Natural Language Networks

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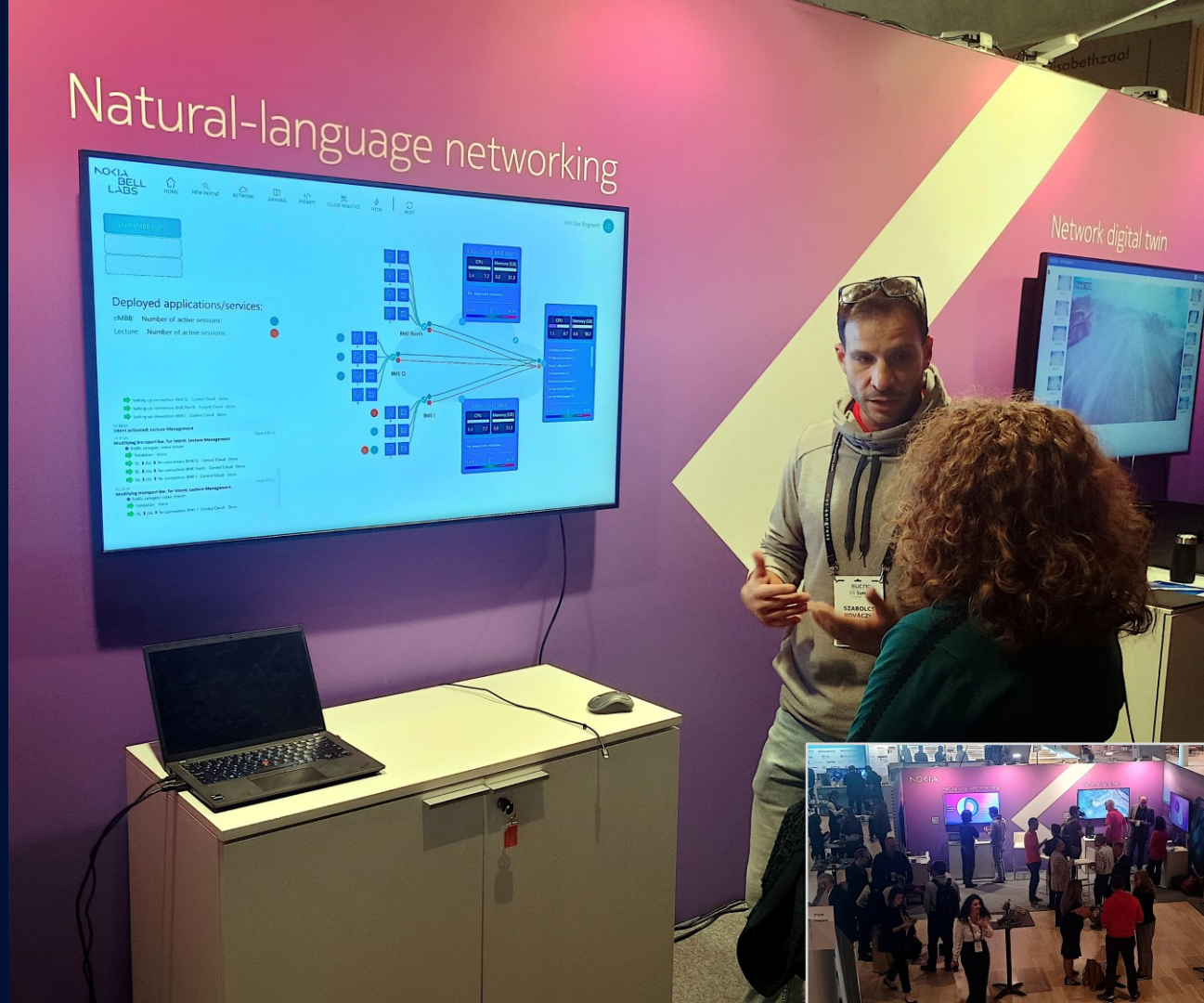
Network Whisperer

