Automating Broadband Access: Abstractions, Standards, and AI-Ready Architectures

OpenRheinMain 2026 | Robert Soukup (Radisys GmbH, Darmstadt)

Radisys

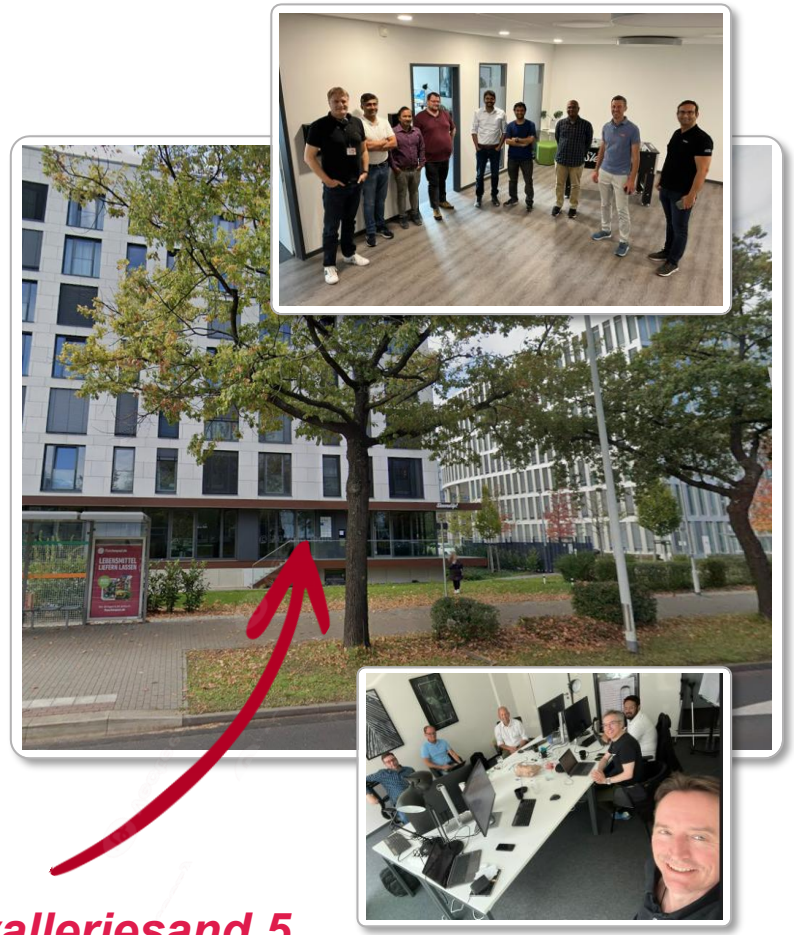
Who is Radisys?

Radisys Corporation

- **Founded almost 40 years** ago as Intel spin-off
- **Technology leader** in fixed (control, orchestration, hardware) and mobile (stack business) and services (e.g. MRF)
- Radisys technology touches almost **2 billion people worldwide**
- Part of **Jio Platforms** (with the sister company Jio, the operator) key shareholder is Reliance India
- **~ 2,000 people, strong R&D in India**; headquartered in Oregon/U.S.

