

# ASQ Meta-Scenarios:

## A Generalized Approach for Requirements Classification of Interconnection Goods

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# Quality of Service (QoS) Research

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- Advanced IP service, e.g., real-time communication [1] constantly require a defined QoS level [2] → **QoS does matter for communication networks**
- **QoS in the 90s:** Focus on intra-AS QoS (e.g., [3]) lead to a realization fiasco (scalability), and unsolved problems → reduced QoS interest
- **QoS for IC:** A well-spread and well-established IC market framework is still required (left unmentioned by [4], [5], and [6]) for a commercially applicable solution
- **ETICS:** Based on flexible and marketable **Assured Service Quality (ASQ)** goods with distributed SLA agreements – focus on **multi-actor IC agreements**, alliances, and coordination, negotiation, and IC-specific issues

# Problem & Contribution

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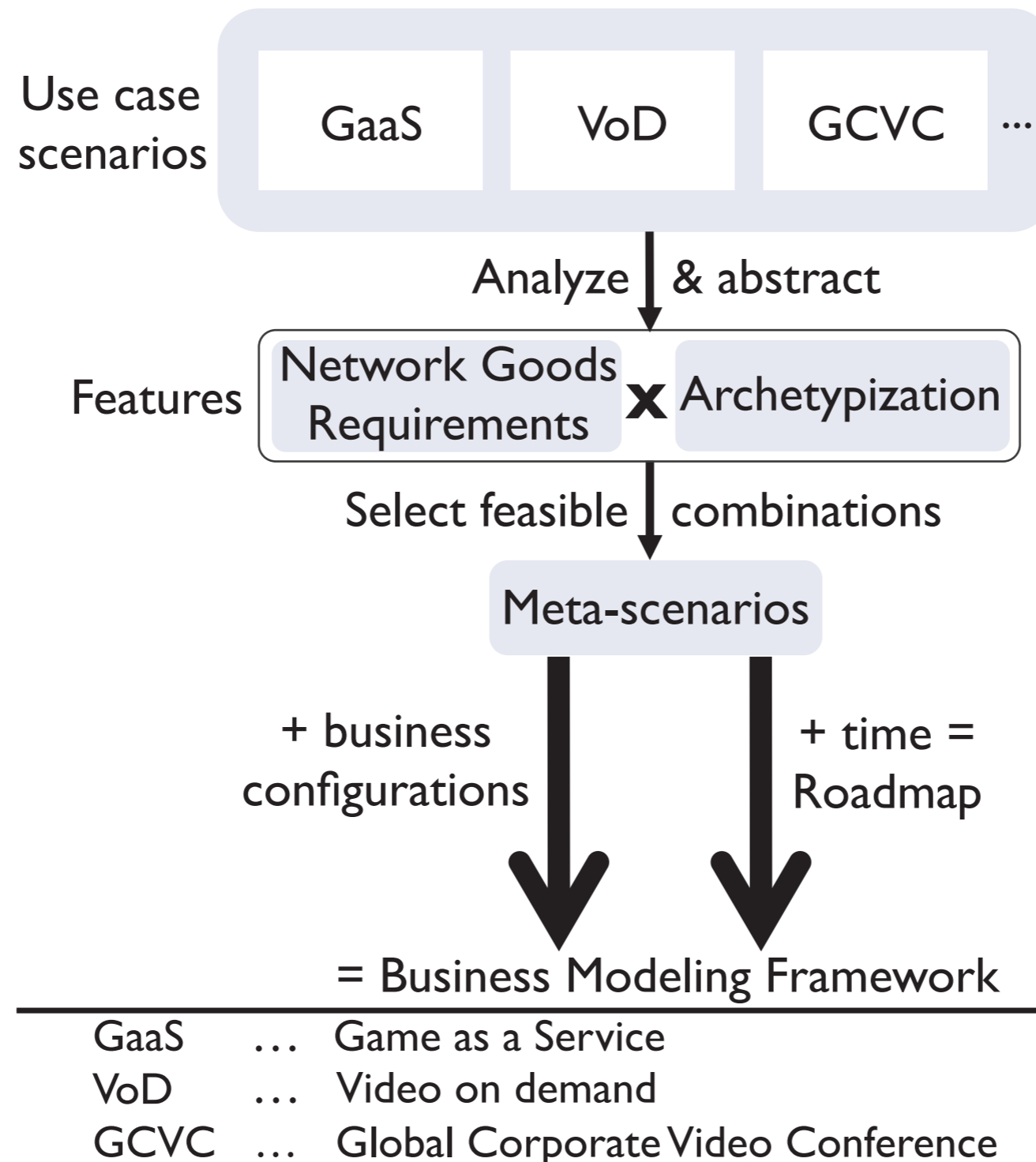
- **Problem: Challenging IC scenarios** are required (w.r.t efforts, technical boundaries, economic implications, etc.)
  - in order to set the **context** for developing initial **future IC concepts**
  - in order to **asses identified solutions** against real-world adoptions
- Challenging IC scenarios are not obvious
  - no **methodology** → trial-and-error mechanism based on experiences
  - essential **requirements characteristics** (from use-case scenarios) are difficult to be extracted /compared
  - Redundant analysis / simulation is often applied

