

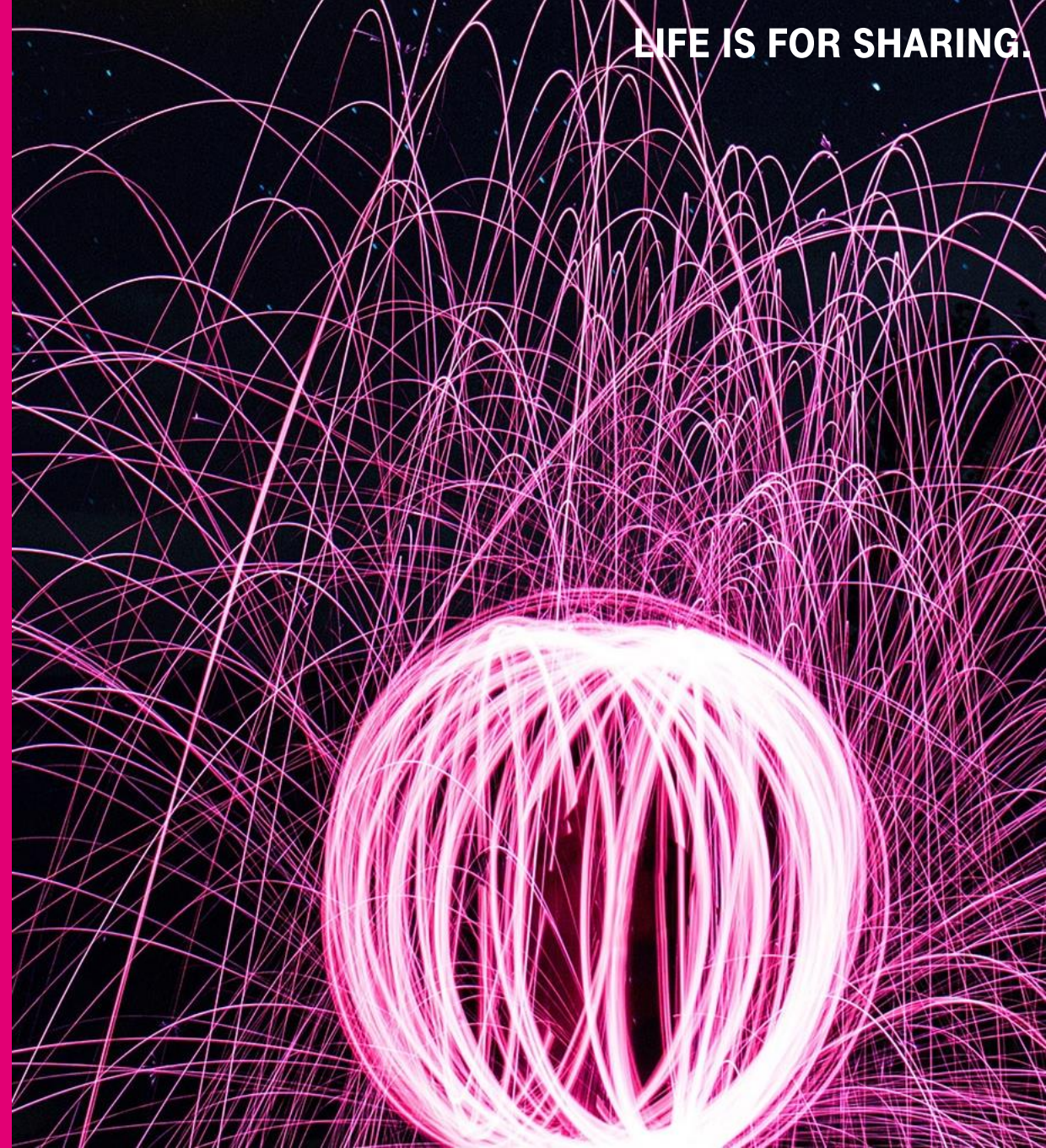
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5G CORE – A NOT FINISHED REVOLUTION

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OUTLINE

WHY 5GC - DRIVERS

BRIEF OVERVIEW OF DT'S CLOUD JOURNEY

HOW 5GC - CLOUD NATIVE EXPECTATIONS

SOME LESSONS LEARNED

STANDARDIZATION



WHY 5GC?

