

**IEEE**  
**Future**  
**NETWORKS**

**Enabling 5G and Beyond**



**International Network  
Generations Roadmap (INGR)  
Virtual Workshop**

**Standardization Building Blocks**

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# 10-Year Vision

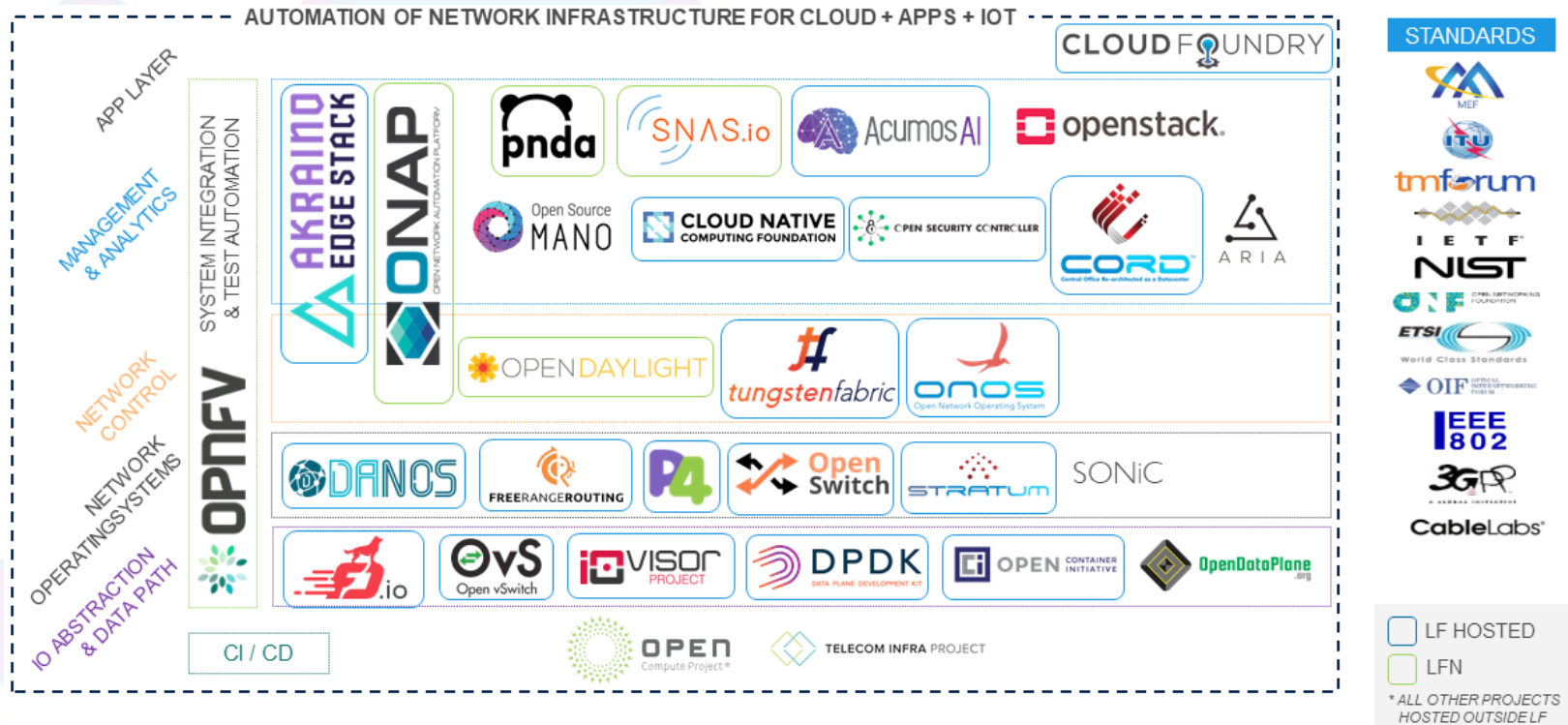
***Standards will be increasingly and critically important to communications and networking!***

- This area of human life is exceptionally hungry for **innovation**.
- The emerging trend is to shorten the **time to market** for new emerging technologies. This trend puts a pressure on **compressing the research-to-standards** transition time for core technologies.
- This trend can be only supported by significant **participation of Industrial and Academic Researchers** in the standardization of emerging technologies.
- The compressed development cycles for an ever increasing volume of emerging technologies and standards will require enormous **resources**, mass **ingenuity**, and extremely high **intellectual potential**.
- This can be achieved effectively by deploying massive resources of global **Open Source** communities.