# Solution: The Big Picture

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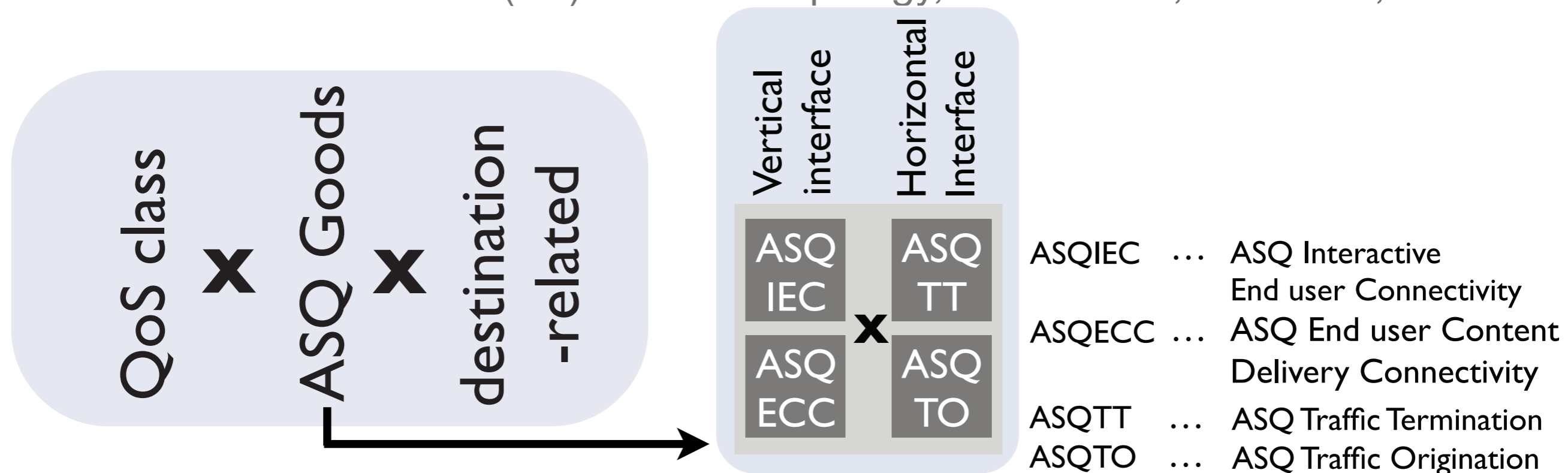
- Forming a generalized requirements classification mechanism on two dimensions:
  - **Network goods requirements** (i.e., QoS demands, ASQ goods related to use-case scenarios, destination-related requirements)
  - Archetypical **network configurations** (i.e., intermediation, markets, and CDN/Cloud assistance)
- **Intention: Elimination of use-case specifics** from scenarios → **generalized ASQ meta-scenarios** allowing purposeful, precise, and comprehensive concept analysis
- Each dimensions consists of a set of aspects allowing a classification in **value ranges / classes** → each unique configuration of classes is a meta-scenario
- **Business models / Business modeling frameworks** can be derived from meta-scenarios by a complementation of business configurations