Nokia's Linguistic Leap Toward Autonomous Networks

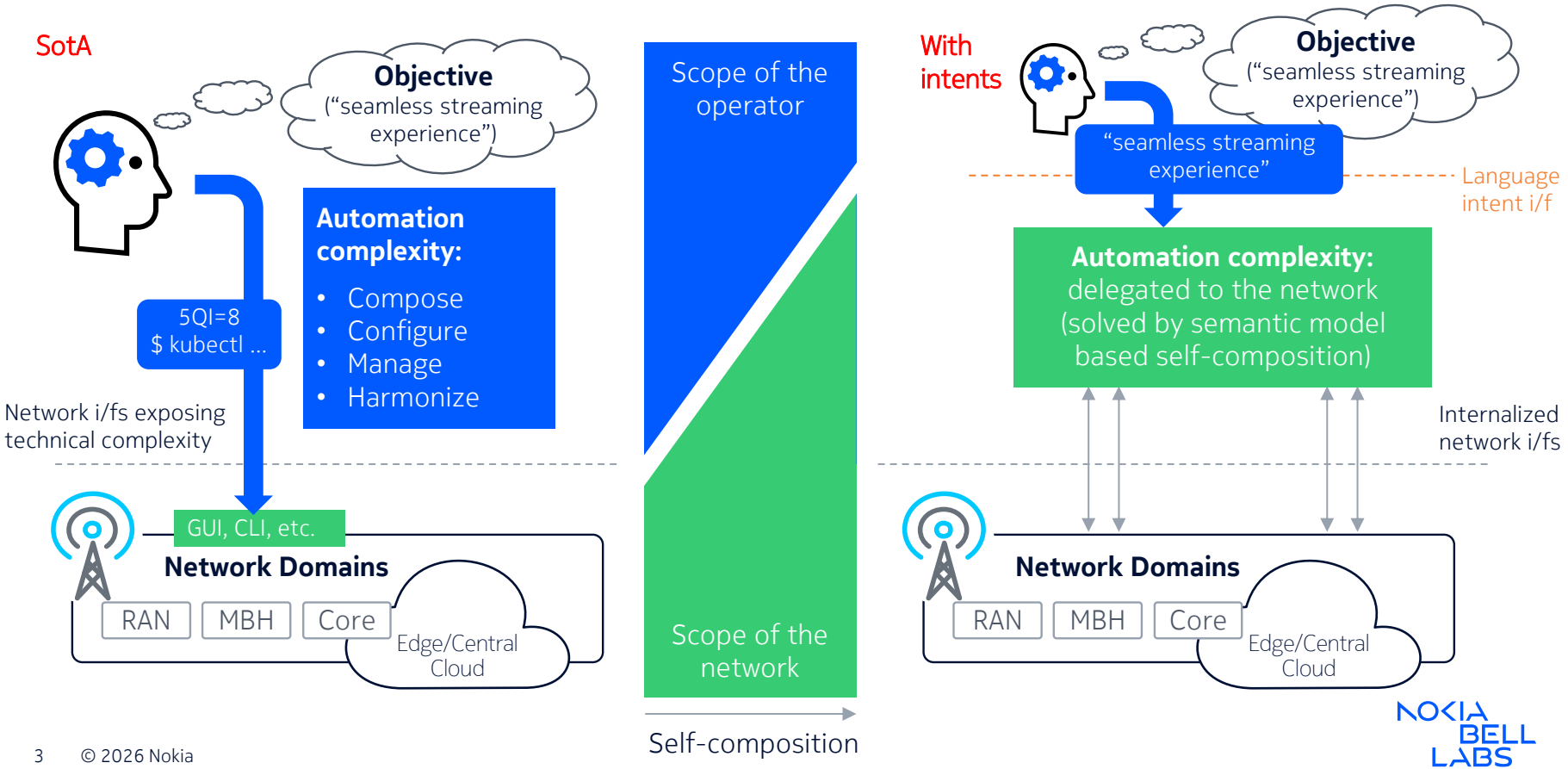
Industry-first network autonomy through natural language intents

Press release @ Brooklyn 6G Summit 2023

1. Natural Language Interface
2. Semantic modeling of network capabilities (e.g., APIs)
3. Intent-driven self-composition of network capabilities
4. AI/ML-driven, self-learning, environment-aware autonomous network

