

The Ecosystem of Network Testing

A Modern QoS/QoE Approach

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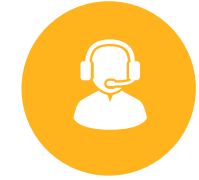
Johannesburg, 24/7/2017

InfoVista at a Glance

InfoVista provides cost-effective network performance orchestration solutions that help our customers provide top-quality user experience while increasing the capital efficiency of their network infrastructure.



Founded in 1995, Worldwide HQ in Paris, France.



Worldwide Customer support



Regional presence
24 local offices



R&D centers
France, Canada, Malaysia, Sweden, UK, USA



Over 1,500 customers
In more than 180 countries



Acquisitions
Mentum, 2012 | Aexio, 2013 | Ipanema, 2015
| TEMS, 2016



Orchestrating the Network Performance

The Evolving Story of Networks

Advancing Generations

- 2G, 3G, 4G, 5G and beyond
- Several implicit features (IRAT, CSFB, CA, ...etc)

Changing End User Use Cases

- Voice, Data, Browsing, Streaming, New TV, OTTs

Large Network Footprint

- Main cities, small cities and remote areas
- Indoor coverage
- Roaming Support

Big Data Analytics

- Large volume of collected logs/information
- What does it all mean?

Competition

- Benchmarking results to guarantee acceptable performance

Device Performance

- Different device models behave differently and can impact the end user perception

Orchestrating the Network Performance – What is Needed?

Cost Effective
Network Design
and Rollout

Network
Management

Feature
Integration and
Optimization

Testing,
Monitoring,
Benchmarking
and Scoring

Subscriber
Analytics

GeoAnalysis

Orchestrating the Network Performance – InfoVista Portfolio

VistaNeo	Planet	Ellipse	Xeus	Xeda	TEMS
<ul style="list-style-type: none">• Mobile Network Experience Optimization (NEO)	<ul style="list-style-type: none">• Mobile Network Planning and Optimization Solutions	<ul style="list-style-type: none">• Microwave link Planning and Transport Network Optimization Solution	<ul style="list-style-type: none">• Customer Centric Mobile Network Troubleshooting	<ul style="list-style-type: none">• Multi Vendor Ran Configuration and Audit Solution	<ul style="list-style-type: none">• Testing, Analyzing, Benchmarking, and Monitoring Mobile Network Performance

End to End Network Performance Orchestration




TEMS

TEMS™ Portfolio, a complete set of trusted solutions for drive testing, analyzing, benchmarking, and monitoring mobile network performance for over 20 years