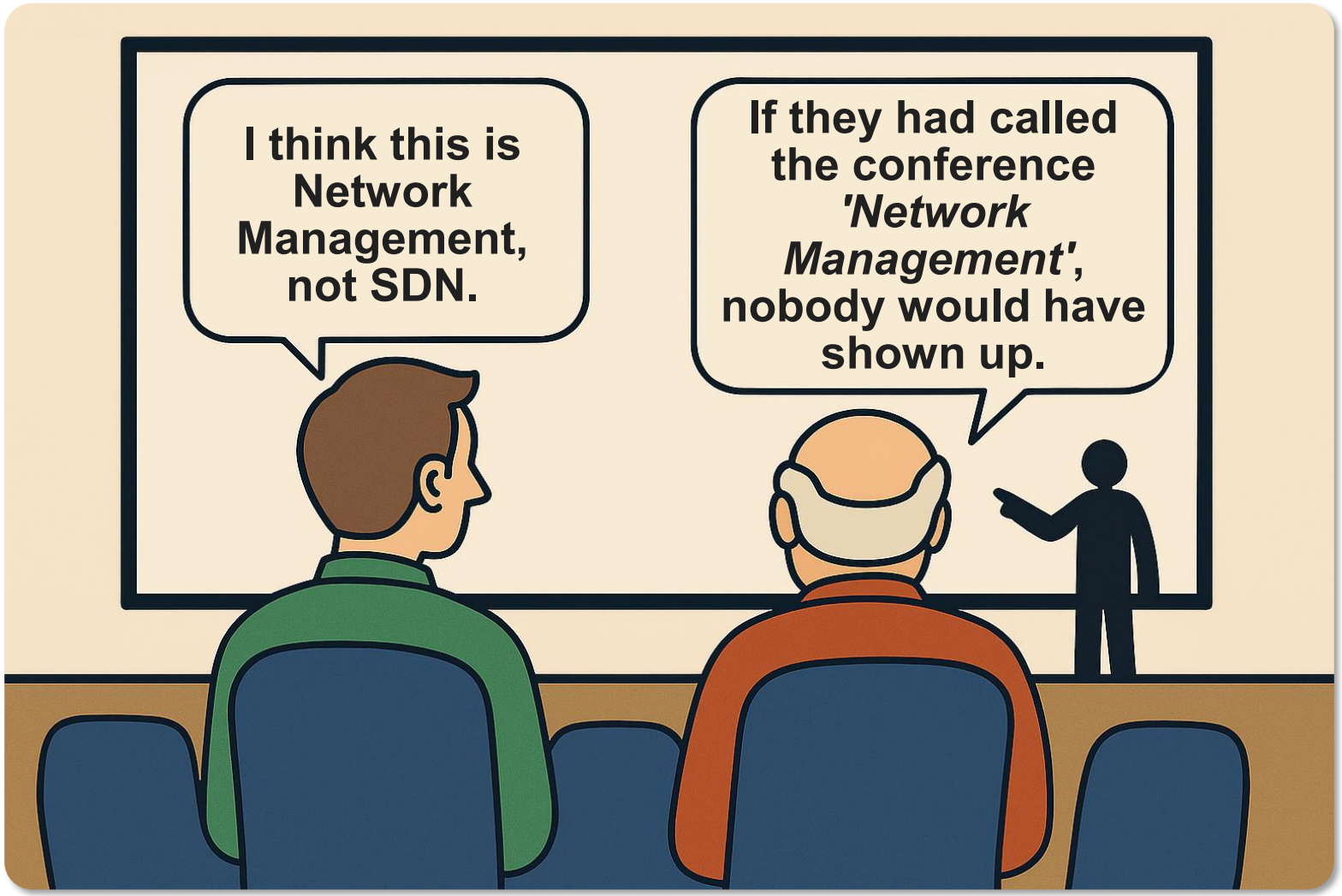
Radisys GmbH, Darmstadt / Germany

- **European hub** in Darmstadt established to reinforce Radisys' German and European footprint
- Approximately **20 engineers** delivering architecture & design expertise, business development, and local operational support
- **Key interface to Radisys' global R&D** organization in India
- **Supporting customers across Europe**, with Deutsche Telekom as an anchor customer
- Conveniently **located within 20 minutes of Frankfurt International Airport**



Am Kavalleriesand 5, Darmstadt

Bad Homburg, Germany, October 2013



This presentation is about ***Network Management***

What is still happening?

Looking back

- Networks are designed and built for covering the **'what'**
  - Network functionality first
  - Routers, gateways, tunnels, protocols …
- The **'how'** is still a secondary thought
  - E2E-Management
  - IT integration
  - Security
- The **differentiators** may have shifted to exactly these items …