# Solution: The Big Picture (cont'd)



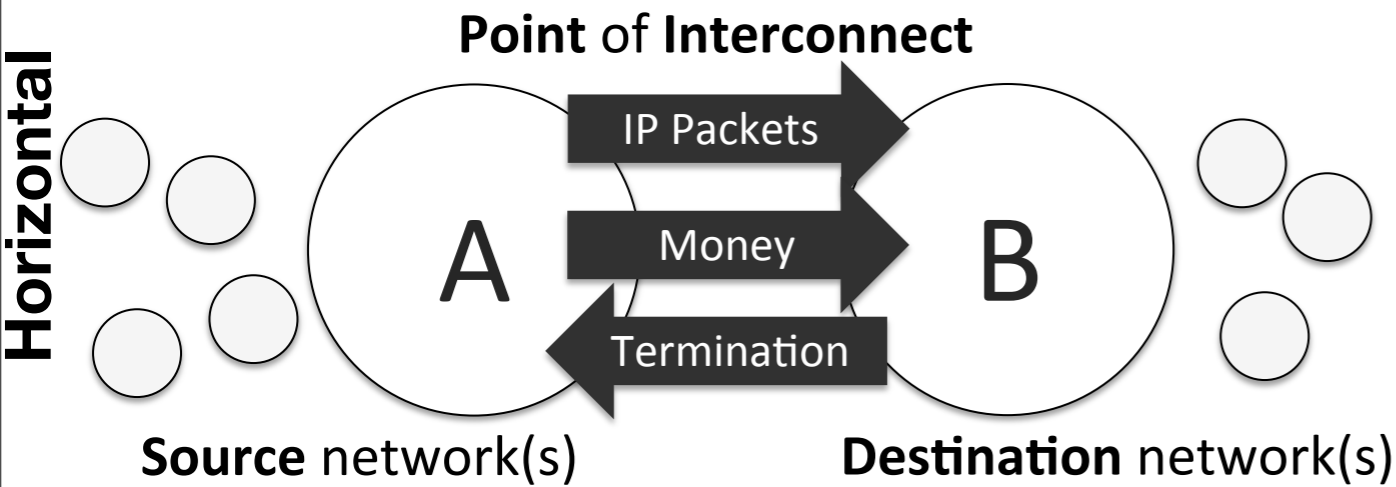
# Network Good Requirements

- Service specific requirements of network goods:
  - **QoS class:** Several distinct QoS levels, e.g., delay or jitter tolerance
  - **ASQ Goods:** Enabling QoS assurance as marketable goods by SLAs
  - **Destination-related (DR):** Network topology, bottlenecks, distances, etc.

