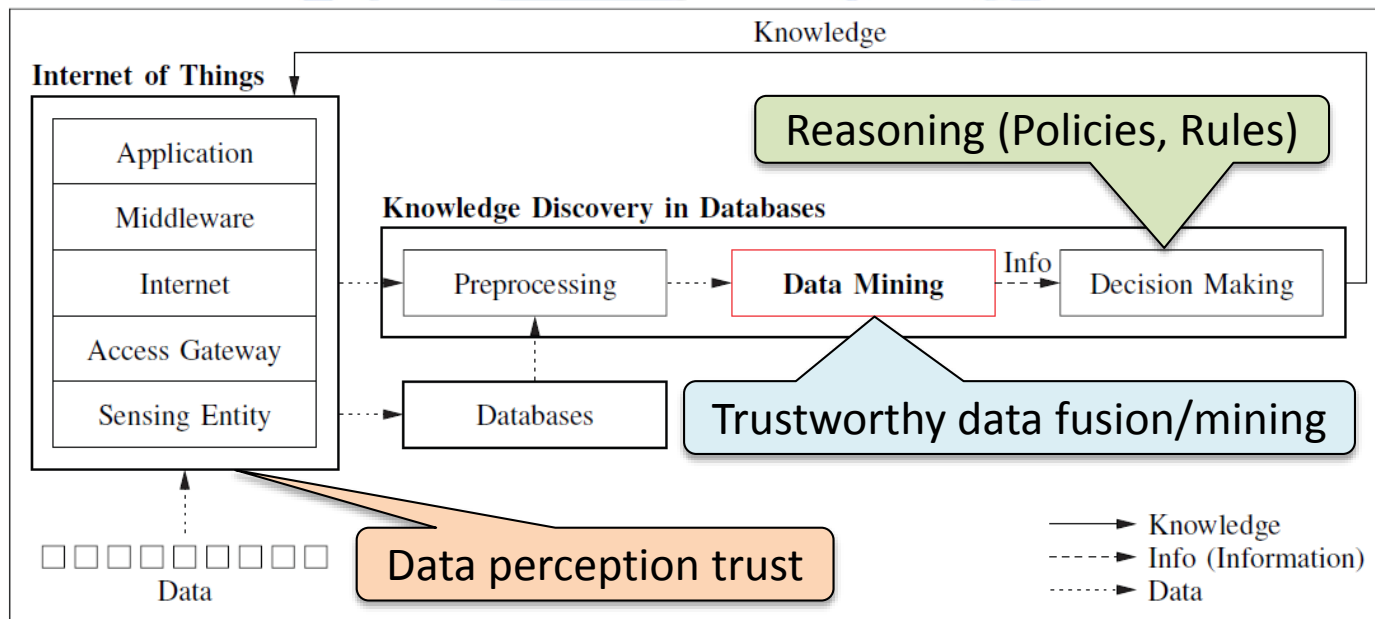
Challenge 4 – Measure & Calculate

- Measurable trust
 - Metrics
- Trust calculation
 - Subject vs. Object
- Trust level



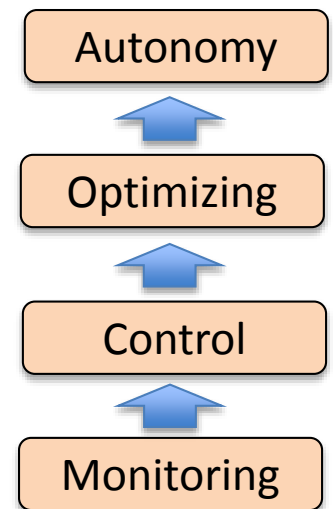
Challenge 5 – Decision Making

- From sensing to actionable knowledge and **trust-based decision making**



Challenge 6 – Autonomy

- **Intelligence** for handling trust requirements under dynamic conditions
- Trust in **Autonomics**
 - Feedback loop
 - Monitoring- Analyzing-Planning- Execution
- **Distributed** intelligence
 - Fog computing, Edge computing



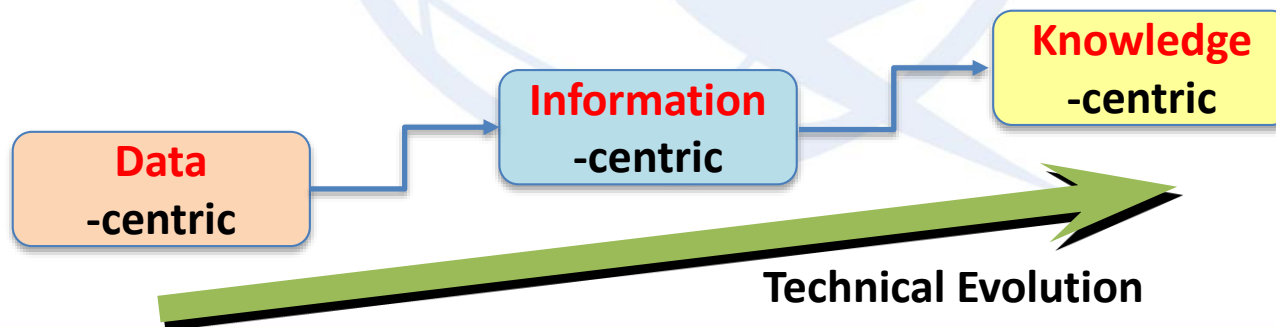
Challenge 7 – Constraint Environment

- Constraints from “things”
 - Performance
 - Less energy consumption
 - Heterogeneity
- **Lightweight** mechanism



Challenge 8 – T-SCPI Architecture

- Build up Trustworthy Social-Cyber-Physical Infrastructure (T-SCPI)
 - **Trust**-enabled infrastructure
 - **Knowledge** centric networking and services
 - Complexity and heterogeneity



Challenge 9 – New business models

- Big data and open platform
 - Platform service – trust related information
- Trust-based services
 - More reliable services (e.g., finance)
 - Online shopping - Usability
- Sharing economy



Challenge 10 - Standardization

- **Trust considerations** as an important item
- New work items on trust
 - Overview
 - Use cases
 - Framework
 - Solutions
 - Regulatory issues
- Collaborate with other SDOs



Conclusion

Future ICT Infrastructure



**Trustworthy Social-Cyber-Physical
Infrastructure**



**Trust-enabled knowledge-centric
networking and services**

Intelligence & Trust

Q&A

Thank you for your attention