

Open Standards, Open Source, and Digital Transformation

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Outline

- **An integrated Open Source / De Facto Standards / Open Standards Development Model.**
- **Standards (Open / De Facto), Open-Source, and Environmental Trends**
- **Challenges associated with Open Source and Open Standards Development**
- **Open Standards, Open Source, and Digital Transformation**

**An integrated Open Source / De Facto
Standards / Open Standards
Development Model.**

Concepts and Definitions

- **Open Standard**

- A specification developed within a standards organization or a consortium to be made publicly available for developing compliant products, and having various utilization rights associated with it and not completely controlled by a single vendor.

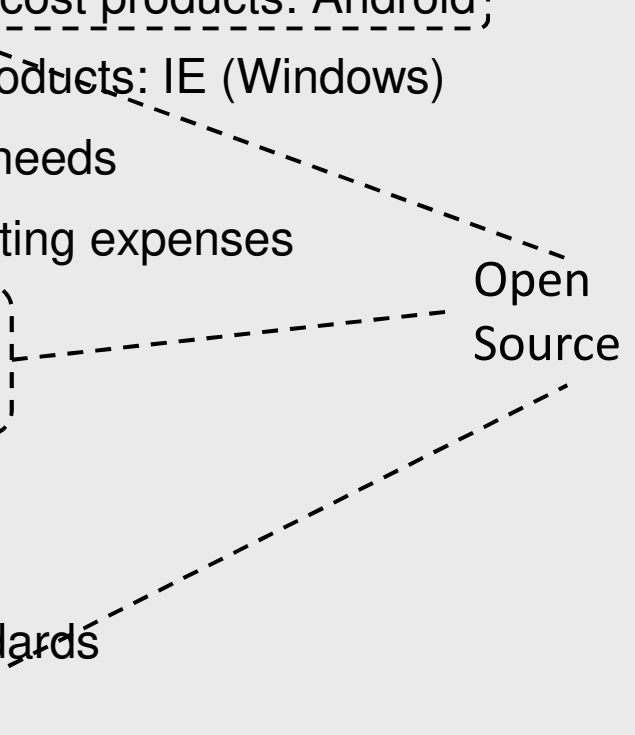
- **De Facto Standard**

- A component, product, or system that has achieved a dominant market position through public acceptance or market forces (e.g. early entrance to the market).
- A De Facto Standard can be supported by a single or multiple entities, can be closed or open, and must retain on-going market / development support by its supporters.

- **Open Source**

- Computer software that is distributed along with its source under a special software license. The license allows users to use, change and improve the software's source code, and to redistribute the software either before or after it has been modified.
- Software is provided with a license in which the copyright holder provides the rights to study, change and distribute the software.
- Nowadays hardware design is open to public in Open Compute Project, though only Chip Vendors or Electronic Contract Manufacturers are heavily involved.

De-Facto Standards and Open-Source

- Establishing de-facto standards is a market/business progress
 - Innovative products: MS Office/iOS
 - {Free/High Performance low cost products: Android}
 - Based on other dominant products: IE (Windows)
 - Maintaining de-facto standards needs
 - Continuous R&D and marketing expenses
 - {IPR control
 - {Ecosystem
 - Advanced business model
 - Defending de-facto standards:
 - Compliance with other standards
 - {Short “time-to-market”}
 - Open source can be an approach for establishing, maintaining, and defending de-facto standards
- 
- Open Source