ARCHITECTURAL CHANGES

- Designed for the Cloud: Service Based Architecture, Auto-discovery of Network Components
- Network Slicing
- Edge Deployment
- Standardized Network Exposure, Analytics

PERFORMANCE

- Higher speed, lower latency
- Higher reliability, higher security
- Faster time to market

VERTICALS AND OPERATOR USE CASES

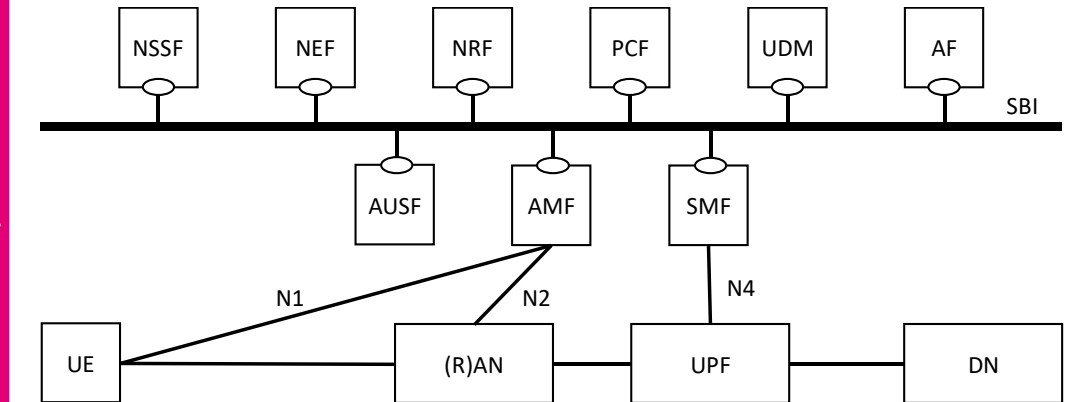
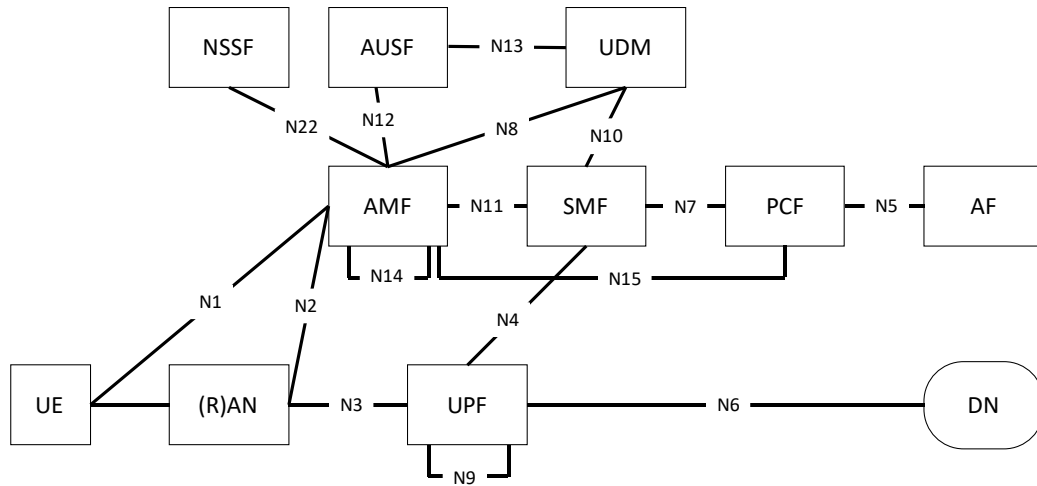
- Campus, private networks, industrial use, V2X, Drones
- Fixed Mobile Convergence (FMC)

SOME FEATURE DIFFERENCES

	EPC	5GC
SLICING SUPPORT	UE can connect to different EPC instance possible/APNs	Natively supported. UE can connect to multiple network slices
NON-PUBLIC NETWORK SUPPORT	Same as slicing support	Yes (Standalone or via slicing)
VERTICALS SUPPORT	–	TSN, 5G-LAN, low-latency QoS, MEC
USER PLANE TRAFFIC HANDLING	P-GW sticky for lifetime of user session (days)	UPF can be flexibly assigned/changed
INTER-NODE COMMUNICATION	Point-to-Point-based, sticky (SCTP)	API-based, Service Based Interface (HTTP/2)
DISCOVERY OF CORE COMPONENTS	No	Yes (NRF, NSSF)
STANDARDIZED CORE EXPOSURE	SCEF (Service Capability Exposure Function)	NEF (exposure), NWDAF (analytics)
IOT POWER SAVING (MICO MODE)	No Mobile-triggered transmission mode	Yes

5G CORE - A CHANGE IN THE MINDSET

FROM FUNCTIONAL THINKING TOWARDS SERVICE-BASED ARCHITECTURE AND CLOUD NATIVE THINKING



3GPP Release 15 core network architecture



WE STRONGLY BELIEVE
IN THE **BENEFITS** OF A
TRULY **CLOUDIFIED 5GC**

HOWEVER, WE **LEARNED**
AND **MODIFIED** OUR
APPROACH ON THE WAY



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CLOUD JOURNEY



**WHILE WE
ACHIEVED A LOT,
THE ROAD TO
CLOUDIFICATION
HAS BEEN
CHALLENGING**

Cloudification of heavy duty network functions in DE has started at scale

Cloudified NW access (mini cloudlets on bare metal) to 900 DE sites



2017



2018



2019



2020



2020+

DT telco cloud scales across the EU footprint

Automation works: complex deployments take minutes/hours instead of weeks/months

5G Core - Stand Alone Deployment: based on cloud principles (Service-Based Architecture, stateless services,...)