# Scope of the SBB WG

- To discover for IEEE standardization opportunities in emerging technologies
  - Assess the present Networking Technologies Standardization landscape and produce a long-term vision for Future Networks and related technologies standardization
  - Partner with technology roadmap teams in building the visions and roadmaps for the standardization components of their specific technology areas
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- **The first edition:**
    - Presented a standardization landscape picture for 5G and beyond technologies and a hypothetical roadmap for selected core technologies that could enable autonomous technology and standardization dynamics
  - **2nd edition:**
    - Present future generation network standardization landscape in a stand alone SBB chapter while the Standardization Building Blocks for specific technologies will be integrated into the technology roadmap chapters

# Today's Landscape - Open Source vs SDOs



# Today's Landscape – Key Words!



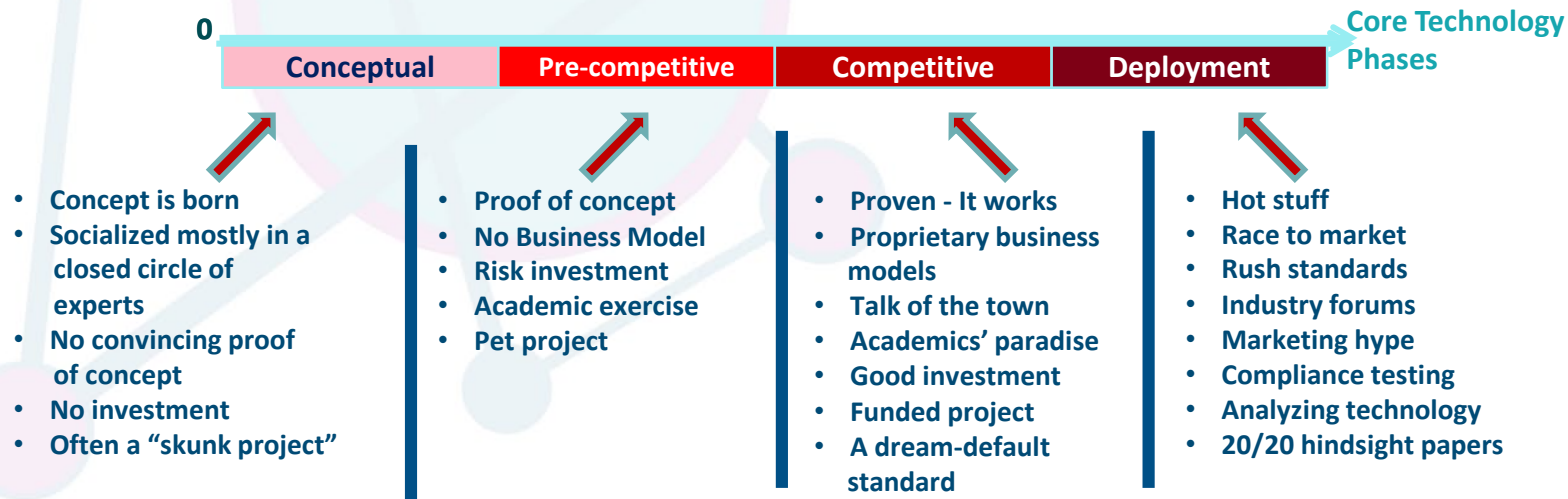
# Top Needs for 10-year Vision

- A significant amount of **standardization** of **emerging technologies** in early phases of technology evolutions.
- An **environment** where Industrial and Academic researchers can contribute to standardization.
- **Shortened development cycles** for core technologies and implementation of standards