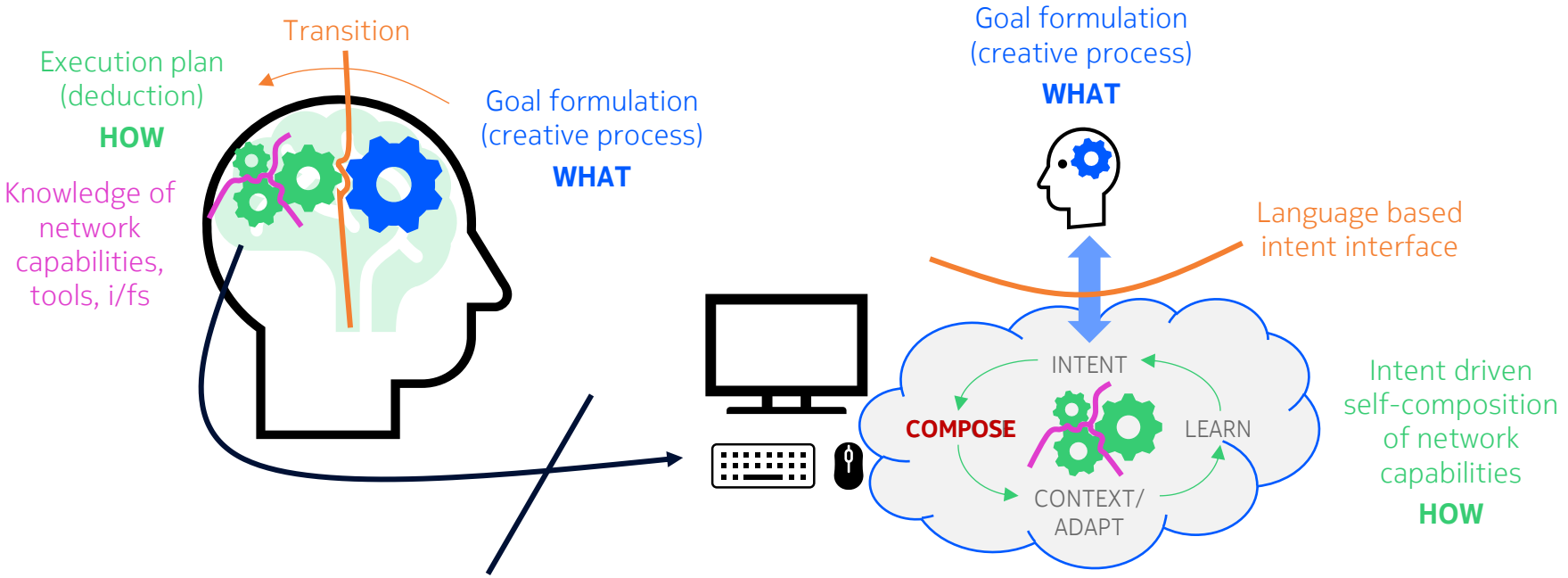


Delegating the automation complexity to the network



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Intent: delegation of execution responsibility to the network



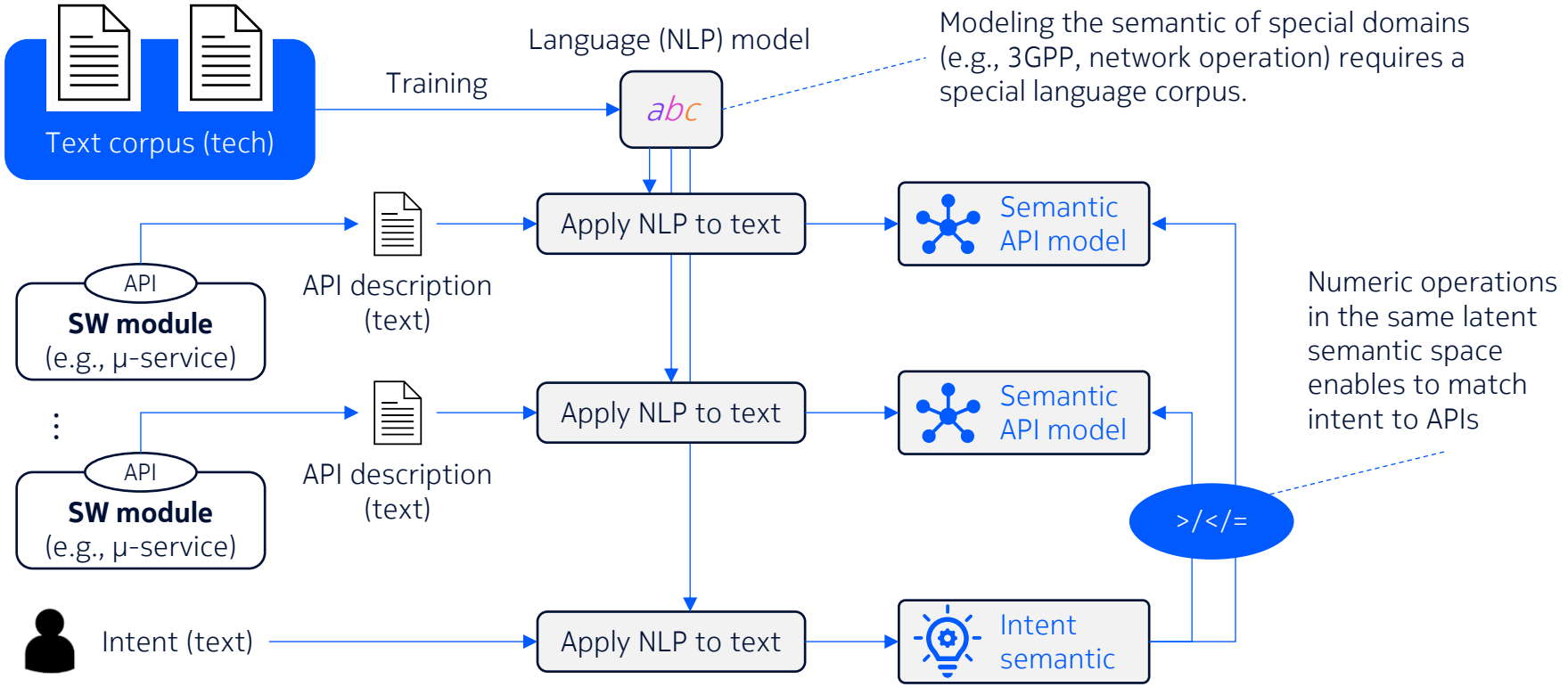
Traditional HMI: technical, complex interface to convey step-by-step execution plans