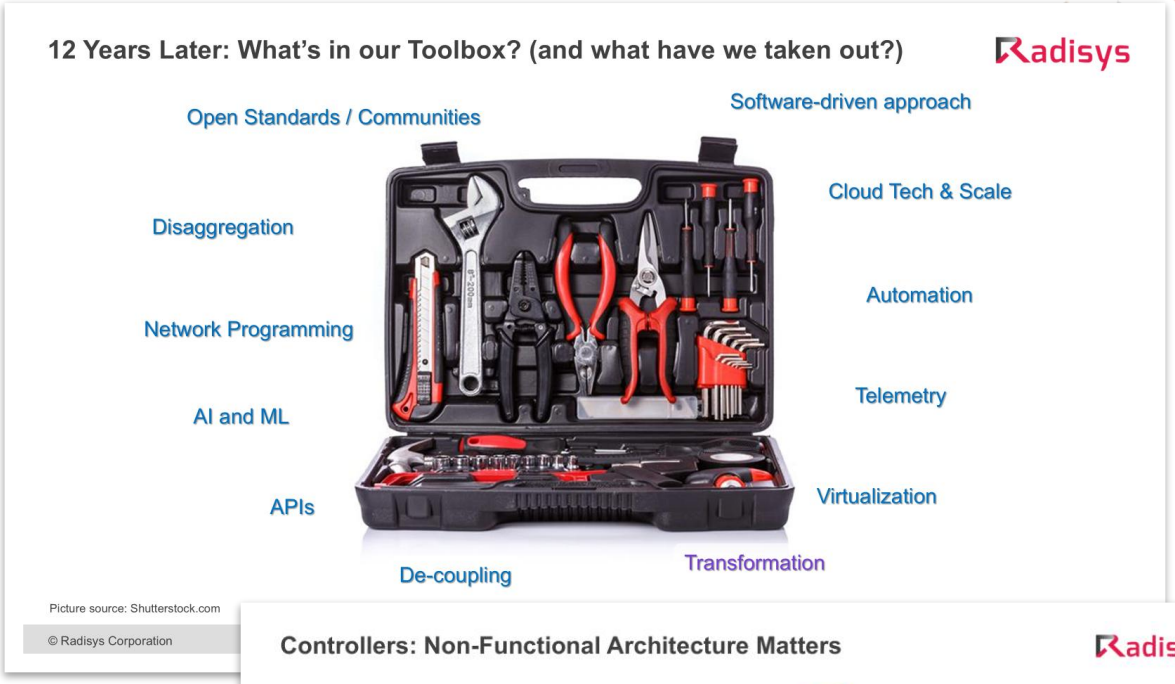
- Need for **efficiency** in production
  - Cf. Light reading report on ARPU and vendor landscape *(Lightreading: Telecom is suffering a big exodus of vendors)*
- **Automation.** Cloud and SDN are here for a while
  - Have we adopted them?
  - Idea was: go for new features
  - The Killer app is: production optimization
- **AI** is here,
  - Are we ready?
  - If so, what to do with it?

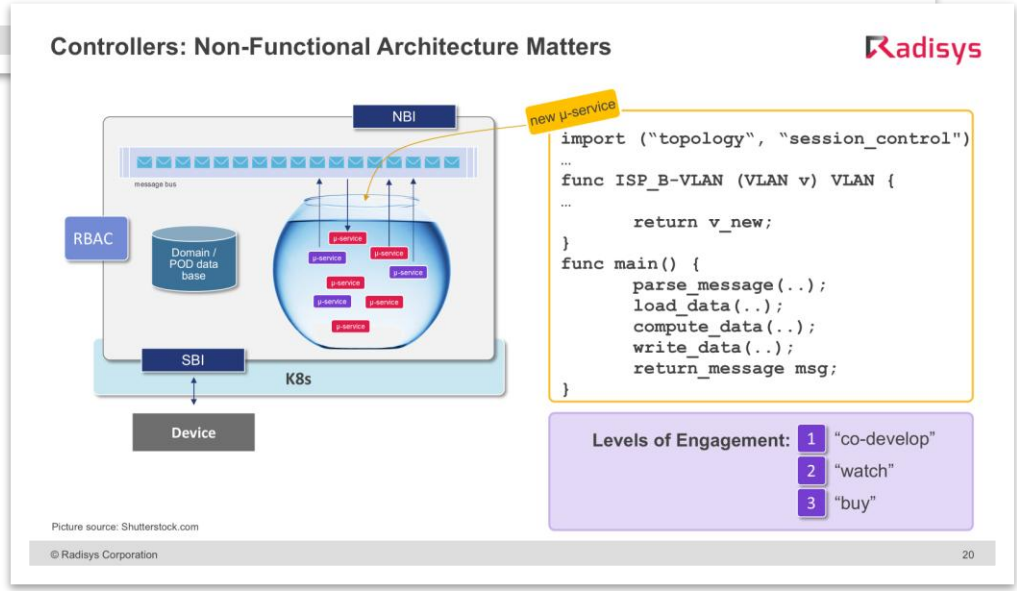
Looking forward

The technology toolbox – reviewed

- White boxes, Disaggregation
- Virtualization, Cloud Technology
- SDN / Programmability
  - → Networks and their management became programmable
- Disaggregation leads to **much more data** that can be used & leveraged
  - → Every component / service instance can generate telemetry data

→ It is (nearly) all software

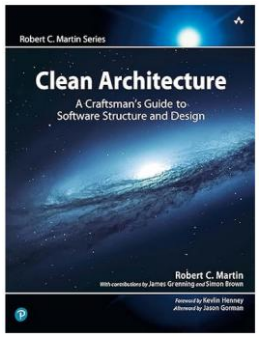




Software? – Software!