# Challenges and Solutions to Meet Needs

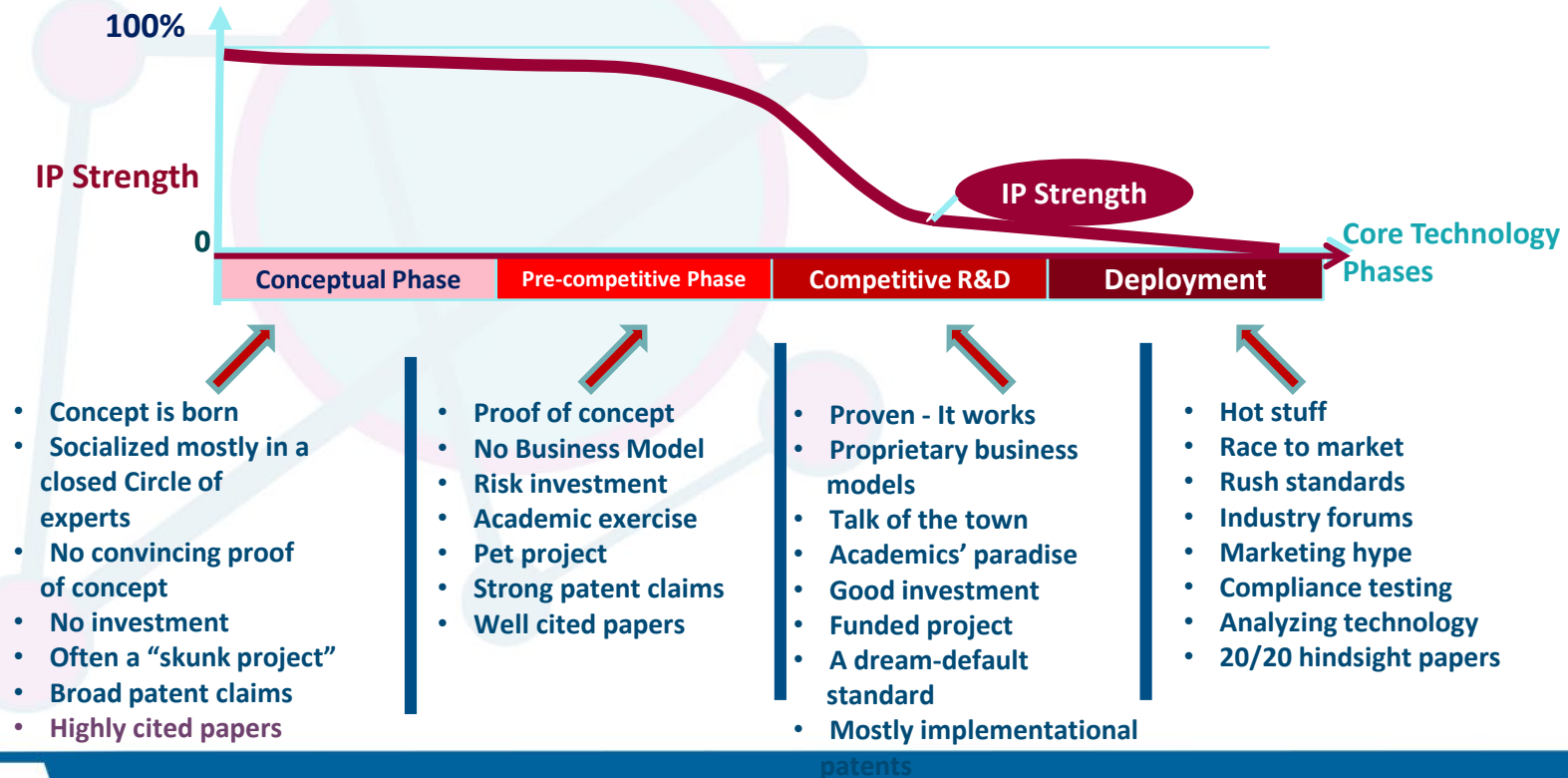
- **Need:** A significant amount of standardization of emerging technologies in early phases of technology evolutions.
  - **Solution:** Bring/deploy industrial and academic researchers into standardization
- **Need:** An environment where Industrial and Academic researchers can contribute to standardization.
  - **Solution:** Create an ecosystem comparable with researchers' modus operandi
- **Need:** Shortened development cycles for core technologies and implementation of standards
  - **Solution:** Deploy more resources with high ingenuity and intellectual potential in open source development methodology

# Ecosystem for Innovation and Standardization Technology Timeline





# Ecosystem for Innovation and Standardization Intellectual Property



# Ecosystem for Innovation and Standardization

## Technology Relevance



- Concept is born
- Socialized mostly in a closed Circle of experts
- No convincing proof of concept
- No investment
- Often a “skunk project”
- Broad patent claims
- Highly cited papers

- Proof of concept
- No Business Model
- Risk investment
- Academic exercise
- Pet project
- Strong patent claims
- Well cited papers