Open Source and Open Standards are Complementary

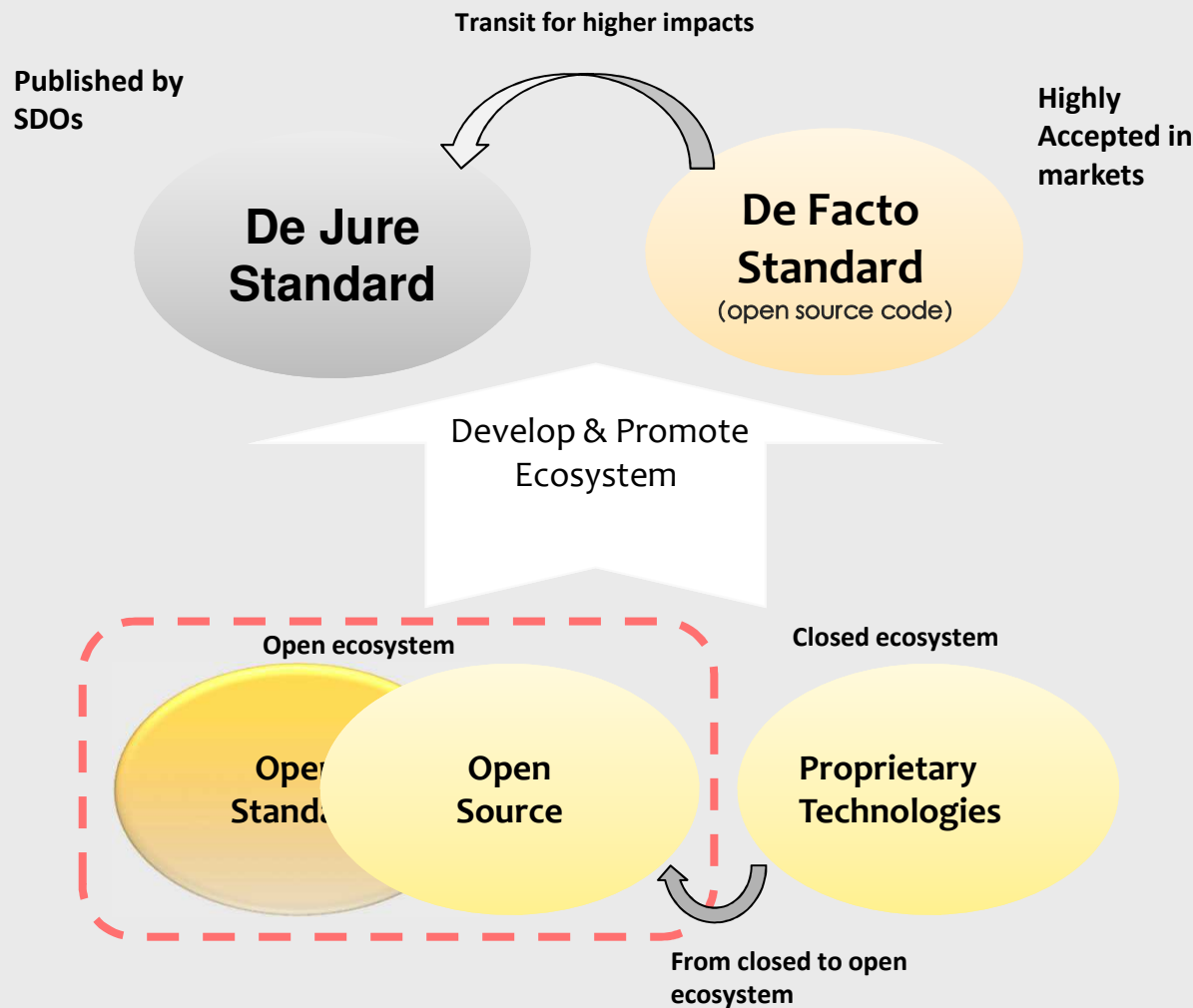
- **Open Source**

- *“Software code or hardware design which may implement open standards and which is developed, implemented, and maintained in a “particularly” transparent (though structured) fashion, with community participation, and (code) is freely available.” **
 - Promotes innovation by leveraging community development
 - * Note: Redistribution of modified code can place obligations upon distributor
 - * Note: Fees can be involved in distribution of open source software.
 - *Note: Software license terms must be adhered to.

- **Open Standards**

- *“Specifications which are developed and maintained in a “particularly” transparent fashion through open community involvement and available for implementation, under the community guidelines.”**
 - Promotes interoperability by using open published specifications
 - Improving data sharing by simplifying integration of disparate technologies
 - * Note: IPR T&C's must be adhered to.