Semantic modeling of network capabilities (SW module APIs)

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Semantic modeling of software APIs



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Semantic APIs: full capability model

(1) Human readable metadata

Text description

E.g., “RAN UE Throughput DL – Payload data volume on RLC level per elapsed time unit on the air interface, for transfers restricted by the air interface.”

NLP model

abc

Informal (inferred) semantic

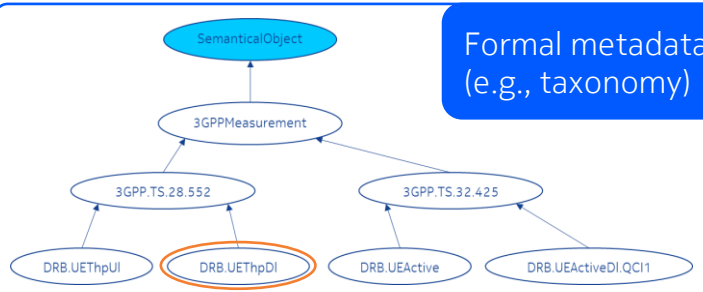
Full capability model

<?> Semantic

Inferred | Formal

APIs

(2) Machine readable metadata



Formal metadata (e.g., taxonomy)

Formal semantic (e.g., standard, taxonomy)

+

</> Syntax

E.g., **int** sum(**int** a**, int** b) { return a + b; }

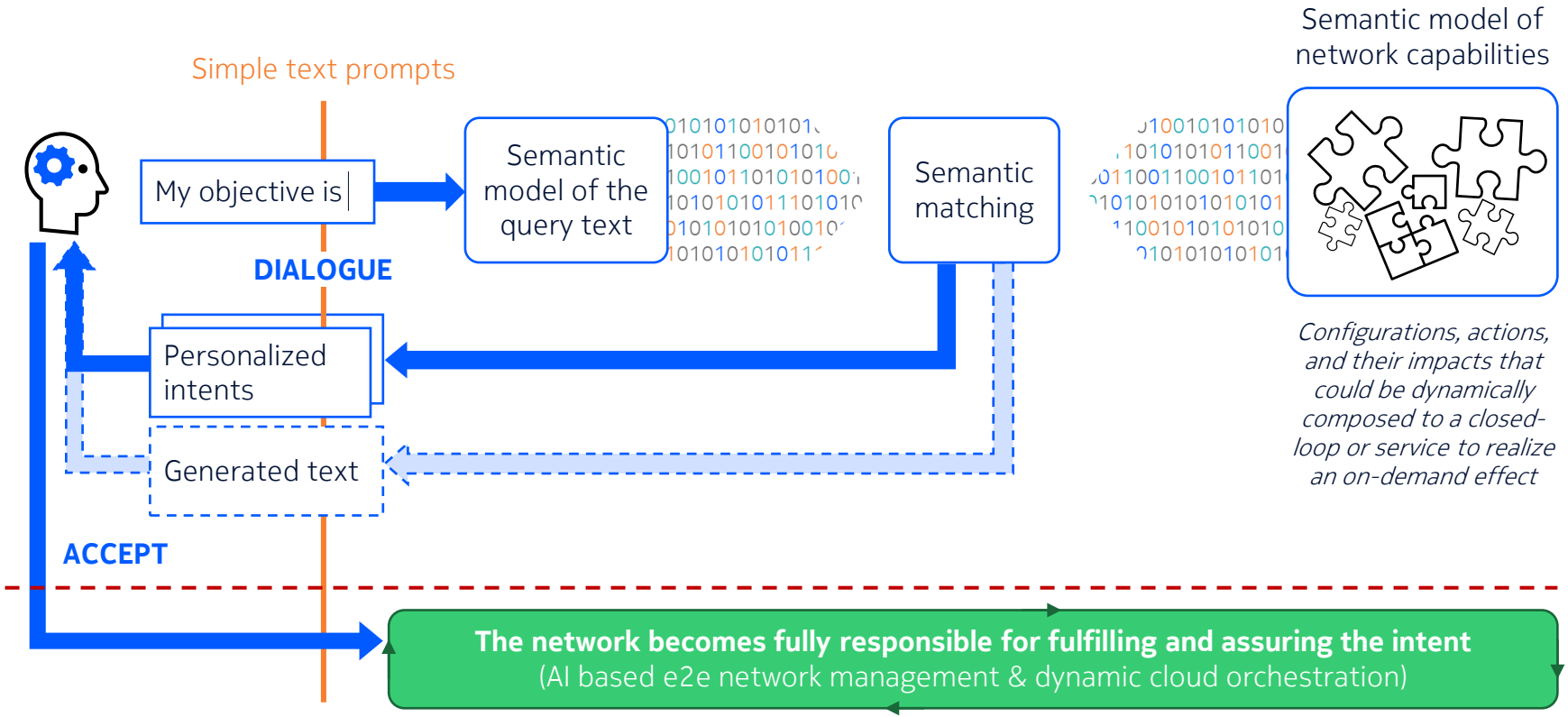
E.g., **int** getDrbUeThpDL(**int** ueId**, int** drbId)

Syntax is not enough

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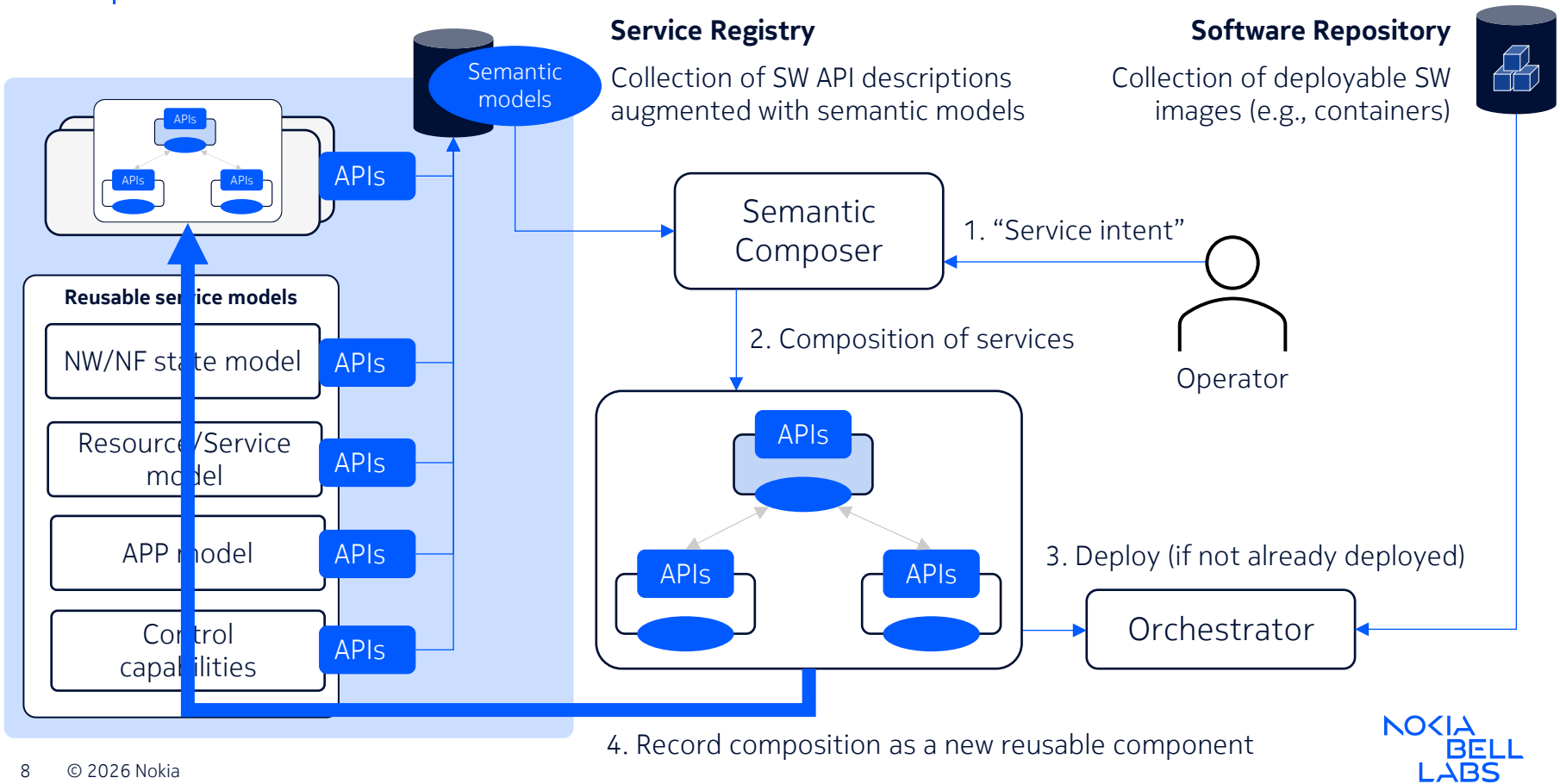
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Language interface