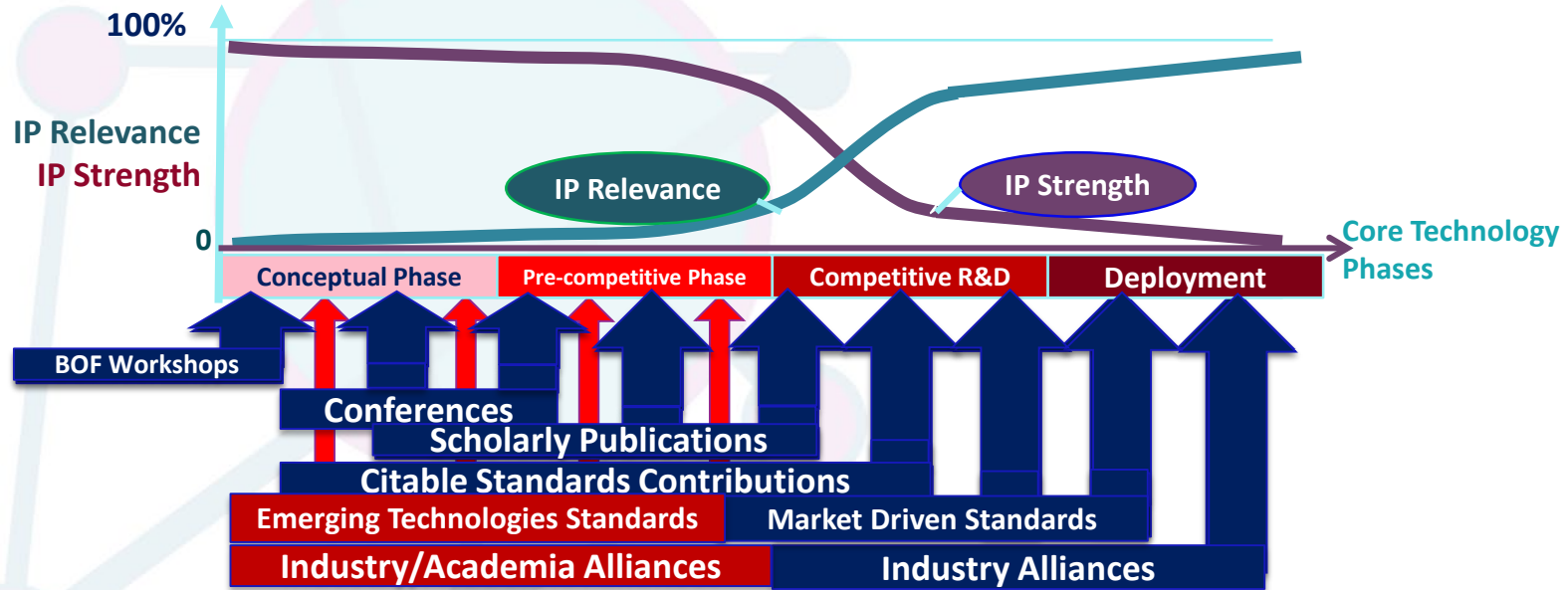
- Proven - It works
- Proprietary business models
- Talk of the town
- Academics’ paradise
- Good investment
- Funded project
- A dream-default standard
- Mostly

- Hot stuff
- Race to market
- Rush standards
- Industry forums
- Marketing hype
- Compliance testing
- Analyzing technology
- 20/20 hindsight papers

implementational  
patents

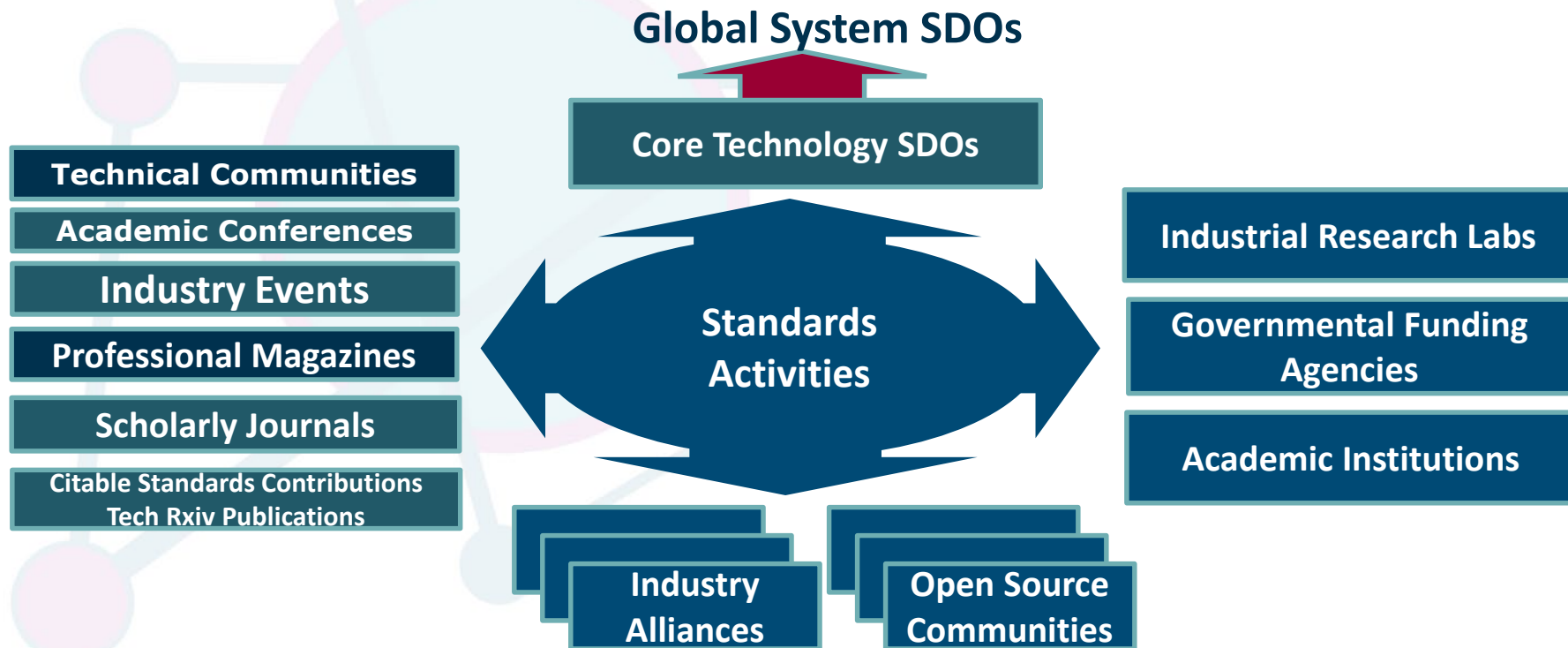
# Ecosystem for Innovation and Standardization