TEMS - Solutions

Testing Solutions

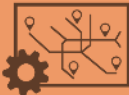
TEMS™ Investigation




TEMS™ Pocket




TEMS™ Automatic



TEMS™ Monitor Master




TEMS™ Monitor Master IMS



Remote Management Solution

TEMS™ FleetManager




Analysis & Planning Solutions

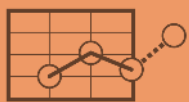
TEMS™ Discovery



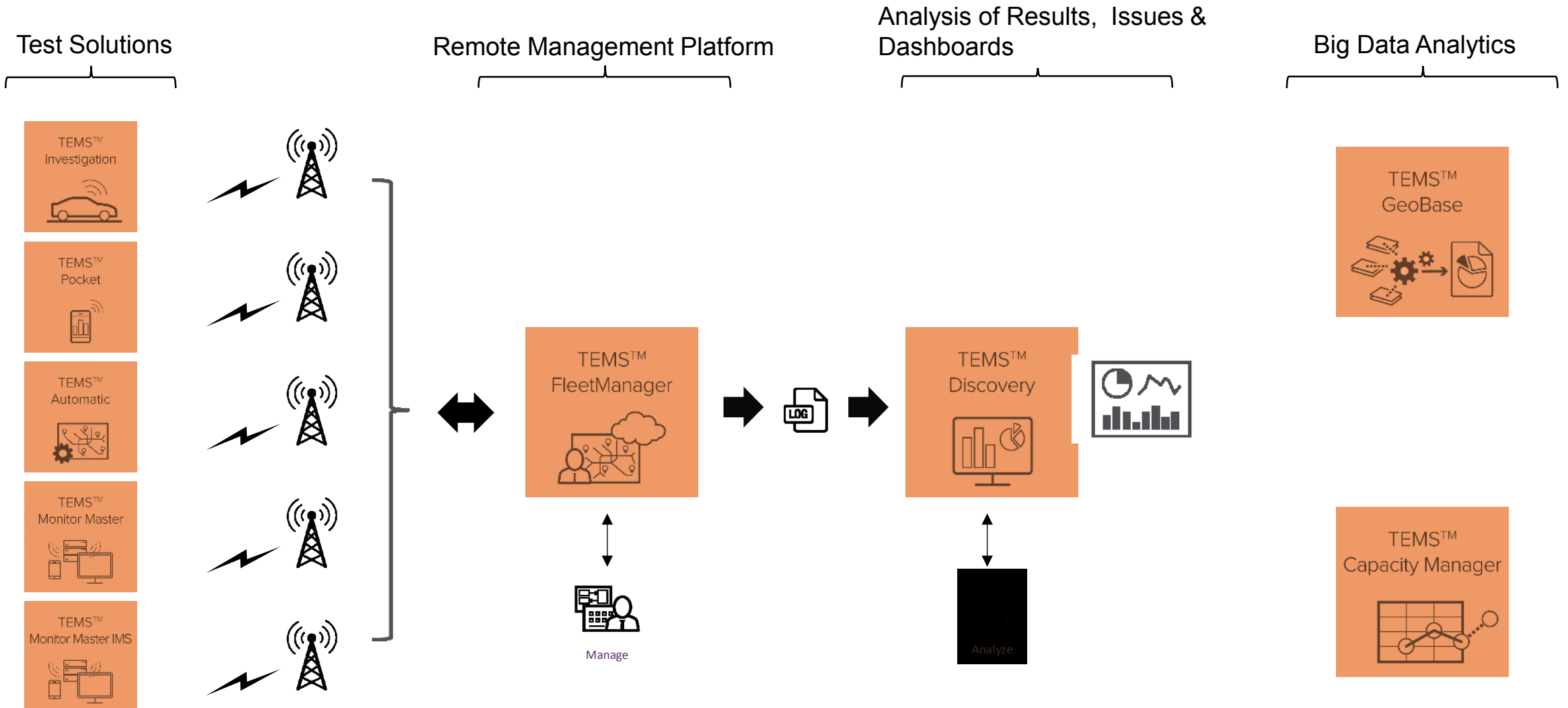
TEMS™ GeoBase



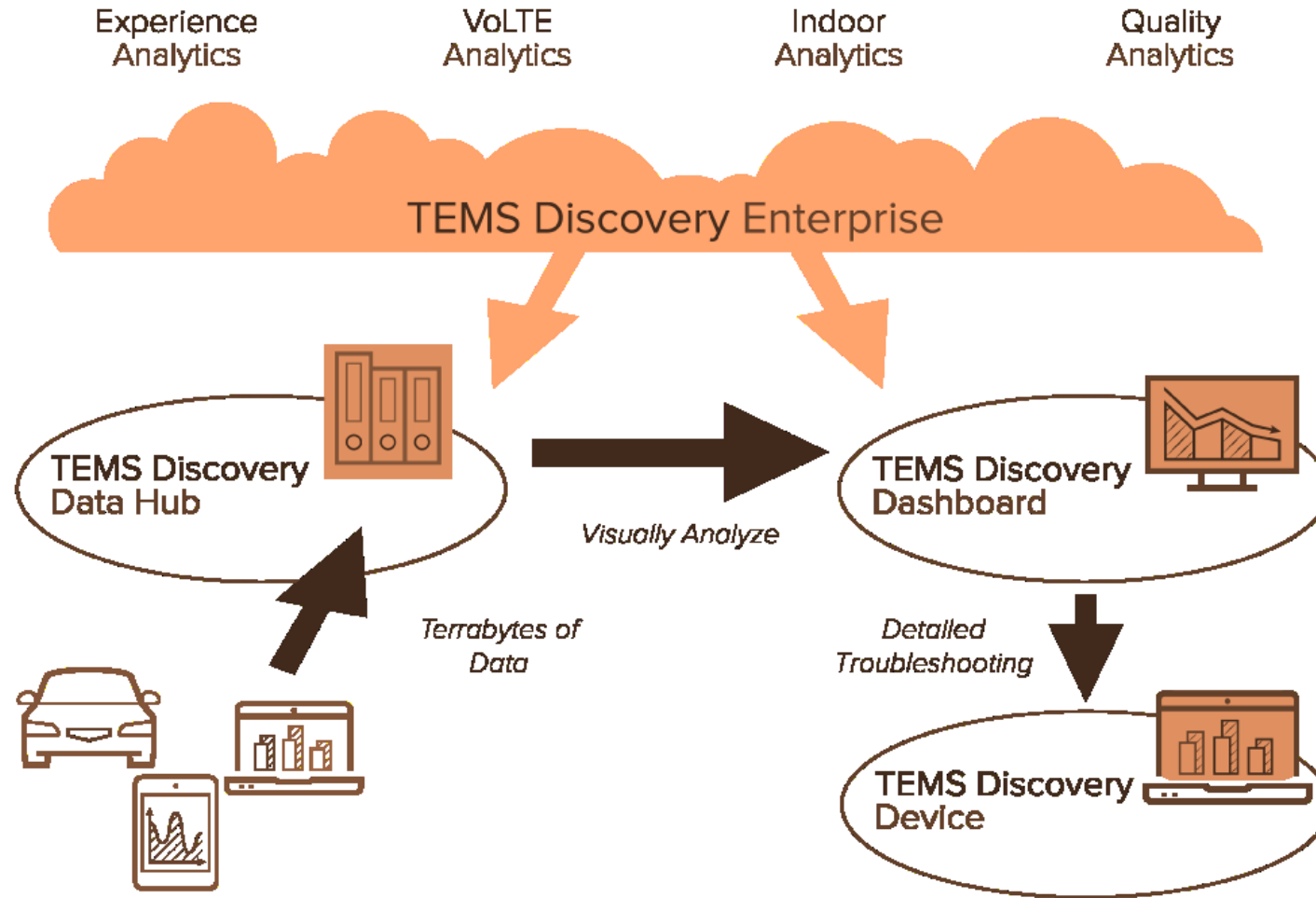
TEMS™ Capacity Manager



TEMS – The Ecosystem in Action



TEMS – TEMS Discovery a Top Down Approach



TEMS – The Benefits of the Ecosystem

Support Several Generations

- TEMS sources out latest devices in the market that supports latest technologies from leading OEM and Chipset Vendors.
- Upgrade is easily done

Flexibility by Changing End User Use Cases

- New use cases are added to the system
- Fleet manager can push new test cases to the testing solutions

Ability to Cover Large Network Footprint - Remotely

- Managing a large fleet from one console, the Fleet Manager
- Ability to deploy small or large testing solutions in any location

Support Big Data Analytics

- Top down approach to visualizing the network health
- Allows for more detailed log analysis

Evaluate Competition

- Ability to test multiple operators at the same time
- How to rank them, more on the upcoming slides



KPIs, QoS & QoE

KPIs, QoS & QoE

KPIs

- Selected indicators that give a high level quantification of performance for different services

QoS

- Totality of characteristics of a telecommunications service that bear on its ability to satisfy stated and implied needs of the user of the service (ETSI TS 102 250-1)

QoE

- Overall acceptability of an application or service, as perceived subjectively by the end-user (ETSI TR 102 643)

KPIs, QoS & QoE

KPIs, QoS and QoE for different services are defined in ITU and ETSI documentation

Internal and Comparative benchmarking need to consider all the KPIs/QoS/QoE for all services to assess either new feature implementation or external competition