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CLOUD NATIVE: EXPECTATIONS






SOFTWAREIZATION



LEVERAGE OPEN SOURCE SW


CLOUD NATIVE ARCHITECTURE

CLOUD DEPLOYMENT



 Service Based Architecture	State & processing separation, statelessness
	 Network Data Layer
 μ -services, containerization	

 Vendor Software	 open source
---	--

	Cloud Platform
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COTS Hardware



LOWER BARRIER OF ENTRY	VENDOR FOCUS ON VALUE-ADD
------------------------	---------------------------



MORE COMPETITION
MORE PLAYERS
MORE INNOVATION



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CLLOUDIFICATION

Lower barrier of entry

Vendor focus on value-add

More competition

Richer vendor ecosystem

More innovation

Cloud Native Architecture



Advanced automation



Advanced tracing & monitoring

Highly-automated operation

**FASTER EVOLUTION
REDUCE TTM**

LOWER CAPEX

**FLEXIBLE
DEPLOYMENTS**

LOWER OPEX

**ADDRESS NEW VERTICAL
BUSINESS AND CURRENT
BUSINESS TO
ENABLE NEW REVENUE
STREAMS**

CAMPUS

PRIVATE NETWORKS

...

INDUSTRIAL USE

V2X

DRONES

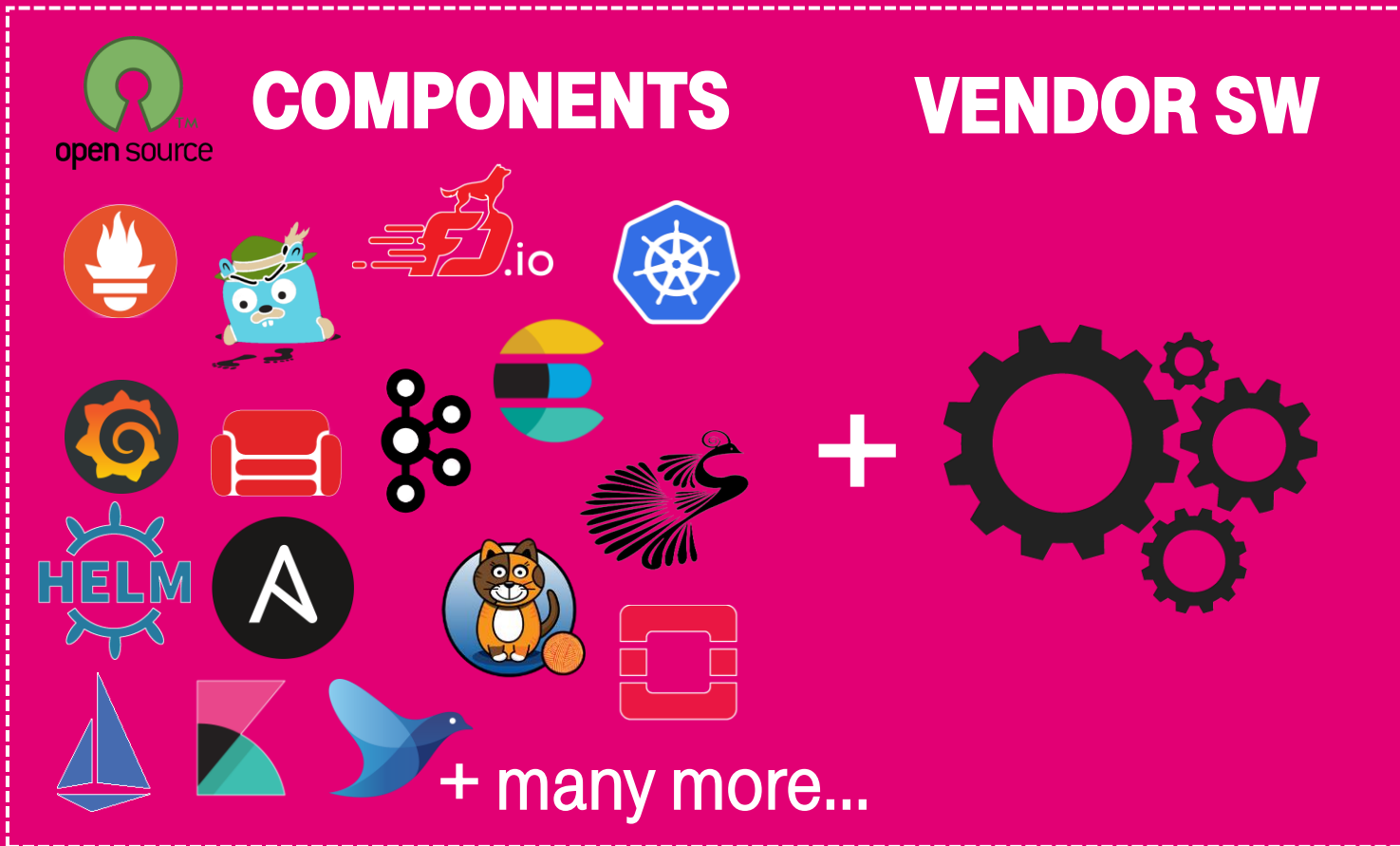
FMC

5GC



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5GC LANDSCAPE: SAME INGREDIENTS DO NOT GUARANTEE SAME RESULTS



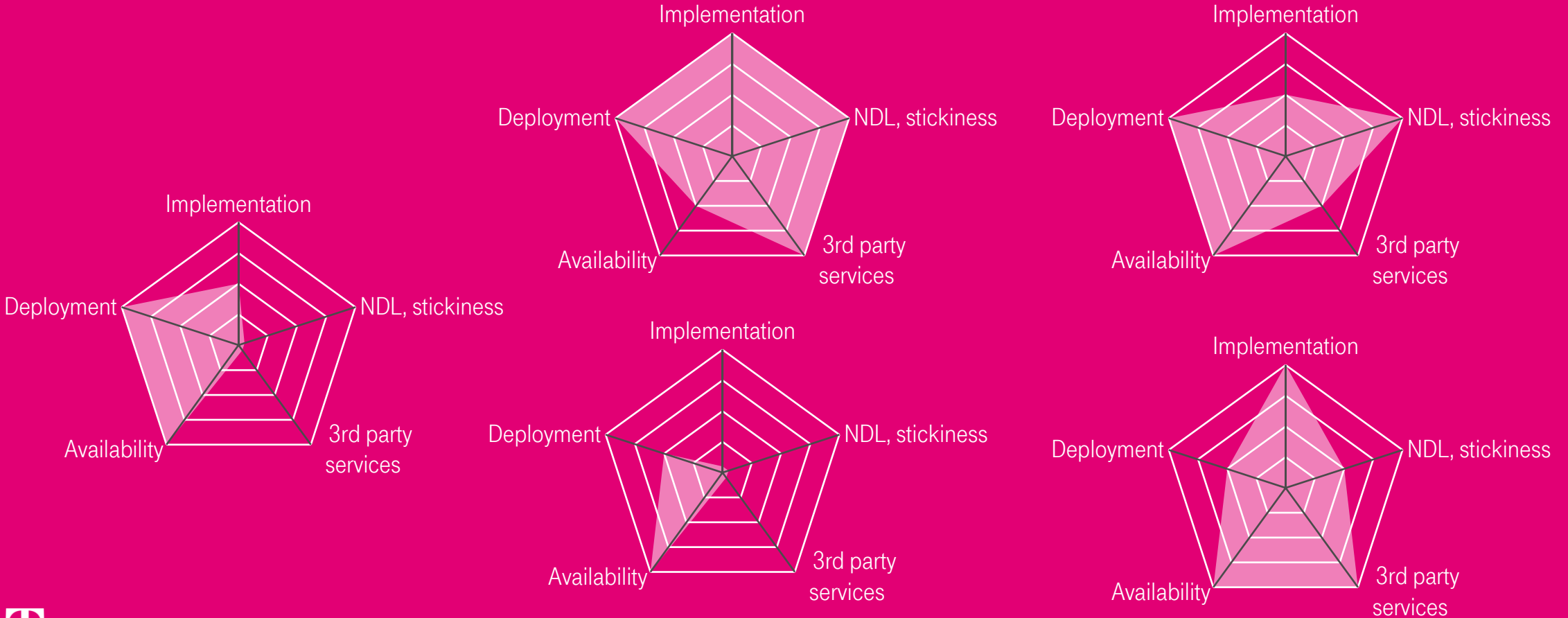
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5GC IMPLEMENTATIONS: SIMILAR INGREDIENTS, DIFFERENT RESULTS