## Emerging Technologies and Standards



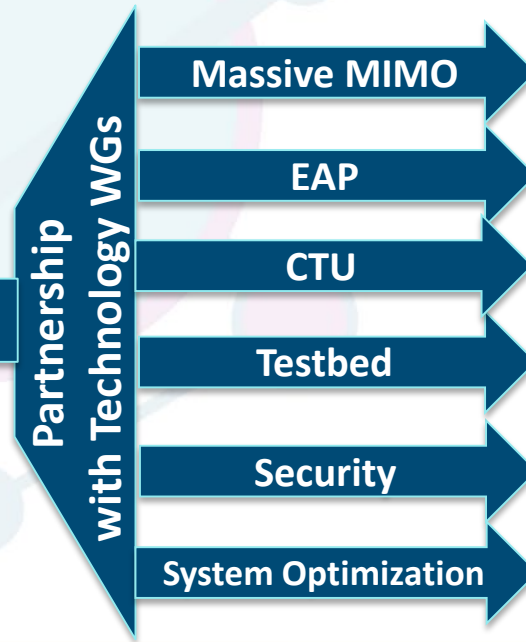
**Emerging Technology Standards help to create and drive Markets**  
**Market Driven Standards respond to the needs of the market, enable Markets**

# Ecosystem for Emerging Technologies Standardization



# Standardization Building Blocks in Technology Roadmaps

- The SBB Team partners with technology roadmap teams in creating the technology vision for standardization and the roadmaps to get there.



- Cross-team meetings and interactions took place with a number of teams and more are planned.

# The SBB Team's Proposed Approach

- ❑ **Standardization vision and roadmap for each technology track depends on each team's approach to the treatment of the problem**
- ❑ **Technology Roadmaps can be augmented by SBB overlay if it presents an autonomous picture for the Tack vision that is not clipped by limiting dependencies**
- ❑ **SBB Team appeals to technology tracks to generate an autonomous framework for their vision.**
- ❑ **If a framework is not possible to create for the entire technology track, then we recommend to consider fragmenting the problem stage into macro-elements and define architectural framework for each of them**
- ❑ **SBB team can then help to create a complimentary Standardization vision harmonized with the framework and/or for associated building blocks**
- ❑ **Basic standards can be of the following types: Frameworks, Reference Architectures, Functional architectures, etc.**

# Highlights of some cross-team collaborations

- Collaboration with Apps and Services WG produced a standardization project for a functional architecture for smart cities (IEEE P1950.1)
- This standard enables an independent dynamics for a smart city long-term vision, technology roadmap and associated standardization overlay
- This standard will definitely spin off various related standards projects
- Satellite Group from start has a vision for the architectural standard as once again illustrated in their presentation in this series
- System Optimization Team is susceptible to a fundamental architectural treatment of the problem space
- Massive MIMO team is receptive to this approach

## Stakeholders

Global System Integrator SDOs  
Core technology SDOs  
Technology suppliers  
Standards developers

Industry Alliances  
Industry practitioners  
Industrial and Academic  
researchers  
Open Source Communities

## Contributing Working Group Members

- Mehmet Ulema
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# Get involved!

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## QUESTIONS?