So, lets build it like the Pros do it (the mainly non-functional part)

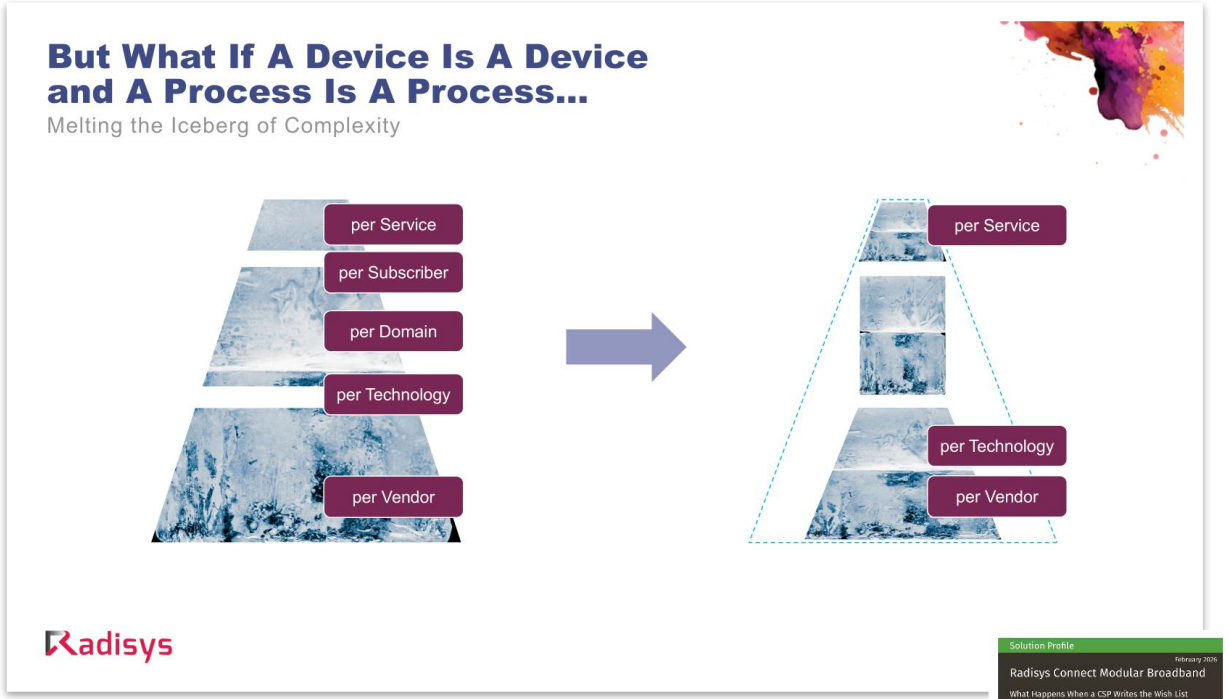
- Uncle Bob`s guidance:
  - Decoupling,
  - Modularity,
  - Separation of concerns,
  - Abstraction,
  - Extensibility by adding code
  - …
- No API bypassing
- No spaghetti code (fast, lean, wrong)
- Conway's law still valid …



Darmstadt, Germany, 2017
LAS VEGAS PRINCIPLE

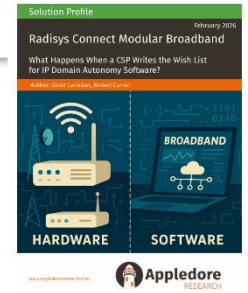
"What Happens in Vegas, Stays in Vegas"
(credit to Las Vegas tourism department)