Open Standard and Open Source Interaction - an important trend of ICT industry

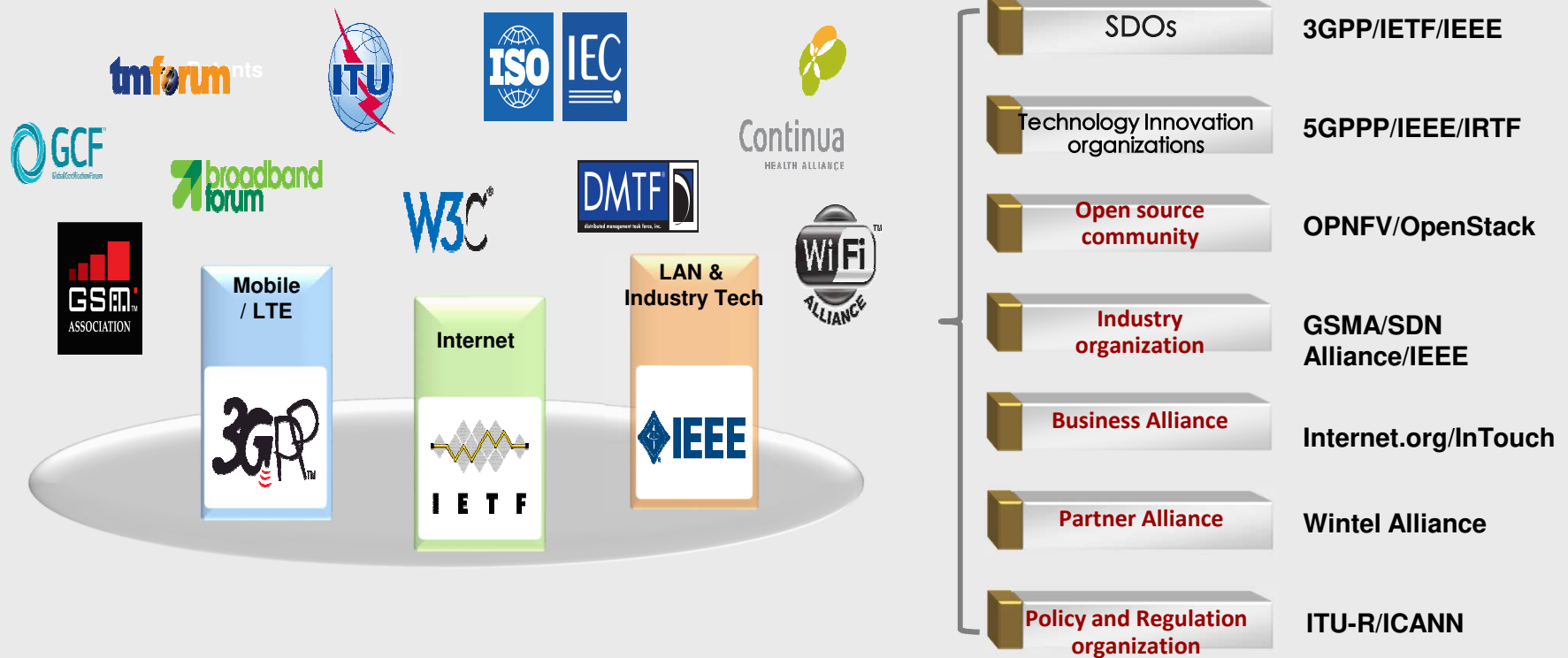


- Open source and standard both learn from each other, open source gradually move to CT industry with the integration of IT/CT technology
- Open source leverage the open standard:
 - ◆ The 'Filter' of the mainstream direction
 - ◆ Comparing technology by Running Codes
 - ◆ Lead some open source projects to generate open standards

Importance of an integrated Open Source / De Facto Standards / Open Standards Development Model

- Open Standards (RAND and RF), Open Source, Open Requirements, and De Facto Standards planning are integral components of cross industry development and go-to market strategy planning.
 - These techniques, integrated with a well designed IPR strategy, become essential elements of an effective development program.
- The role of an integrated “open” and proprietary cross industry development strategy is important for several reasons
 - Leverage external technology, intellectual property, and developmental skills
 - Leverage organizational leadership positioning to steer developmental activities and to ensure utilization of internal technology
 - Leverage education and technology transfer
 - Establish critical cross industry alliances and become foundational members in new organization development
- Goal is to steer internal and complimentary technology to the market place, while maintaining effective leadership and guidance
 - Effective use of these tools mandates early planning in both technology and market strategy planning

From the standard organization to the 7 categories of industrial organizations



- Based on 3GPP, IETF and IEEE, extended to 7 types of organizations to enhance the industrial influence
- Focus on the sustainable development of the industry, pay attention to the long-term interests of the organization and the project

Standards (Open / De Facto), Open-Source, and Environmental Trends

Evolving Importance of Open Source and De Facto Platforms in Standards Implementations

- Over the past several years open source and de facto communities have begun to flourish as extensions of standards communities, especially in the IT business environment.
 - New market areas and opportunities are becoming characterized by integrated standards – open source – de facto solutions (open and closed).
 - In the IT and Service Delivery environment, the focus tends to non royalty bearing IP solutions.
 - Standards IP is often viewed as sliver licensing, which leverages access to IP of competitors.
 - An evolving topic in the Standards IP world is the scope of reciprocity and ensure that IP is not organizationally withheld.
 - Open Source has become a tool to build upon open IP to drive rapid market acceptance.
 - De Facto has evolved in both open and closed scenarios
 - Open – Android, Linux
 - Closed – Windows, iOS