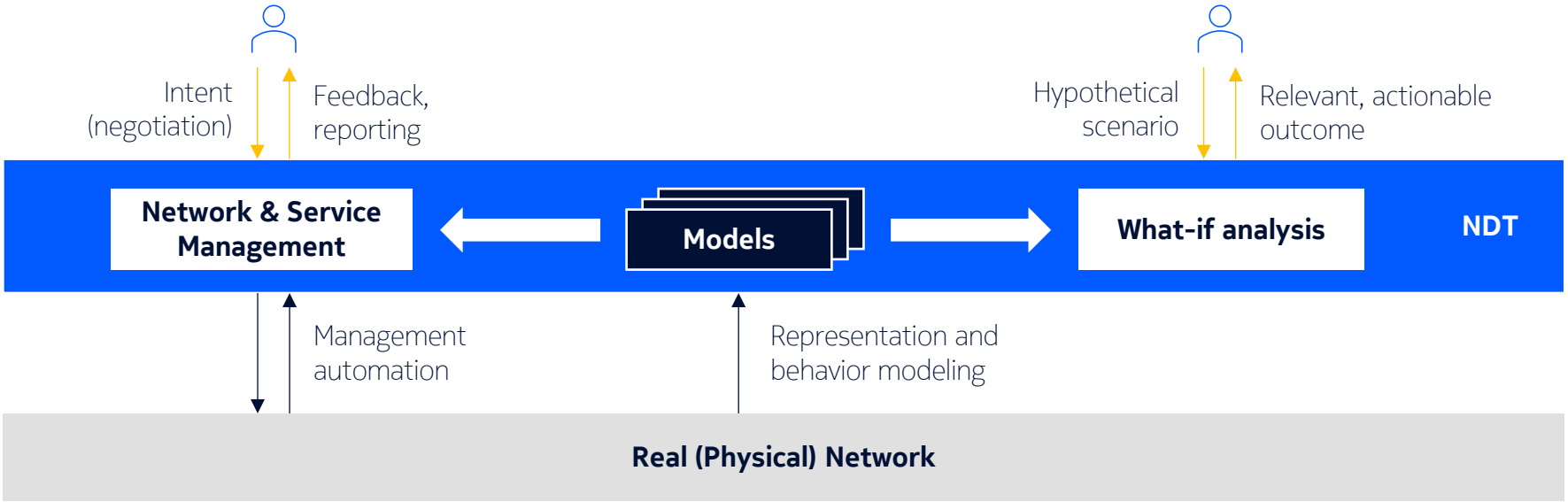
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Composition



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Network Digital Twin (NDT)