- Implemented remove duplication and inefficiencies



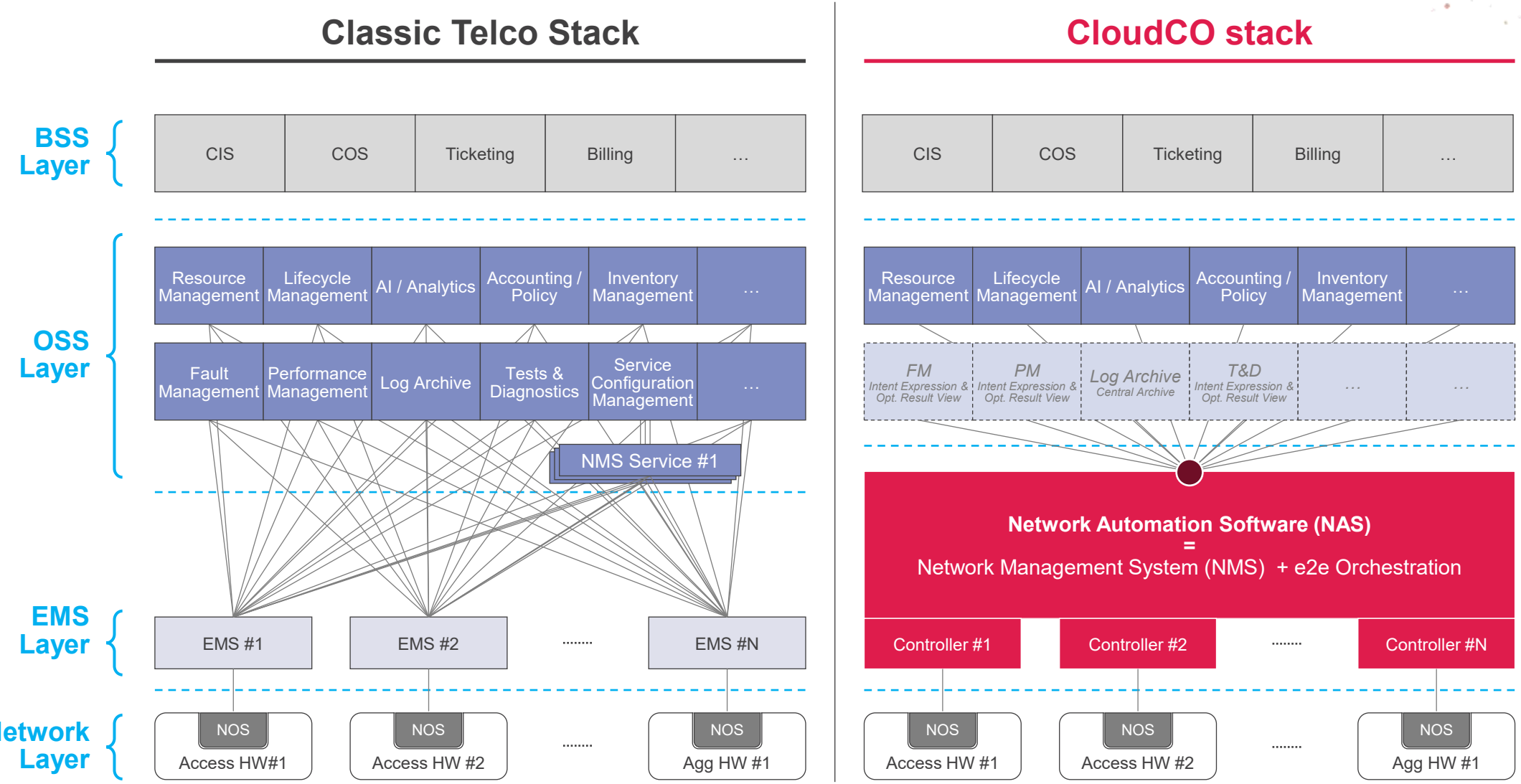
(from Base in Munich, 2025)

See also Radisys Connect Modular Broadband - Appledore Research



Result of applying IT paradigms to NAS (was NMS)

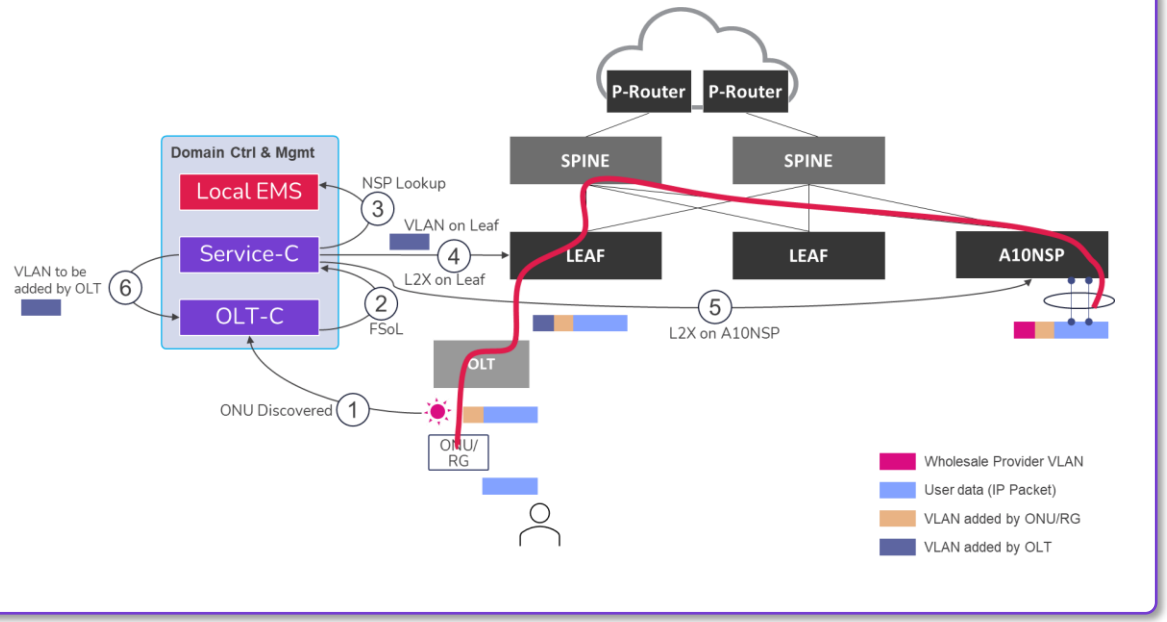
Consolidating the EMS Zoo and per-technology OSS implementations