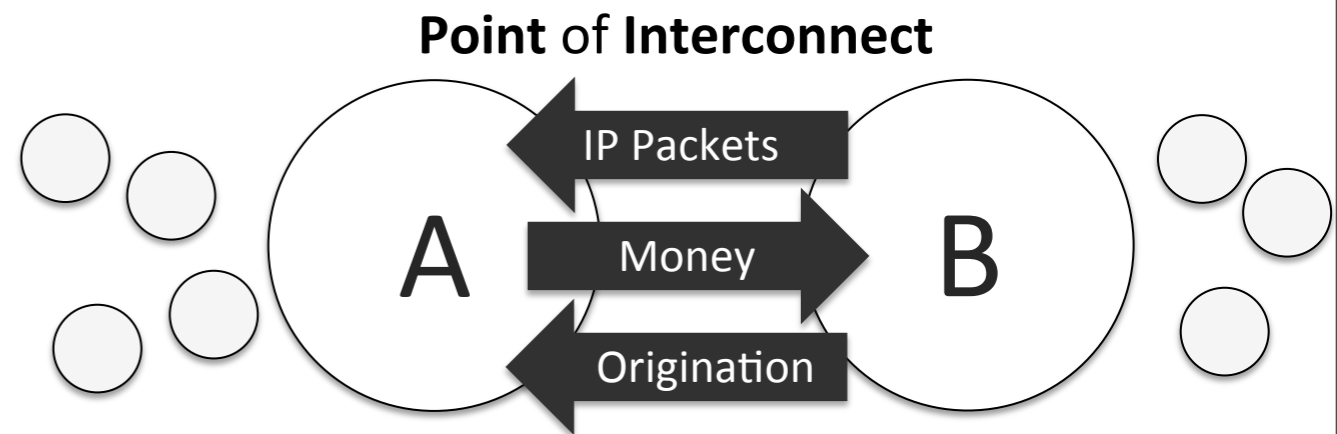


# ASQ Goods

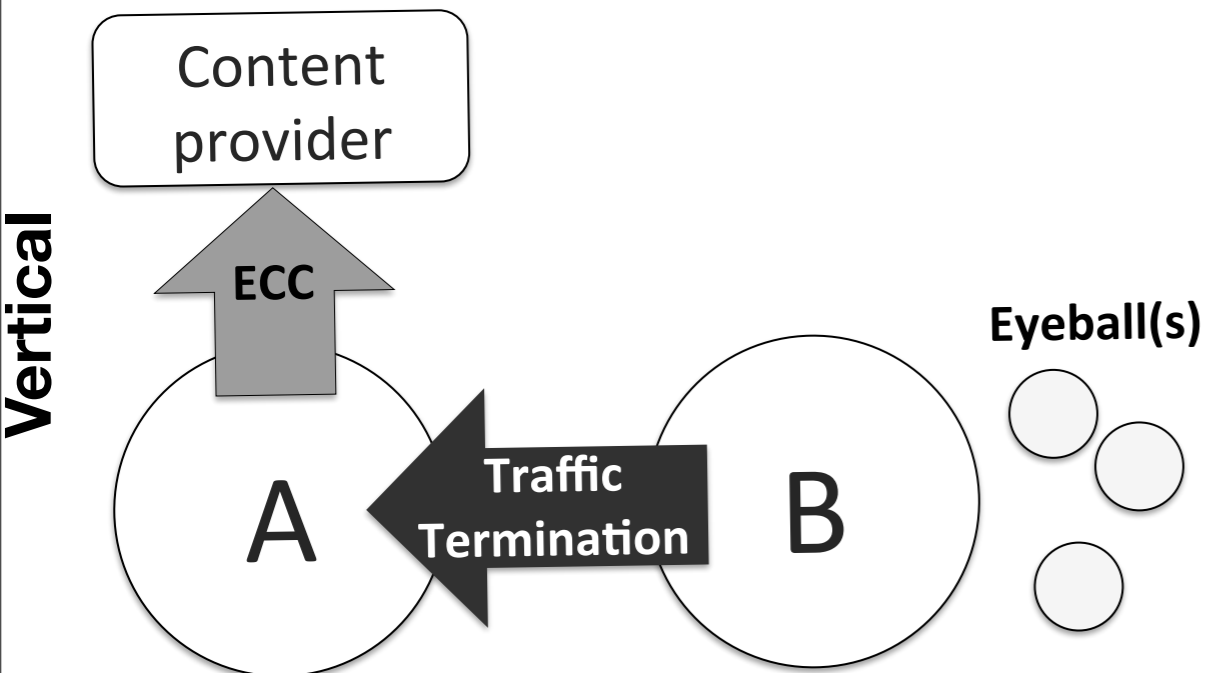
ASQ Traffic Termination (**ASQ-TT**)