Trends in ICT Standards, Open Source, and De Facto

- Standards
 - Pre 2000, standards traditionally focused on coherent technology integration, technology interoperability, technology infrastructure requirements, implementation guides and policies, and industry recommended practices
 - Post 2000, standards have evolved to address infrastructure and solution protocols, industrial solution definitions / requirements / interfaces / architectures / system definitions, etc., software infrastructures, as well as test suites and reference implementations.
 - There has become more emphasis on
 - IPR accessibility
 - Compliance
 - Certification
 - Industry Specification and Development Communities

Trends in ICT Standards, Open Source, and De Facto

- Open Source
 - Open Source acceptance has rapidly evolved during the past 15 years, as an acceptable industry solution approach.
 - Early Open Source development focused on applications, infrastructure, operating systems, and developmental object modules.
 - Industry leaders expend significant efforts in pursuing global acceptance of open source in customer implementations
 - Over the past 6+ years, Open Source has evolved to pursue solution oriented, application system, and communication solutions.
- De Facto
 - Traditionally De Facto referred to company or sub-industry platforms, where participants were willing to maintain the necessary on-going investment to sustain the De Facto platform within its environment.
 - Over the past few years, there has been scenarios of cross industry (often open source) de facto platforms to address the traditional closed De Facto platforms (e.g., Android vs iOS and Windows).

Challenges associated with Open Source and Open Standards Development.

Managing Open Source and De Facto Standards Development in Coordination with Open Standards

- The convergence of Open Standards strategies with Open Source deployments and Industry De Facto frameworks, coupled with IT / CT technology and architecture convergence necessitates that all levels of participation of the companies business strategy understand their roles.
 - Corporate Standards to evaluate the full developmental landscape and to coordinate the external development strategy.
 - Developers to understand the process for involvement in cross industry development and for following company processes to ensure success.
 - Business units to ensure coherence of cross unit priorities.
 - IPR Legal to ensure compliance with evolving IPR landscape

Licenses and IPR Considerations are Important

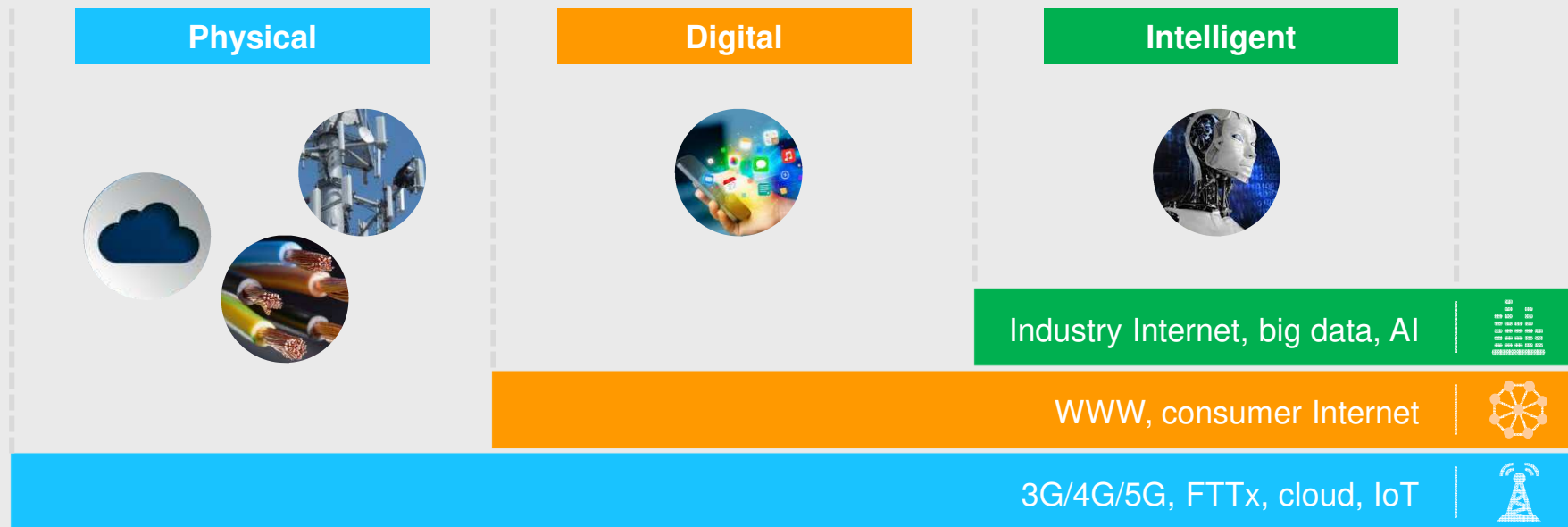
- Open Source development and distribution involve copyright and patent related obligations
 - Copyright – Nonexclusive royalty free license conveyed
 - Patent – Royalty free (non-assert) access conveyed
- Distribution of Open Source code involves indemnification of rights to provide copyrights and patents (whether own rights or rights of others)
 - Pedigree of software is important
- Some Open Source licenses are compatible with GPL (e.g. BSD and MIT) and can be converted to GPL, expanding IPR commitments.
- Open Source software can be “Forked” (sub-divided with new derivative works and redistributed for unintended applications).
 - Software can be forked for other applications conveying unintended copyright / patent access.
- Developers are responsible for ensuring integrity of integrated code to validate all rights are conveyable in subsequent distributions.
- Rules and documentation of various licenses must be adhered to or IP rights of others may be violated.