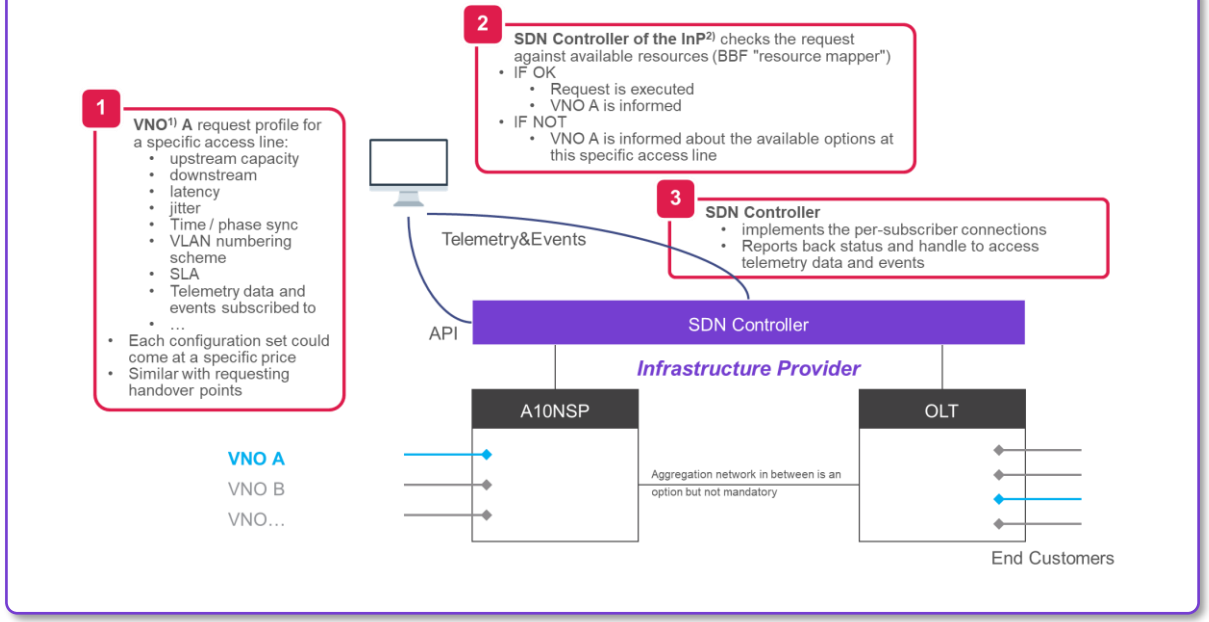
Action! The dynamic network

Come to the BBF NetArch BSA Working Group this week ☺

3S Technology



Wholesale use case



We can ***proactively and reactively program*** the network!

Network Modeling

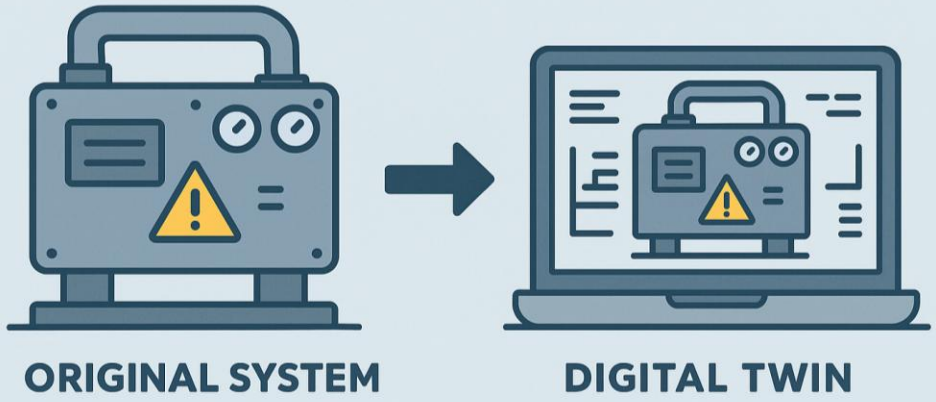
Next wave towards efficiency

We have **automated and consolidated** – or are on the way of doing this

We have **Telemetry data and logic** on top

What's next?