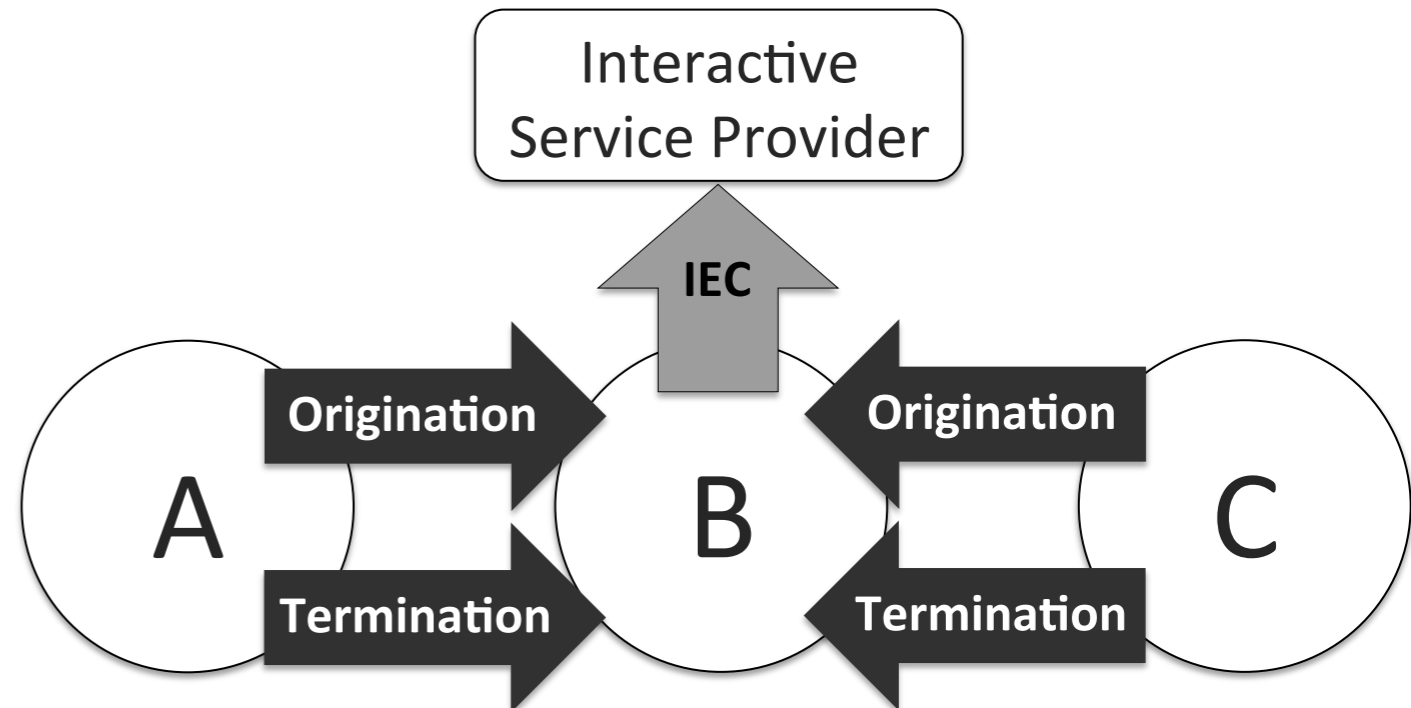
ASQ Traffic Origination (**ASQ-TO**)



End-user Content delivery Connectivity (**ASQ-ECC**)



ASQ Interactive End-user Connectivity (**ASQ-IEC**)



# Archetypization

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- Based on the **value network theory**, i.e., value chains integrating network relationships as source of value [7] [8]
- **Applicability:** IC QoS frameworks focus on multi-actor network interrelations, which cannot be captured by classical value chains
- **Method:** Analysis of market structures (i.e., stakeholders, activities, and domains) in order to form network configurations in a two stage process:
  1. **Decomposition** of atomic activities from a variety of use-cases
  2. Formation of **general activity configurations**

