Clarifying the Concept of Intent
draft-clemm-nmrg-dist-intent-01

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Status update

- Initial discussions on this at IETF 100/101 + NMRG interim at IFIP/IEEE NOMS 2018

- Per discussions, the first in a suite of eventually three drafts:

    (1) Terminology – Definitions and Concepts: Intent vs policy vs service models, etc
    This draft

    (2) Intent definition – Expressing Intent *(draft TBD)*

    - Human – Machine interface aspects

    - Relationship to data models – can you use YANG?

    - Layer interdependencies

    (3) Basic intent architecture and framework/reference architecture
    draft-moulchan-nmrg-network-intent-concepts

    - How to render intent
    - How to validate network behaves "as intended"

- Various updates from -00: editorial updates and tightening, added references

What is this about?

- "Intent-Defined Networking" is one of the recent industry buzzwords
  - Basic idea: Define what you want, not how to do it
  - This sounds good, but is this idea really new? (rhetorical question)
    - Policy-based management: Define high-level policies, leave it to policy renderers to do the rest
    - Service models and service provisioning:
      Define services & leave mapping of the service to low-level configurations, resource allocations, and objects to a flow-through provisioning system
    - Information hierarchies and abstractions are known concepts and common practice for service providers today (e.g. TMForum eTOM / Business Process Model, ITU-T TMN reference model (management layers + FCAPS)
- So, what is intent, really?
  - How does it differ from what came before?
  - Is Intent a reincarnation of policy? Of service models? Is intent synonymous, or different?
    Why all those terms and how do they relate?
 - If it is different: how so? What are the implications?

Existing Frameworks (that also make extensive use of management abstractions and hierarchies)

Source: ITU-T

Existing Frameworks (that also make extensive use of management abstractions and hierarchies)

aka "TMN Pyramid"