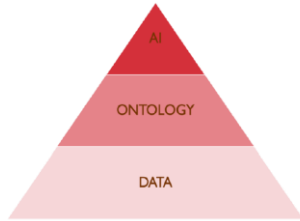
→ ***Need more insights!!***



- **Twins as emulators**
  - Containerlab, GNS3 and the likes
- **Twins as** representation based on the data describing the system and its state
  - ***AI tools love this***

→ **Twins provide insights!**

How we run networks today and tomorrow



Telecom-specific Ontology, Appledore Research
https://appledoreresearch.com/report/telecom-specific-ontology/

Problem to solve:
"I want to …"

Reactive, requires previously acquired knowledge

Formulate as a computer program

Send it over ☺

Proactive & Reactive, requires no previously acquired knowledge

Workflows and Operations Tools

Hard-coded correlation, rule based

GATE
invoke

Actors (SDN-C)

GATE
invoke

AI / NLP Platform (Orchestrator + Agents)

Local inference + reasoning

GATE

Data as Digital Twin, Normalized, Vectorized, Knowledge / Property Graphs

Commands / Intents

Normalized and Abstracted / Filtered data

Live Inventory and Topology, technology-invariant

semantic knowledge

raw data

Network with functions, nodes, ports and links

Data input to the AI agents

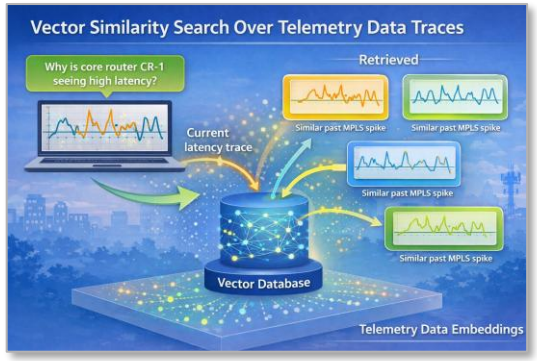
Two major types

- **Vector data store**
  - It gives the LLM “experience memory.”
    - E.g. telemetry data but also text, logs, tickets
  - Can be compared, results “with probability”
    - Find similarities in meaning using Linear Algebra ☺

$$f(x) = \mathbf{v} \in \mathbb{R}^d$$

- **Example use case**
  - “Find misconfiguration of BGP on my routers”
  - “Find similar daily traffic pattern”

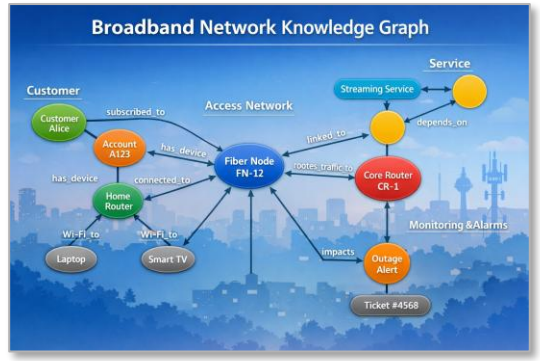
- **Good for …**
  - … Unstructured knowledge
  - … Logs and telemetry
  - … Runbooks
  - … TAC cases
  - … Similarity search
  - … Experience-based troubleshooting
  - … Conversational memory



- **Knowledge/Property Graphs**
  - Gives the AI agent “world structure.”
  - Exact data (relationships)
  - Nodes = entities (routers, switches, flows, policies, tenants)
  - Edges = relationships (connected_to, depends_on, configured_by)

- **Example use case**
  - “which customers are affected by QoS policy #5 change?”

- **Good for …**
  - … Topology representation
  - … Service dependencies
  - … Network segmentation
  - … Policy relationships
  - … Multi-hop reasoning
  - … Impact analysis
  - … Compliance verification



Combination and building a system

Putting the pieces together to assure accuracy

STAGE 1 — Front-Load the LLM with normalized data structures from your NAS[1)]

- Run questions
- LLM will vectorize

➔ ***Leads to reasonable results.***

STAGE 2 — Enrich system with contextual data

- Create Ontology - Build schemas based on your NAS information model
- Populate schemas with your real-time data