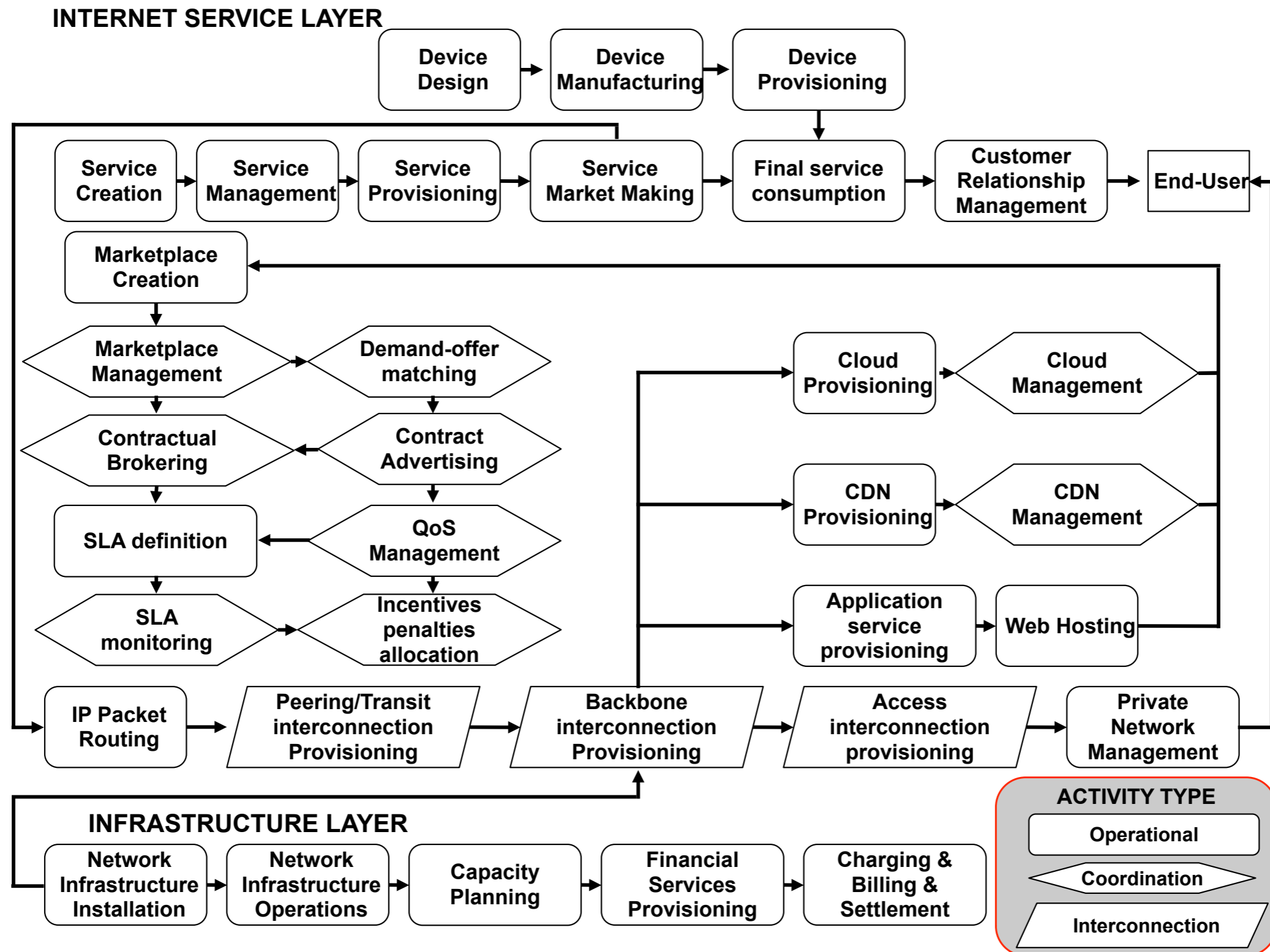


# Stage 1: Activities

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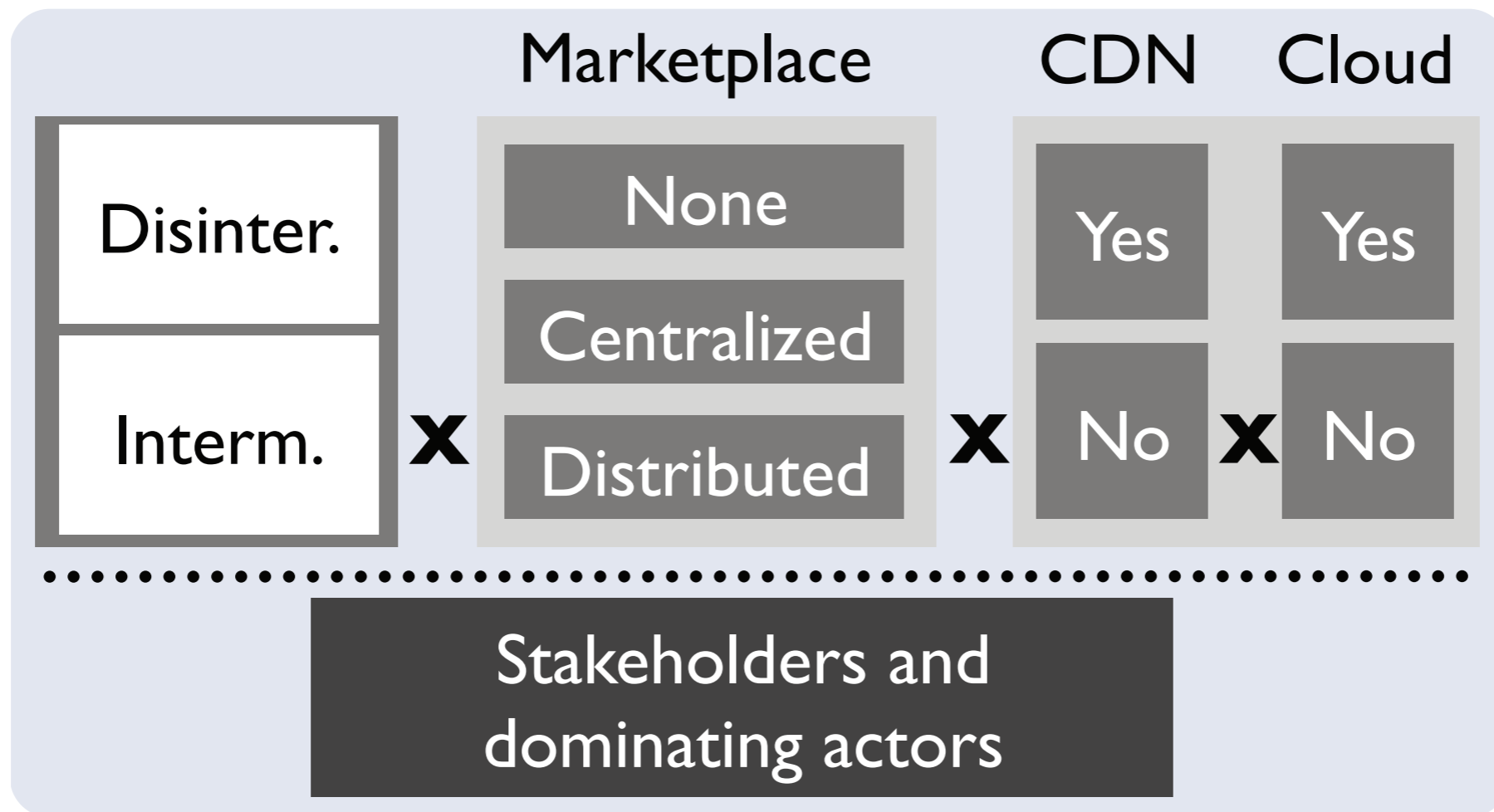
- Two Layers: **Infrastructure Layer** and **Internet Service Layer**
- **Infrastructure Layer** activity categories:
  - Network **infrastructure installation**, network **infrastructure operations**, **capacity planning**, **financial services** provisioning, and **charging, billing** and **settlement**
- **Internet Service Layer** activity macro-categories:
  - **IC, Data Center/Cloud/ASP provisioning, Marketplace provisioning, service provisioning**, and **device provisioning** activities