Competence Factors to Master

- Explicit goal is essential to be successful
 - Implementation of in-house technology in all three platforms, to pursue dependence from other implementers and to position for long term leadership needs to be considered
- Leadership is important in both standards and open source communities
 - Develop expertise to foster internal colleagues, recruit external experts and to obtain credibility in Standards and Open Source meritocracy.
- Broad industry participation provides more opportunity to be successful,
 - Alliances should be evaluated in advance to ensure the company is able to develop community cooperation.
- Organization should be capable to support continuous, long-term investment
 - Early identification of key customer and industry partners is necessary to achieve a developmental paradigm, which is adopted and accepted.

Open Standards, Open Source, and Digital Transformation

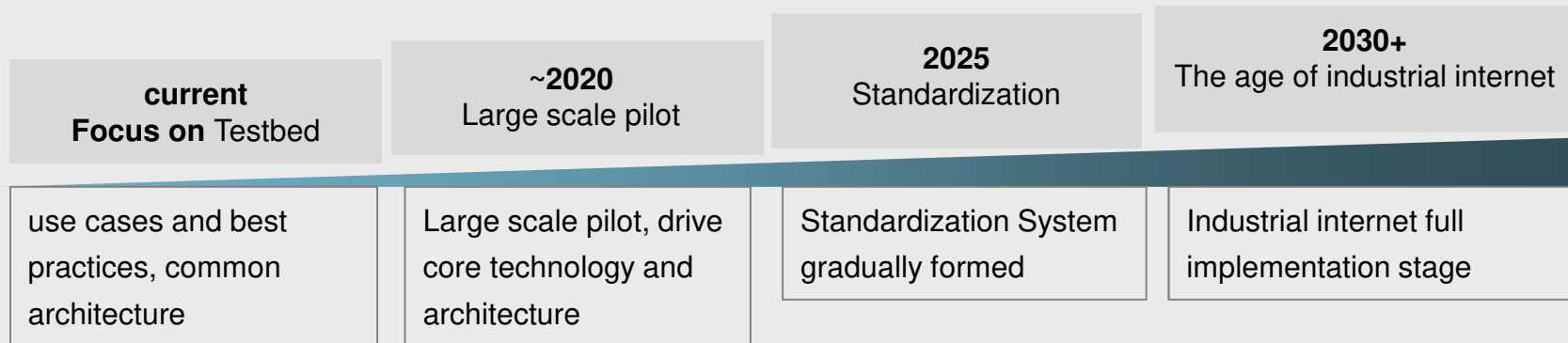
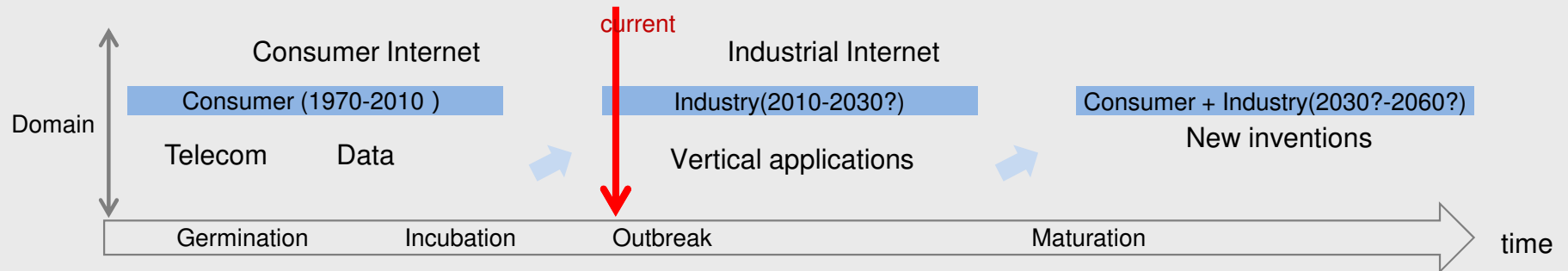
Next 10 Years: Connections Will Get Smarter, Connectivity Will Become a Primary Resource