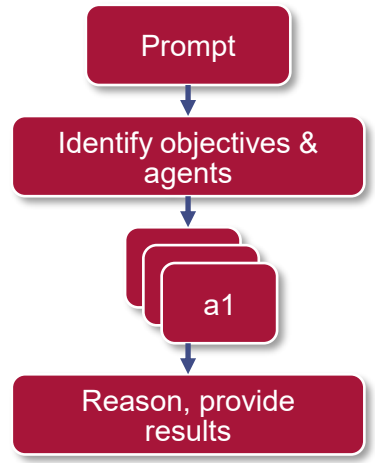
➔ ***Leads to enhanced correlation.***

- If e.g. an outage has occurred:
  - Read the graph to find the affected nodes, devices, customers
  - Read the DB to find similar outages in the past
  - Check if any of those patterns apply (RAG)
  - Give recommendation or start the relevant actors

STAGE 3 — Add orchestration and agents

- Load domain specific knowledge
- Provide data (KG, VDB) to LLM or sub-agents
- Fan out the request to the agents
- Reason over the answers

➔ ***Leads to enhanced results, maintains de-coupling***



1) Network Automation Software

From tech & willingness to results

? How to get to useful high-quality results

Basic system, Actionable "the network"

Normalized Processes, Tools and data

Deterministic & contextually Awareness towards Autonomous N/W

1. Core technology, SDN
2. NMS & Data Platform — Schematic + Semantic interface (incl. KG & V-DB)
3. AI/NLP Process

Hard, requires transformation in areas

Even harder, requires transformation E2E

Cool, not so hard, but requires Steps 1 and 2…

Supported by BBF Community Work

See also: marketing papers on CloudCOv2 and AI in Broadband

Closed loop

4a Run network w/o human intervention

hard

VS

Producing Answers

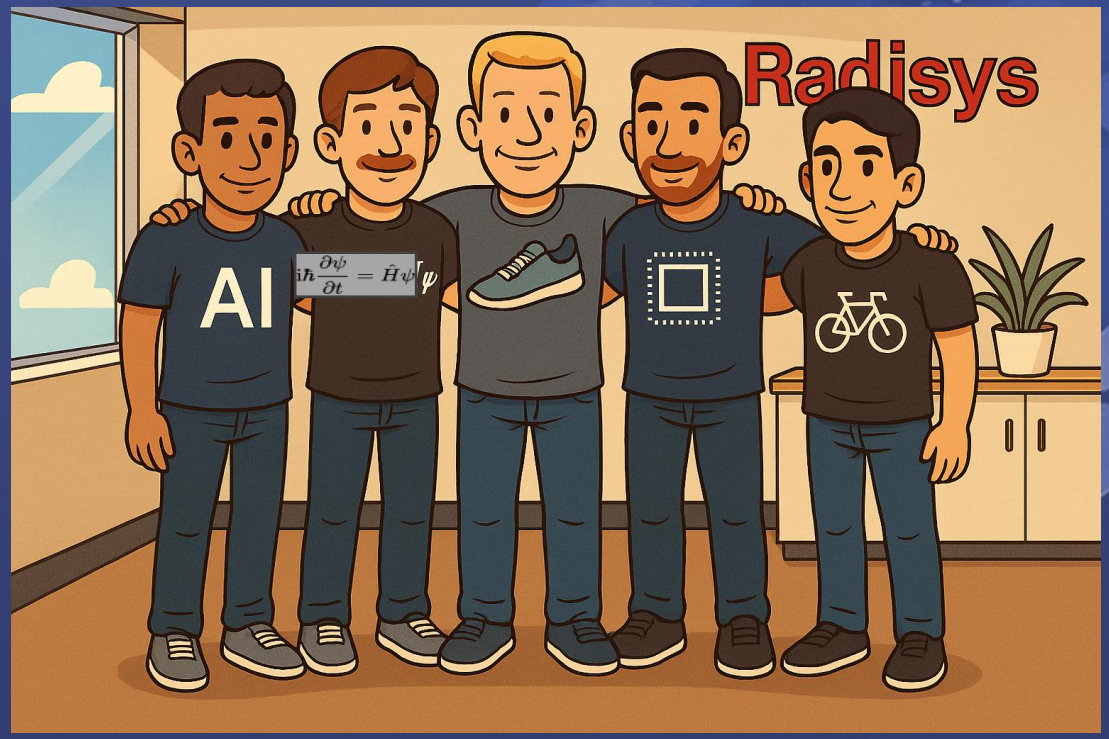
4b Run network w/ human intervention

Write computer program (deterministic), use e.g. claude.ai

easy

Less efforts
Faster TTM and TTC
Move your teams into innovating new services

Is this already 80% ?



Thank You

Radisys