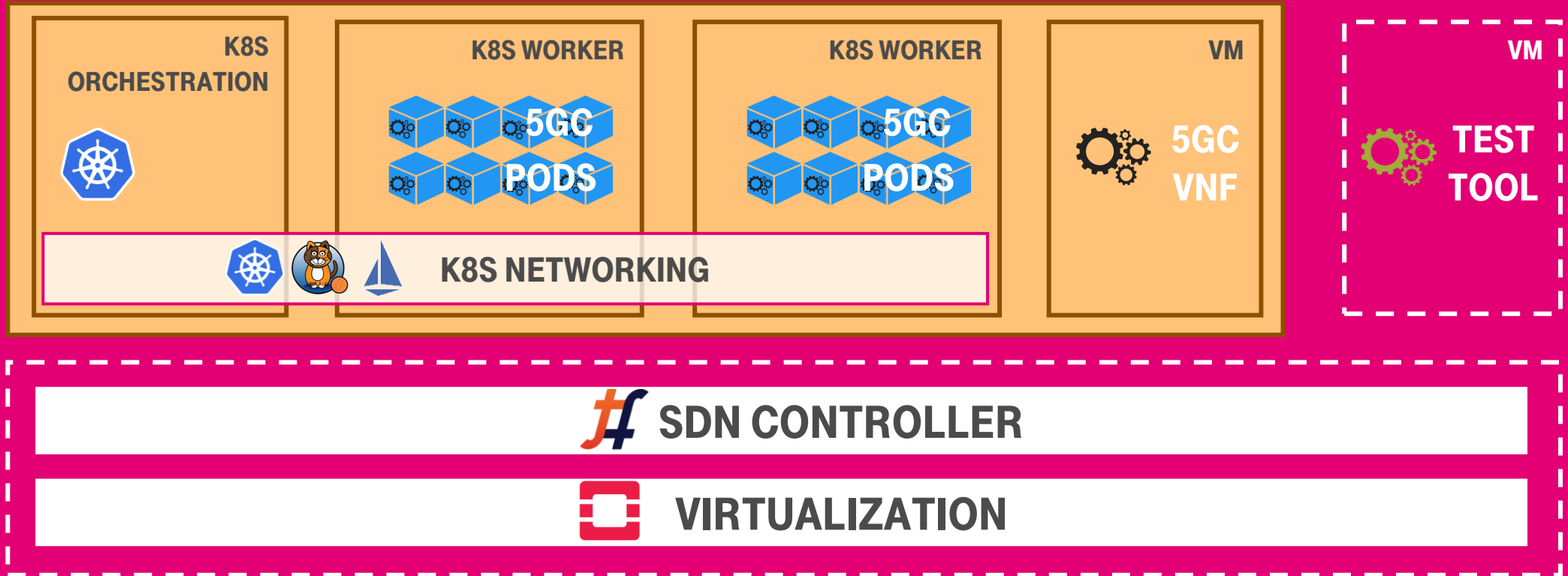


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NDL: Network Data Layer (<https://www.ngmn.org/publications/a-network-data-layer-concept-for-the-telco-industry.html>)

DT'S TRIAL SETUP.

VENDOR APPLICATIONS



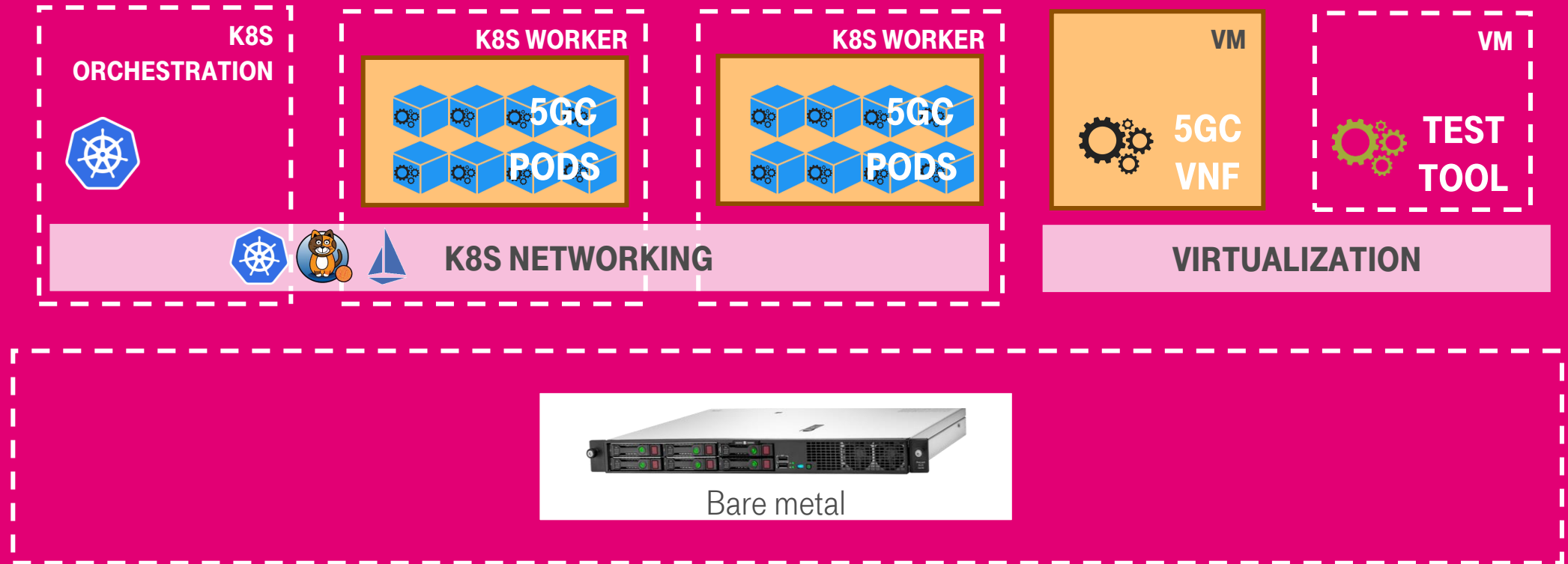
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CLOUD PLATFORM

TARGETED TELCO SETUP

VENDOR APPLICATIONS



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■ ■ **CLOUD PLATFORM**

KEY LEARNINGS ...