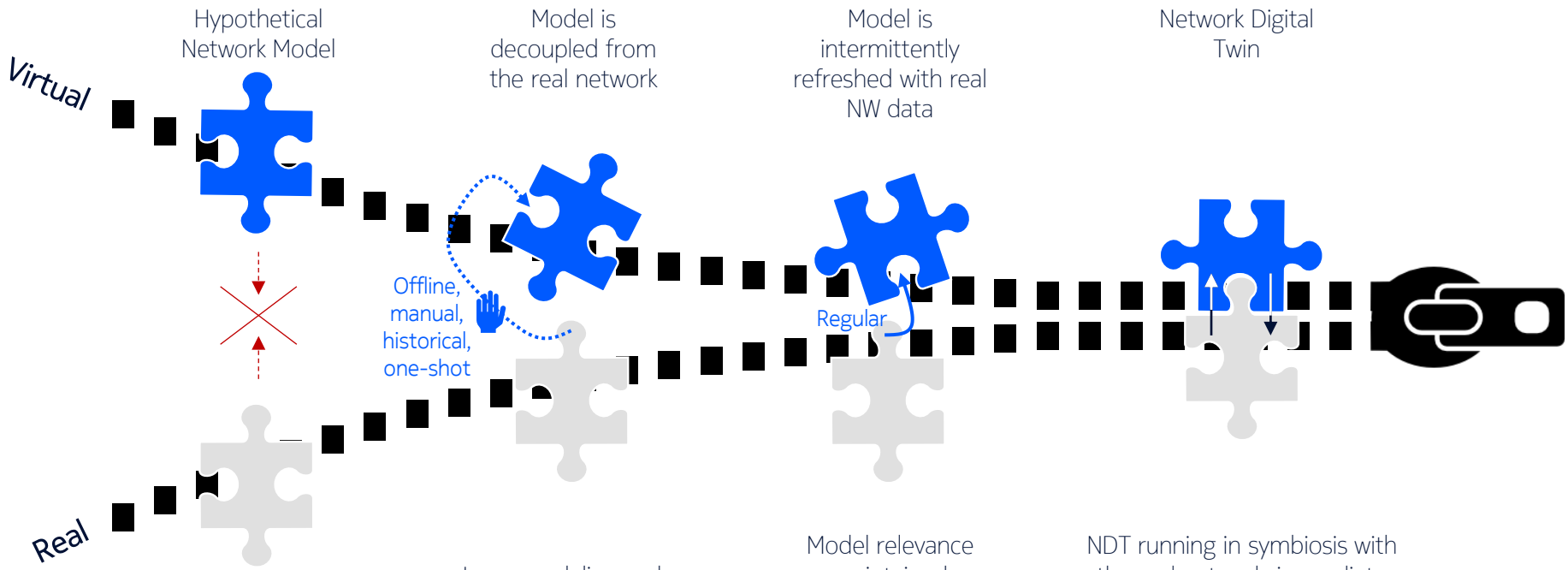


Relevant standards:

- ITU Y.3090: Digital twin network - Requirements and architecture
- IETF draft-irtf-nmrg-network-digital-twin-arch-08: Network Digital Twin: Concepts and Reference Architecture
- TMF IG1307: Digital Twin for Decision Intelligence
- ETSI ZSM 015 & ZSM 018: Network Digital Twin
- 3GPP TR 28.915: Study on management aspect of Network Digital Twin