Source: ITU-T
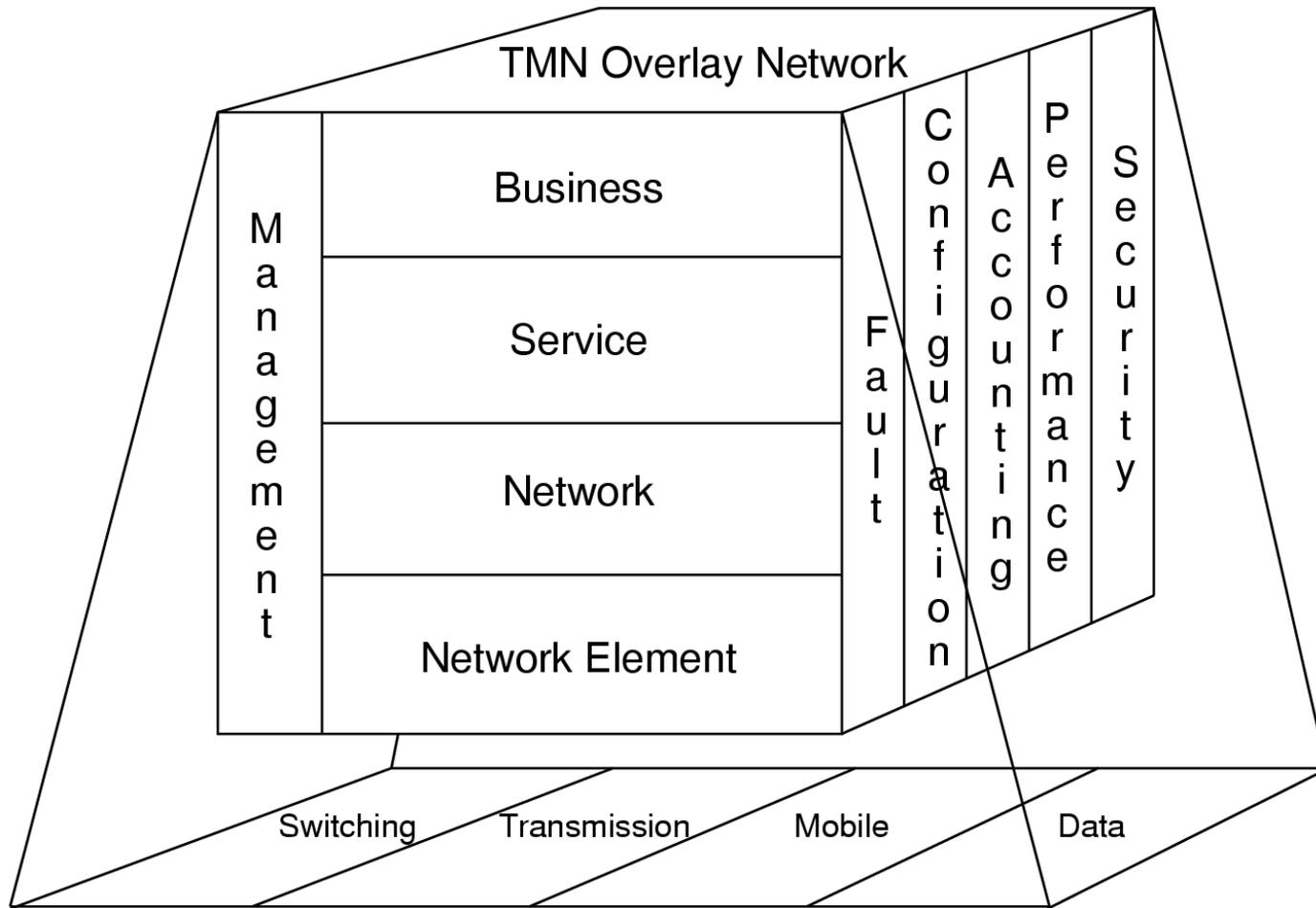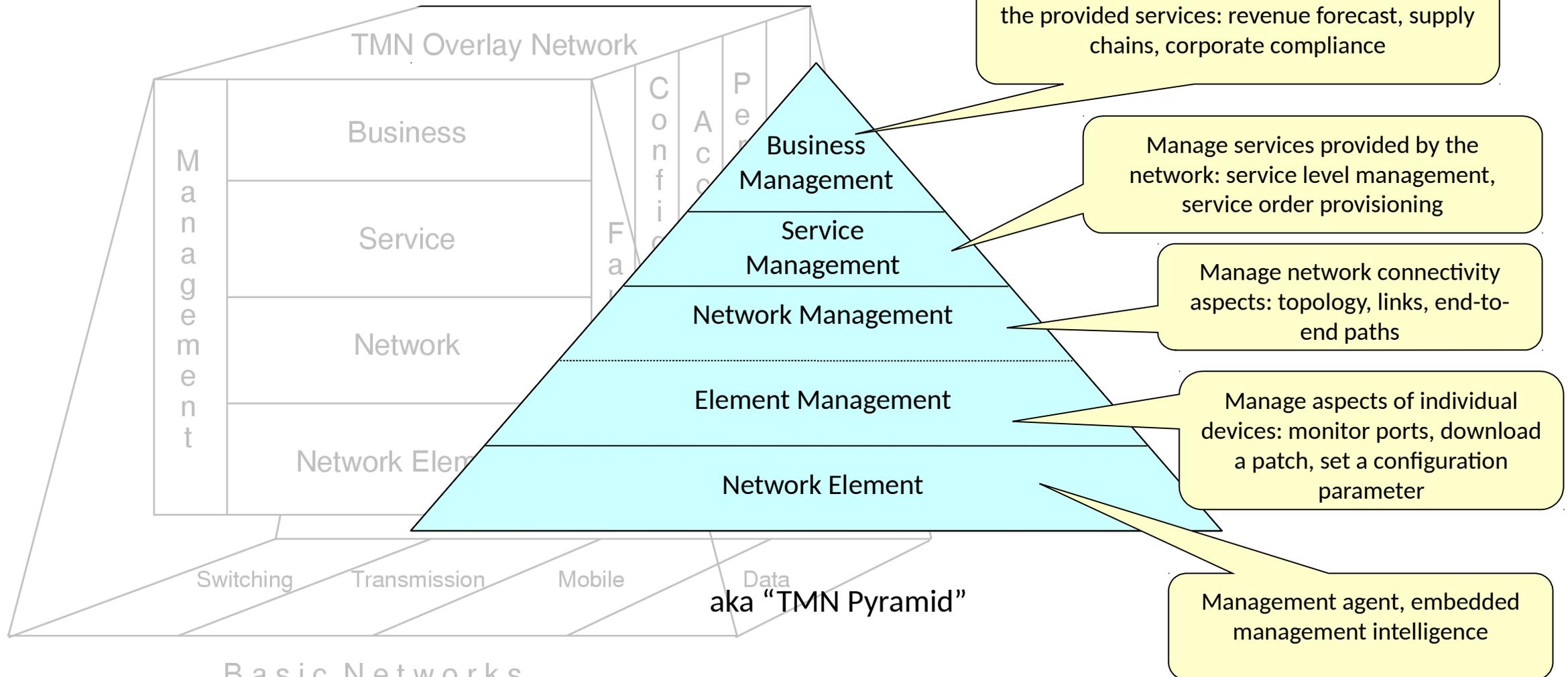
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