Audit Report

Lesotho, 2022

umlaut
Part of **Accenture**
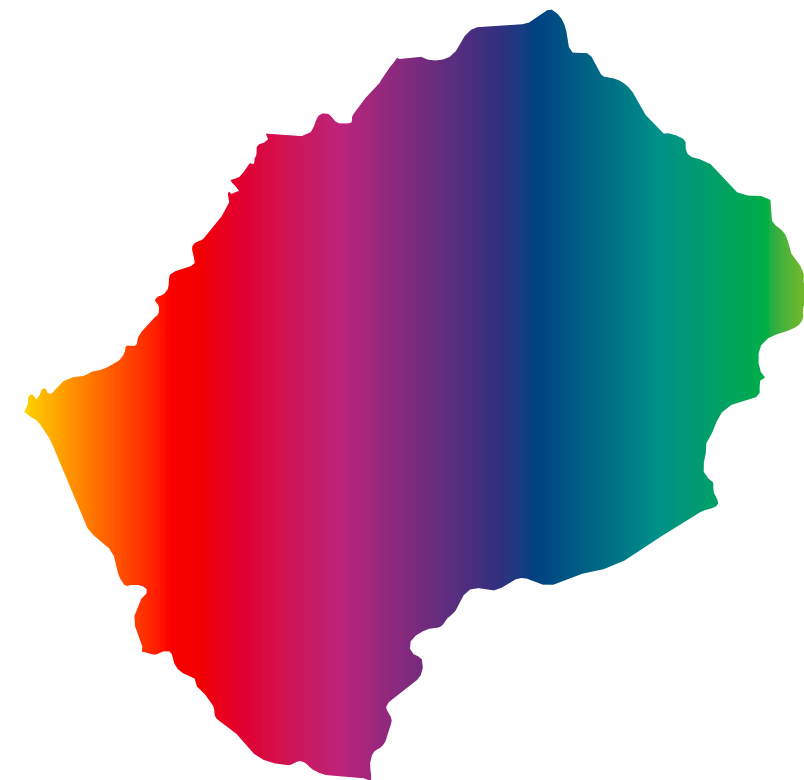
Foreword

umlaut has tested the quality of the Mobile Networks in Lesotho and took a detailed look into the performance of each operator.
The company is headquartered in Aachen, Germany and is a world leader in mobile network testing and benchmarking.

Measurement Overview

Measurement setup

The leader in mobile benchmarking, umlaut, has analyzed the mobile networks in Lesotho with regards to mobile network performance.
We measured smartphone voice and data performance based on extensive drive tests.

This report has been commissioned by Vodacom, using our methodology. umlaut conducted its benchmarking exercises in Lesotho with predefined routes provided by Vodacom Lesotho.

The audit was done as a performance benchmark per-formed by umlaut between 28.04.2022 and 02.05.2022 in cities and towns as well as on connection roads.