**CROSS LAYER
DEPLOYMENT**



**AUTOMATION IS KEY
RIGHT FROM THE START.**

MAJOR CHALLENGES



**INTEGRATION ON
OPERATOR
CLOUD**



**IMPLEMENTATION
MATURITY**



**END-TO-END
MONITORING**



**CROSS-LAYER
NETWORKING**



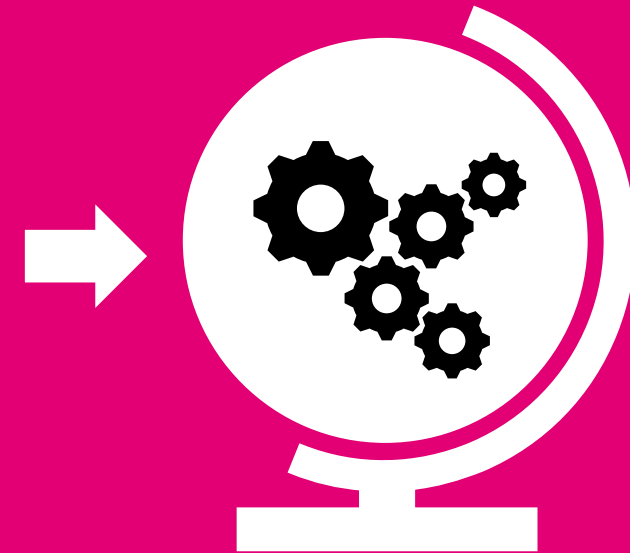
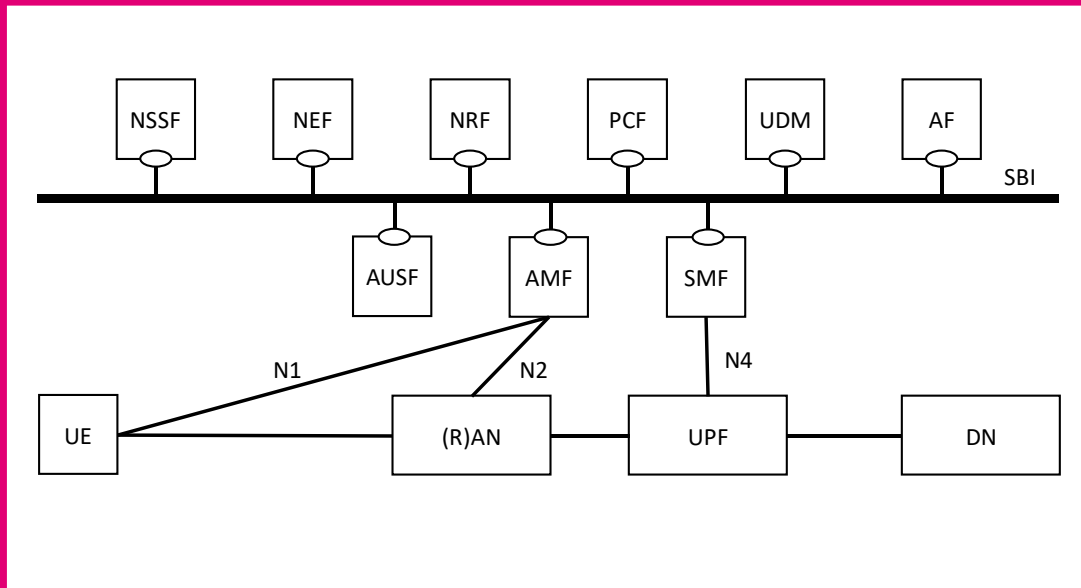
**... AND MORE
TO COME.**



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STANDARDIZATION IS IMPORTANT!