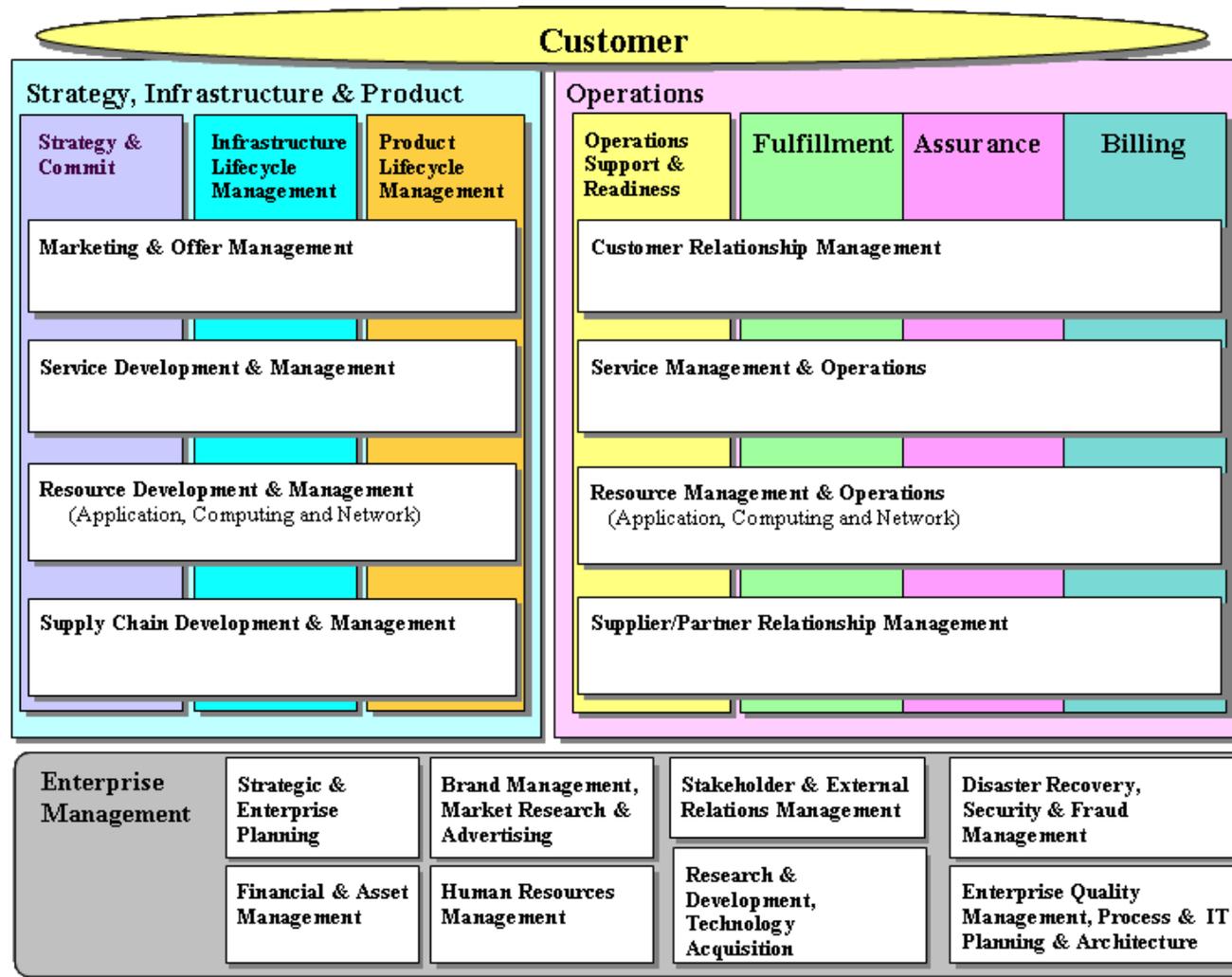
eTOM – enhanced Telecoms Operations Map
(TM Forum GB 921:
Business Process Framework)