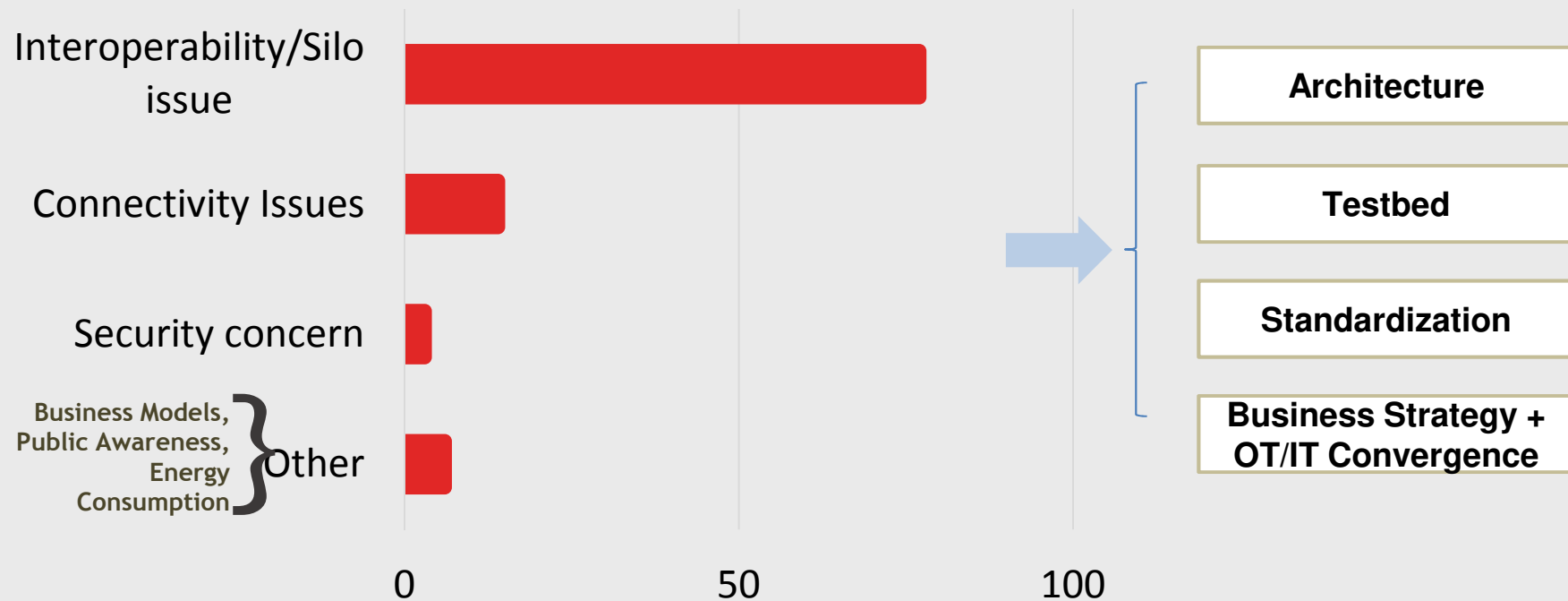
- In 2025, the number of connections will top **100 billion**, **5x** more than 2015.
- In 2025, **75%** of global **homes** will have access to **broadband**.