WITH 5G, WE HAVE A GLOBAL STANDARD



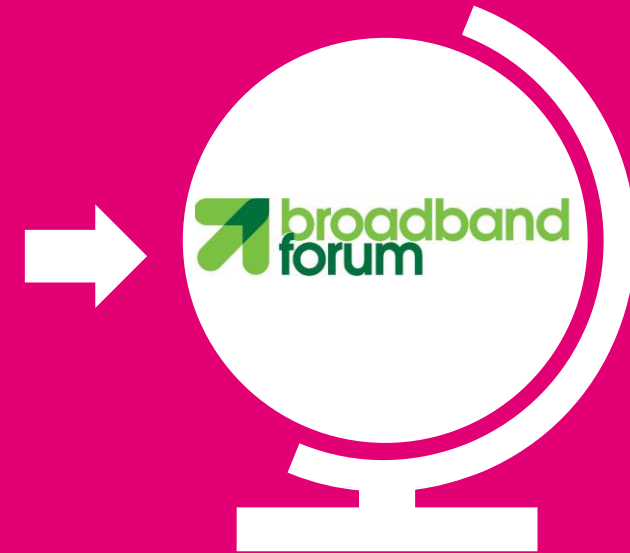
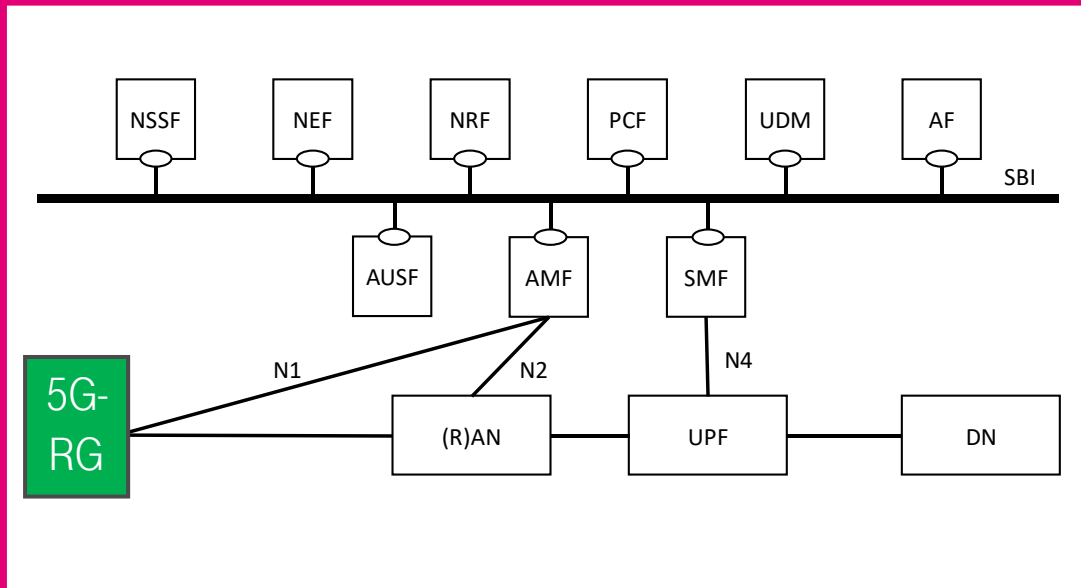
KEY FUNCTIONALITIES SHOULD BE STANDARDIZED



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GLOBAL STANDARD

5G CORE BECOMES THE CORE FOR FIXED NETWORKS

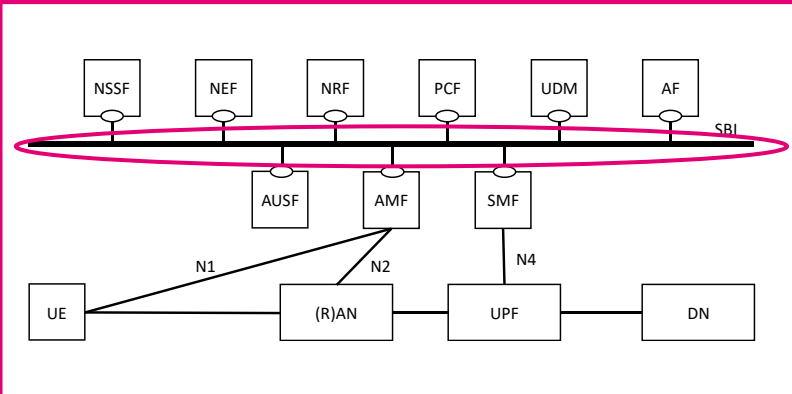


5G RESIDENTIAL GATEWAY (5G-RG) BEHAVES LIKE A UE



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NETWORK FUNCTION COMMUNICATION



COMMUNICATION BETWEEN THE NETWORK FUNCTIONS (NFs) ENSURED THROUGH THE SERVICE-BASED INTERFACE (SBI)

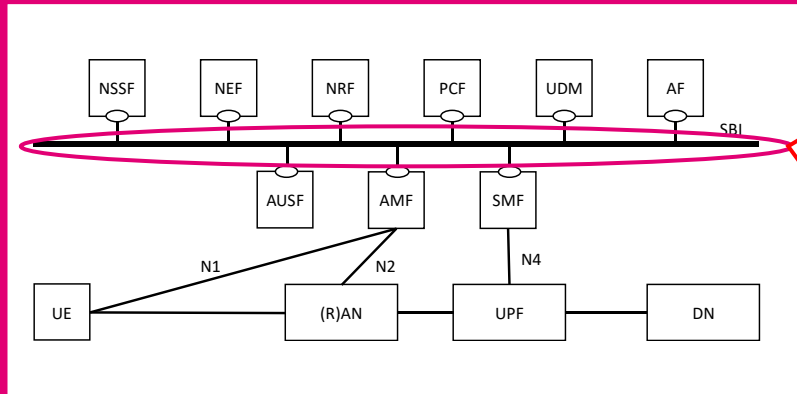
QUESTION: HOW SHOULD IT LOOK LIKE?