Source: TMF

Differences between concepts and terms

- Service Models:
  - Describe instances of services that are provided to customers (see e.g. RFC 8309)
  - Service instantiation involves **orchestration** and **mapping** to underlying resources (user does not specify how to add, modify, remove a service – the system does it)
  - Machine-to-machine interactions; flow-through provisioning
  - Typically centralized

- Policy:
  - Set of rules (event/condition/action or variations)
  - Imperative: specify **how to act** / what to do under what given circumstances
  - (largely) machine-to-machine (but also devops-to-machine) interactions
  - Policy rendering: **abstraction** (and homogenization) of low-level knobs and data

- Intent:
  - Declarative: Define desired **outcomes** and high-level operational goals
  - Interactions between humans and machines
  - Network (or Intent-Based Management System) renders intent – two aspects: **information abstraction** and **determination of logic**
  - Centralized and decentralized flavors

Discussion items

- Define intent narrowly (only "new" concepts) or broadly
  - Putting things into a common context vs. guilty of "intent-washing"
  - Operational intent – service intent – flow intent
  - Intent at different hierarchy layers (at device/network/service level), distinguished by actor (NOC operator, user, administrator)
- Intent functional areas:
  e.g. intent fulfilment vs intent validation (or assurance?)
  - Intent compliance assessment and monitoring
  - Service assurance and service level management ("intent washing")
- Intent levels
  - Intent at multiple levels in a hierarchy: e.g. service vs network infra
  - Intent of multiple roles: e.g. NOC operator, admin, end user
  - Intent at multiple levels of granularity: e.g. flow intent
  - Intent reconciliation, intent conflict detection
- Possible expansion of scope to intent reference architecture?

Discussion items (contd)

- Intent articulation and human-machine aspects
  - Type of actor impacts the type of interaction and interface
    - Natural language processing – infer meaning
    - Dialogue vs command
      - Dealing with under-specification (and over-specification)
      - Conflict avoidance
      - Resolution of ambiguities
  - Technical solutions are beyond scope of this particular draft, but important for distinction of what makes intent "unique"
  - "Can intent be expressed as YANG data model?"
- Beyond scope but relevant for IRTF: possible research topics
  - Human-machine interaction
  - Intent compliance assessment
  - Intent conflict detection, reconciliation, negotiation
- This is ongoing work & the discussion is just getting started
- Next step: RG adoption?

Thank you!