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From modeling towards NDTs



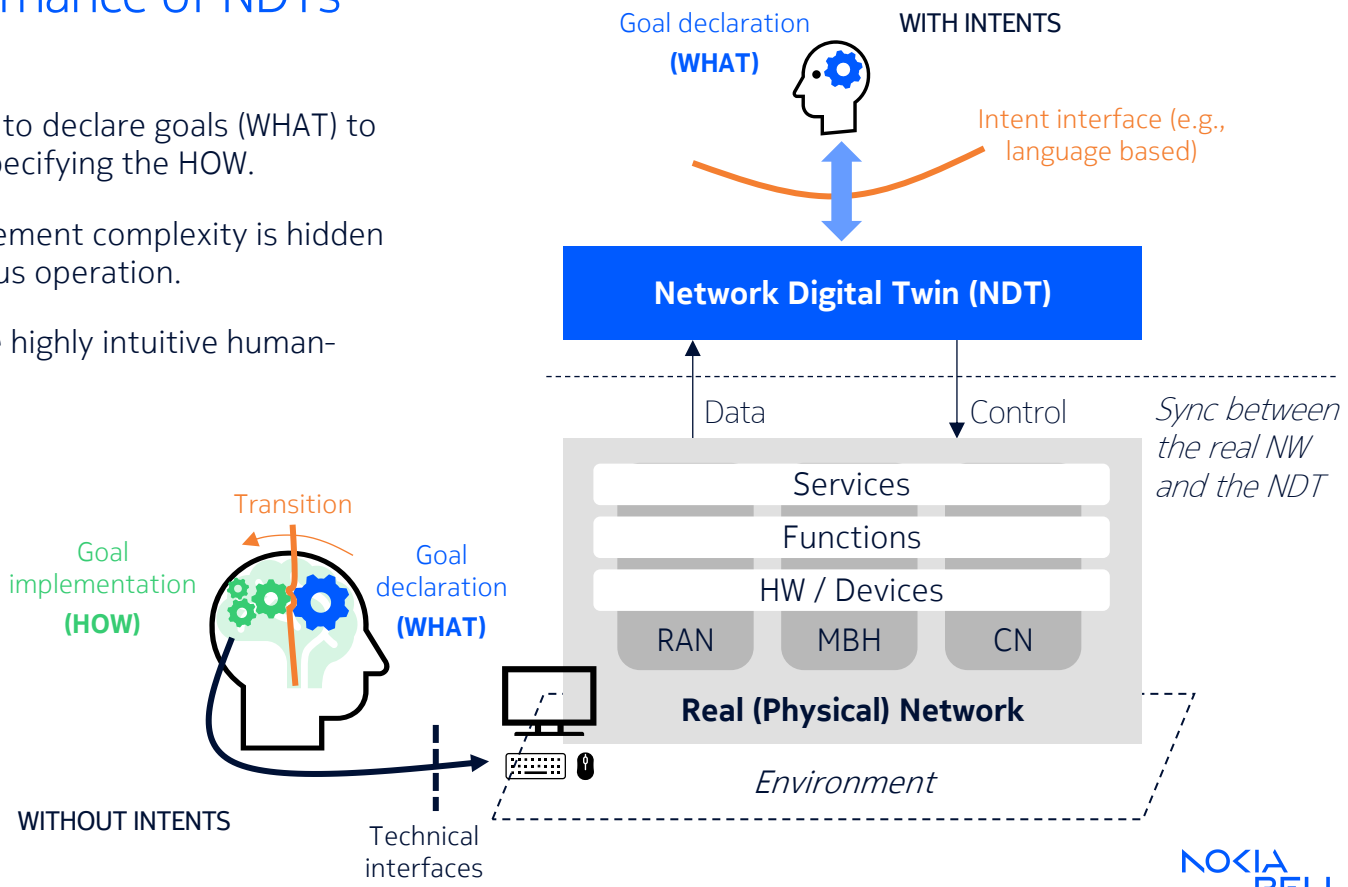
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Intent based governance of NDTs

Intents enable the operator to declare goals (WHAT) to the network/NDT without specifying the HOW.

Network and service management complexity is hidden by the network's autonomous operation.

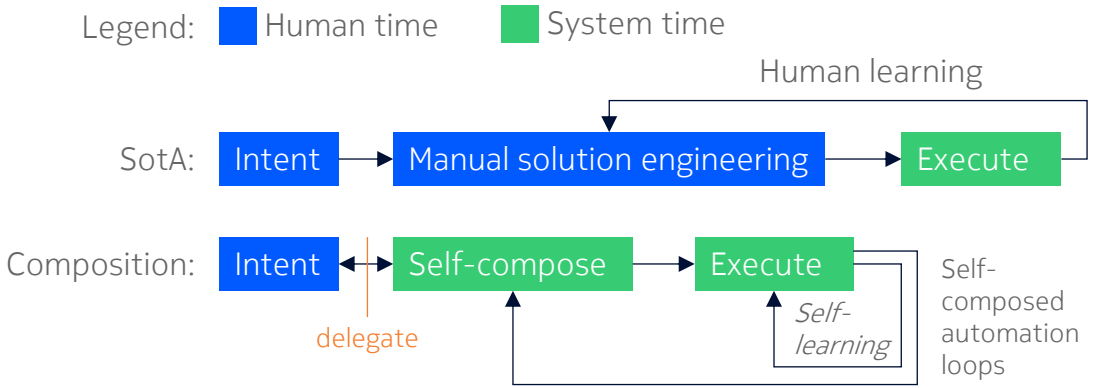
Natural language intents are highly intuitive human-machine interactions.



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Benefits of NDTs and autonomous composition

1. Provide adaptive and flexible automation by dynamically identifying, surfacing and exploiting the full extent of the network's capabilities (data, models, functionality).
2. Create the best (e.g., most optimal, available, deployable) composition that provide the outcome declared by the operator intent.



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