# Stage 1: Activities (cont'd)



# Stage 2: Typical configurations

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Disinter. ... Disintermediated configuration

Intermed. ... Intermediated configuration

# Validation

- **3 characteristic use-case scenarios** are below classified in meta-scenarios (derived from a selection policy of a pool of IC use-case scenarios)

TABLE I  
META-SCENARIOS BY EXAMPLE

Scenario	Requirements			Archetypization
	QoS	ASQ Goods	Destination-Related (DR)	
GaaS	Best QoS class	ASQIEC and ASQTT goods	D1: Timely/platform-specifically varying DR requirements	Intermediated, marketplace, cloud-provisioning configuration
<b>= Meta-scenario M-GaaS</b>				
VoD	Best QoS class	ASQECC, and ASQTT or ASQTO goods	D2: NSP IC to varying countries (VoD servers may not be within the country of content delivery); CDN support is applicable	Typically Intermediated configuration with CDN support
<b>= Meta-scenario M-VoD</b>				
GCVC	Best QoS class	ASQIEC, and typically ASQTO goods	D3: NSP interconnection	Traditionally, a disintermediated configuration
<b>= Meta-scenario M-GCVC</b>				

- **Second step:** A larger set of heterogeneous use-case scenarios were classified: All could be attached to M-GaaS, M-VoD, or M-GCVC, but differ in some orthogonal topics
- By reversely applying this methodology, even **random generations of meta-scenarios** are possible within set boundaries

# Conclusion

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- **Aim:** Reduction of redundancies in analysis, and improvement of transferability of identified IC solutions
- **Solution:** Generalized Requirements Classification of IC Goods, by the means of “Network Good Requirements” and “Archetypical Network Configurations”
- **Validation:** Variety of heterogenous scenarios could be classified in a small number of meta-scenarios – even the **random generation** of IC scenarios is anticipated
- **Further work:**
  - **Orthogonal aspects** like user demand, bandwidth requirements, or economic implications (e.g. costs, utilities, symmetries of traffic/markets/ASQ demands)
  - Importance of **directionality** of ASQ goods needs an investigation

# Thank you ...

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- ... the discussion is open!

[1] J. Adams, L. Roberts, and A. Jsselmuiden, “*Changing the Internet to Support Real-Time Content Supply from a Large Fraction of Broadband Residential User,*” BT Technology Journal (BTTJ), vol. 23, no. 2, 2005.

[2] T. Yang and D. Makrakis, “*Hierarchical Mobile MPLS: Supporting Delay Sensitive Applications Over Wireless Internet,*” in Proceedings of the International Conferences on Info-Tech and Info-Net. IEEE Press, 2001.

[3] R. Braden, D. Clark, and S. Shenker, “*Integrated Services in the Internet Architecture: an Overview,*” RFC 1633, 1994.

[4] H. Yamaki, M. Wellmann, and T. Ishida, “*A Market-Based Approach to Allocating QoS for Multimedia Application,*” in Proceedings of the Second International Conference on Multiagent Systems (ICMAS-96). MIT Press, 1996.

[5] J. Hwang, M. B. H. Weiss, and S.-J. Shin, “*Dynamic Bandwidth Provisioning Economy of a Market-Based IP QoS Interconnection IntServ-DiffServ,*” White paper, School of Information Studies, Syracuse University, 2000.

[6] D. M. Turner, V. Prevelakis, and A. D. Keromytis, “*The Bandwidth Exchange Architecture,*” in Proceedings of 10th IEEE Symposium on Computers and Communications (ISCC). IEEE Press, 2005, pp. 939–944.

[7] R. Gulati, N. Noriah, and A. Zaheer, “*Strategic Networks,*” Strategic Management Journal, vol. 3, pp. 203–215, 21.

[8] A. Ghezzi, F. Renga, and M. Cortimiglia, “*Value Networks: Scenarios on the Mobile Content Market Configuration,*” in Proceedings of the 8th International Conference on Mobile Business, 2009.