Source: Huawei GIV 2016

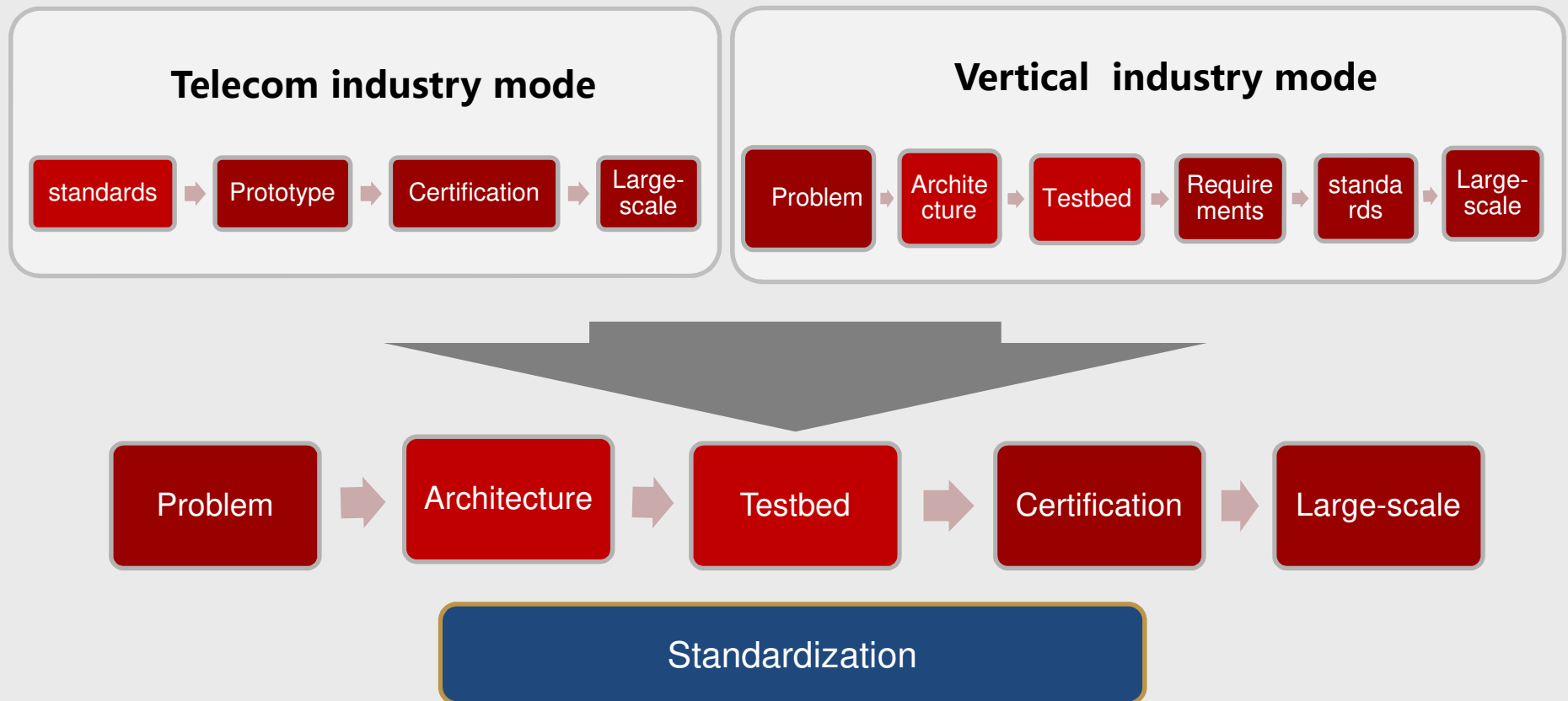
The Industrial IoT is a revolution to lead the next industry



The Biggest Challenge Facing the digitization transformation and Industrial IoT



Integrated Industry development methodology with verticals



- The telecom industry and vertical industry should collaborate closely to know each other deeply to accelerate the convergence between horizontal enabling technology and verticals.

Huawei Positioning: Enabling Customers' Digital Transformation and Business Success

