Intent-Based Networking in NMRG

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with input from
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What is this about?

- "Intent-Defined Networking" is one of the recent industry buzzwords
  - Basic idea: Define what you want, not how to get 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, mapping to low-level configurations and objects left to a system
- So, what is intent, really?
  - How does it differ from what came before?
  - Is Intent a reincarnation of policy? Are they synonymous? Do the mean different things? Why all those terms and how do they relate?
  - If it is different: how so? What are the implications?
- How do you define Intent?
  - Is it a data model? Can you use YANG?
  - Does it contain imperative aspects? Do we need to be able to express layer interdependencies?
- How do you "achieve" intent?
  - How do you render intent?
  - How do you know if your network is configured and does behave "as intended"?

Selected aspects

- Concepts and terminology
  - Relate intent, policy, service models; IBN vs PBM, etc
  - Compare RFC 3444: Data Models vs Information Models
- Intent articulation
  - Declarative vs Procedural
    - Declarative: Desired outcome, goals, post-conditions
    - Procedural: (programmed) workflow
    - Some middle ground (e.g. rule-based)
  - Relationship to Data Model (Intent as YANG?)
  - Human – Machine Aspects
    - API vs natural language inference of intent
- Rendering frameworks
  - Intent = SDN Controller API? Policy = Device Automation? Service model = non-SDN services?
  - Predetermined: well-defined rendering rules, deterministic, "programmed"
  - Dynamic: achieve intent via control loops, negotiation and planning, trial-and-error, ...
  - Centralized vs Distributed (control hierarchy) vs. Decentralized (e.g. peer-to-peer, autonomic)
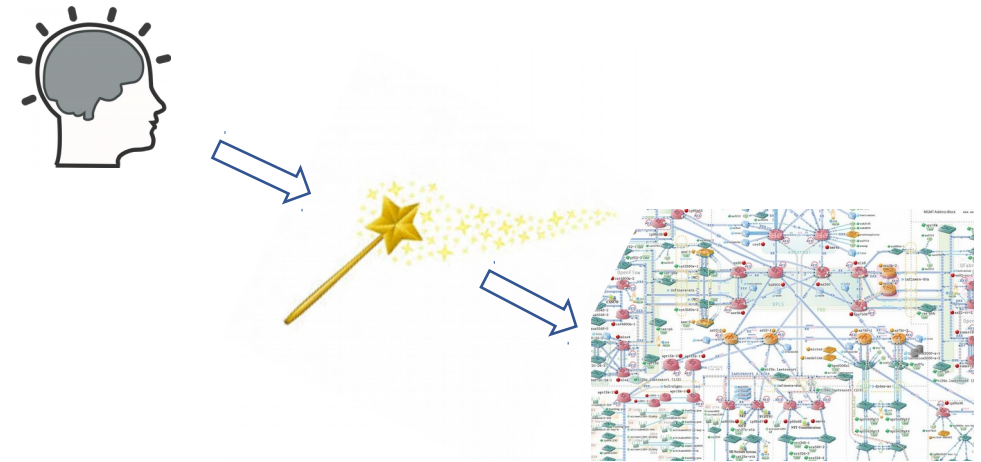
More research challenges

- Intent frameworks

- Intelligent inferral of intent

- Intelligent collaboration between networked systems to achieve global intent; coordination techniques

- Intent interaction

- Intent monitoring, validation of intent compliance using ML techniques, tie-in with promise theory

- Intent protocols (or intent extensions to existing protocols)

- Other? (may want to build a catalogue of research questions)

- Complement activities in NMRG with academic research published in IM/NOMS

Current status

- Ongoing discussion in NMRG, with touchpoints at least for ANIMA

- Current thinking: need to define 3 things
    - (1) Terminology – definitions and concepts: Intent vs policy vs service models, etc
    - (2) Intent definition – how to express intent – "Human – Network Interface"
    - (3) Basic intent architecture and framework/reference architecture – how to render intent

- Initial drafts that can serve as starting points
    - Re: (1) Distinguishing Intent, Policy, and Service Models (draft-clemm-nmrg-dist-intent)
    - Re: (2) TBD (note: avoid SUPA trap)
    - Re: (3) Concepts of Network Intent (draft-moulchan-nmrg-network-intent-concepts)

- We welcome collaborators!

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