QUESTION: SHOULD IT BE A 3GPP INVENTION?

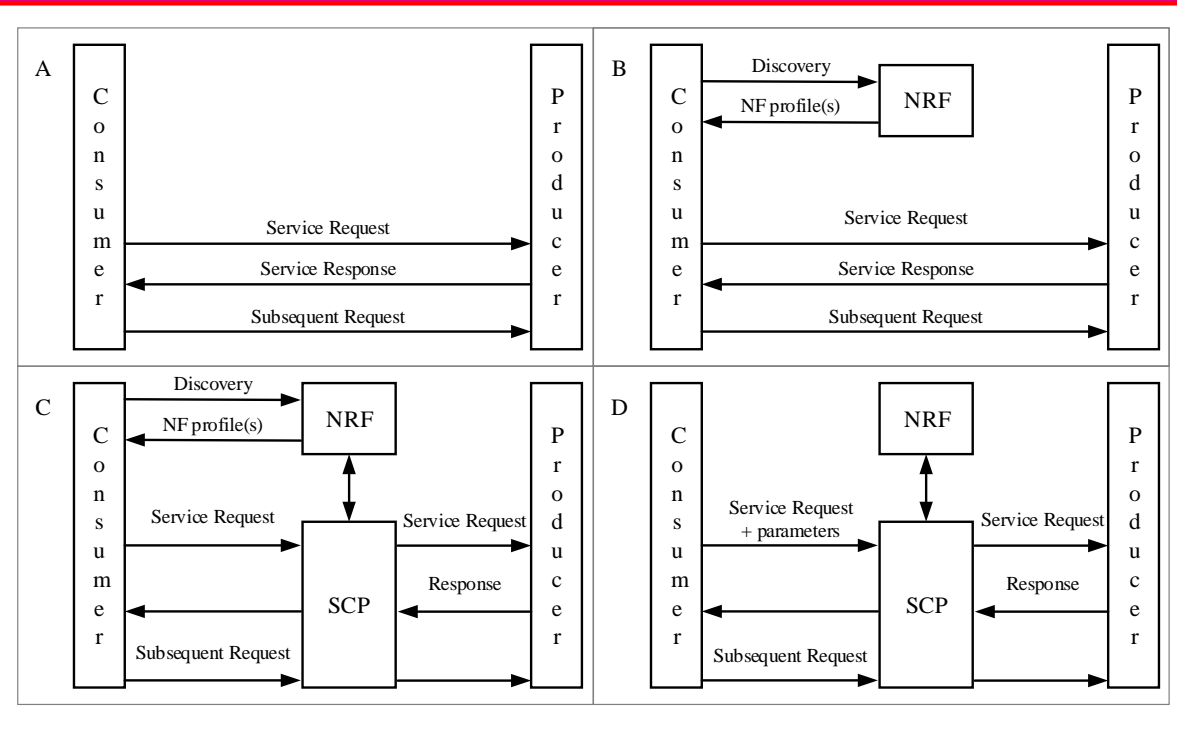
QUESTION: CAN WE USE SOMETHING EXISTING?



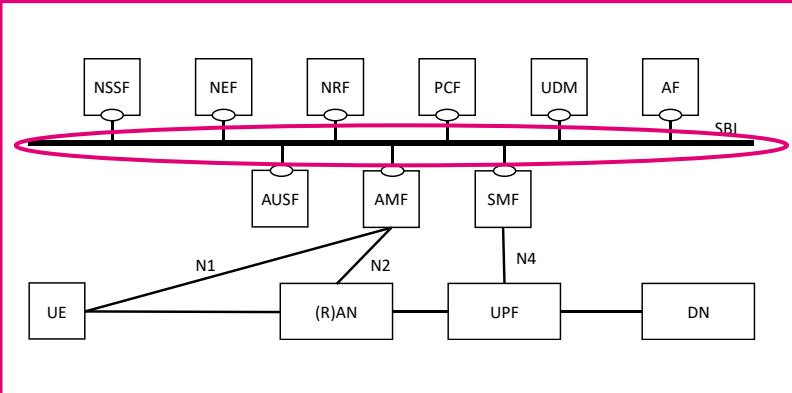
SERVICE COMMUNICATION PROXY



3GPP HAS DEFINED THE SERVICE COMMUNICATION PROXY (SCP) IN RELEASE 16



BUT THERE IS NO NEED FOR IT!



**5G CORE IS A
SERVICE-BASED ARCHITECTURE/CLOUD NATIVE
APPLICATION ON TOP OF A CONTAINER SYSTEM.**

**KUBERNETES IS WIDELY USED WITH ISTIO AS A
SUPPORT FUNCTION.**



**NOT EVERYTHING HAS TO BE STANDARDIZED!
LIST OF REQUIREMENTS IS SUFFICIENT!**



Q & A

T...

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