**Enabler and Preferred Partner
of Digital Transformation**

Connection Provider



Platform Enabler



Ecosystem synergist



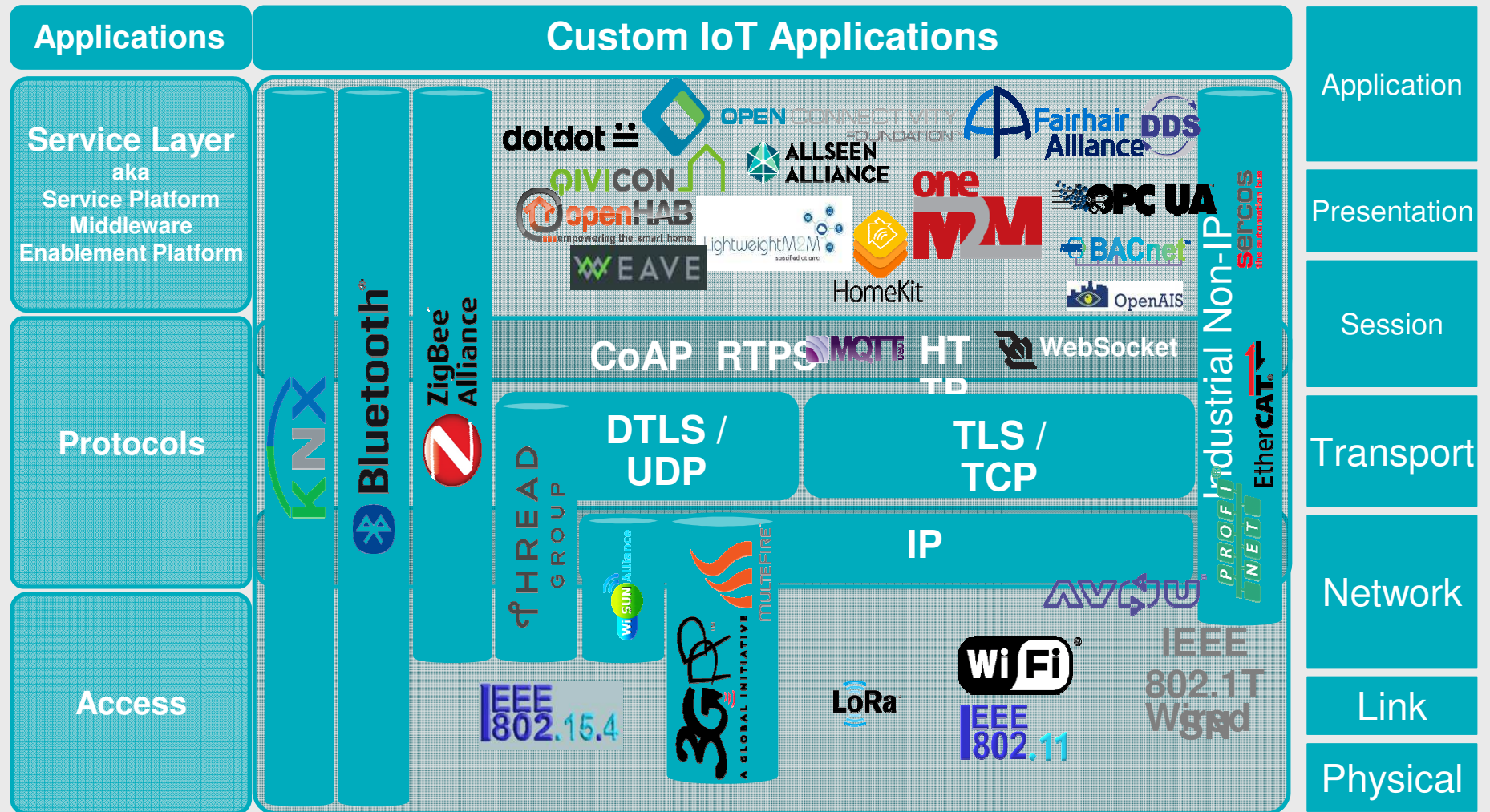
MBB, FBB, enterprise networks, cloud computing, storage, services, etc.

Jungle of Consortia, Standards, OS-Projects in IoT

- Which groups actually specify technology, which are just doing marketing & promotion?
- Which technologies are used / will be used in M2M/IoT?
- Which technologies are overlapping or complementing each other?



Technologies in IoT Stack



Interworking is Key
Open Standards ⇔ Interworking Glue

Observations for the Future

- Open Standards, Open Source, and De Facto are potentially on convergent paths.
 - Future cross industry business and developmental planning will require that these three industry development profiles be addressed in an integrated fashion.
- Consequently future standards developers will need to recognize that standards cannot be viewed as an “island”, independent of open source and de facto platforms.
 - Standards strategies must embrace the three areas synergistically
 - Standards developers must understand the implications of the three areas
 - Companies will need to ensure the processes are in place to support developers in working across the three areas.
 - IPR Legal will become more aligned with the standards strategy community.
 - Future industry solutions will evolve architectural and middleware requirements, as well as full “stack” application integration, driving closer alignment of these three tools.
- In the IoT world, Interworking is Key, and Open Standards is the Glue for Interworking.