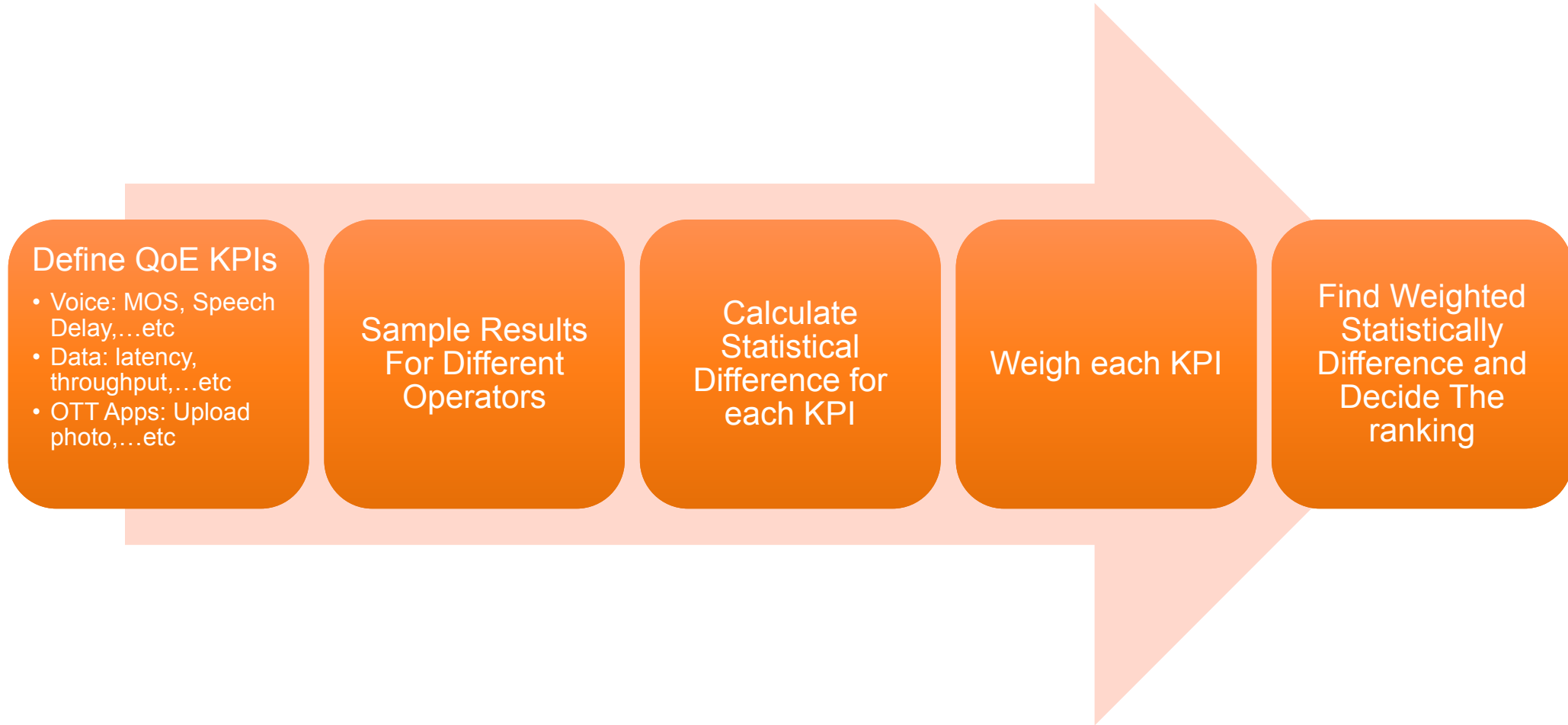
How Qualify and Quantify performance differences from a user perspective?

OTTs – Sample KPIs

	Facebook Logon and Logoff Success Ratio (%) and Duration Facebook Operation Success Ratio (%) and Duration: (Load Feeds, Upload Photo, Upload Status, Load Friends List)
	Instagram Logon and Logoff Success Ratio (%) and Duration Instagram Operation Success Ratio (%) and Duration: (Load Feeds, Search b Hashtags)
	Twitter Logon and Logoff Success Ratio (%) and Duration Twitter Operation Success Ratio (%): (Load Feeds, Twitter Posts)
	Streaming Throughput, Streaming Completion Rate, Streaming Setup Success Rate, Streaming Video Play Start Success Ratio, Streaming Video Session Success Ratio, Streaming Service Access Time, Streaming Session Video Interruption Duration, Streaming Video Play Start Time, Streaming Video Session Time
	Average audio MOS for VoIP

- Several KPIs for each service.
- All have same importance?
- Which one affects end user more than the rest?
- **How to qualify and quantify performance differences from a user perspective?**

Statistical Approach



Sample Voice KPIs and its Weight

KPI	Weight
Call Retention Rate	30%
Call Setup Success Rate	20%
Average MOS	35%
Average Mouth to Ear Delay	15%



- This could be market dependent

Sample Output of Statistical Approach - Voice

	Network 1				Network 2				Weight
	KPI	std	N	StatDiff	KPI	std	N	StatDiff	
Call Retention Rate	0.95	0.218	87	0.046	0.97	0.170587	69	0	30%
Call Setup Success Rate	0.93	0.255	87	0	0.91	0.286182	69	0.2343	30%
Voice Quality (MOS)	3.89	0.5	2600	0	3.56	0.7	2070	17.154	30%
Mouth to Ear Delay	105	5	435	42.67	70	15	350	0	5%
Voice Call Setup Time	1200	300	87	0	1800	275	69	12.31	5%
StatScore	2.1473				5.8319				
Rank	1				2				

Results are based on statistically significant results.

In principle, a statistically significant result (usually a difference) is a result that's not attributed to chance.



Summary

Putting it all Together

- Orchestrating the network performance is an ongoing effort with a lot changing variables
- We have to evolve our network testing methodologies to meet these challenges
 - InfoVista is at the heart of it all



Thank you!

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