Dedicated measurements have been executed as drive tests outdoors using a Samsung Galaxy S20 Ultra device. All data measurements have been performed in 4G preferred mode. Voice measurements have been done in 4G/4G preferred mode on both sides, while call origin has been alternated.
In addition crowdsourced performance data has been collected and evaluated between CW51 2021 and CW22 2022.
The following pages provide a comparative overview about the performance results observed for the different tested service types.
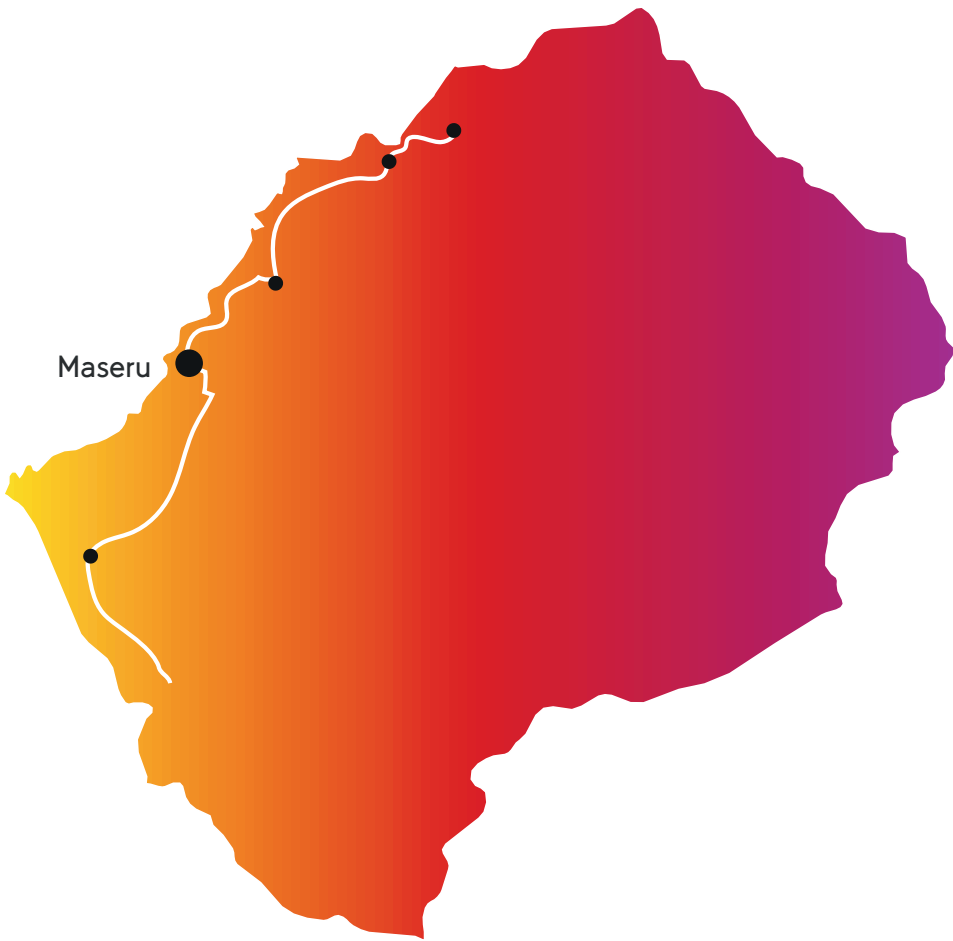
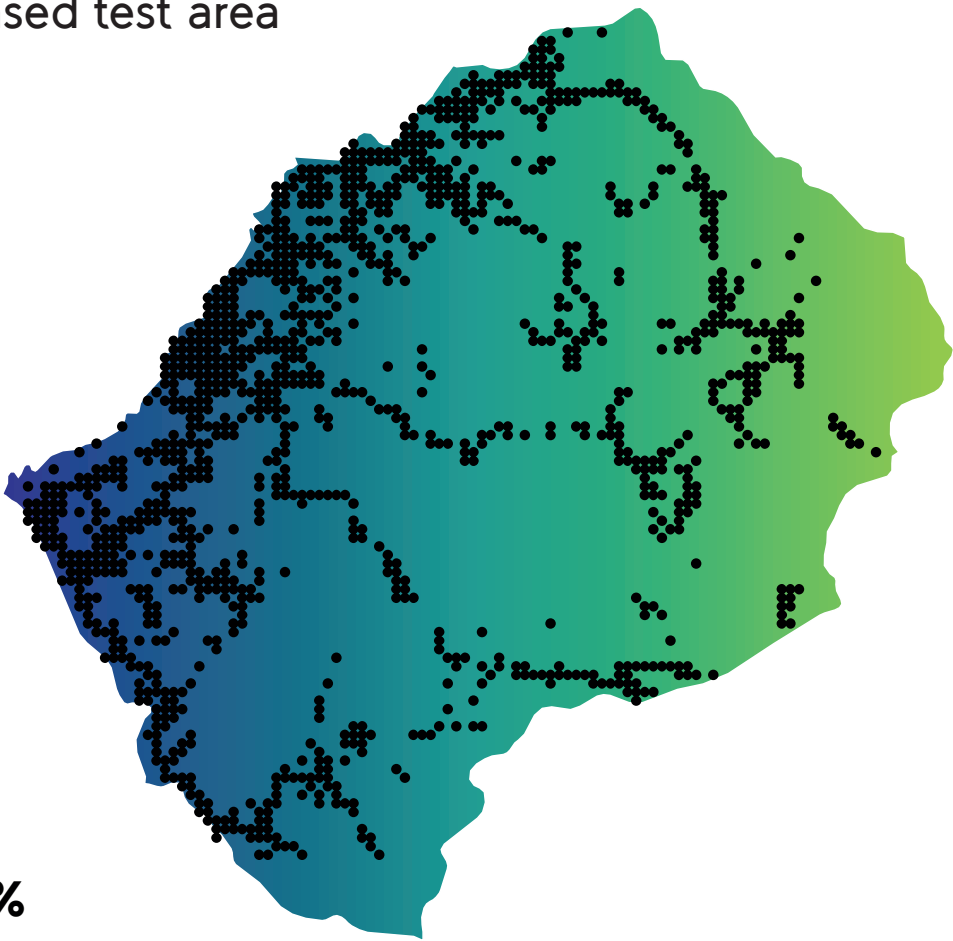| Drivetest	Voice	Data
Device	Samsung Galaxy S20 Ultra	Samsung Galaxy S20 Ultra
Test Cases	Mobile–to–Mobile (M2M) Side1 (4G preferred) to Side2 (4G preferred) 105 sec call window 70 sec call duration 15 sec call setup timeout Multi–RAB traffic injection on both sides	Data 4G preferred HTTP DL datastream 7s HTTP UL datastream 7s HTTP 10MB DL fixed file transfer HTTP 5MB UL fixed file transfer Web Browsing – Kepler ETSI Ref. Page 10 Live web pages 1 YouTube HD video ~ 45s 1YouTube 4k video ~45s 1 YouTube live stream ~ 45s
Mobility and Route Types	Drive test 100% 1 City, 5 Towns and on Roads	
Samples	~ 1,303 per Operator	~ 12,639 per Operator
Dates	5 measurement days 28.04.2022 – 02.05.2022	
Crowd Data Assessment	24 weeks CW 51 2021 – CW 22 2022	

Testıng area

Drive route

Maseru

Crowdsourcing based test area

77.4 %
of the 'build–up area' covered

76.3 %
of the 'Population area' covered

5,847 km²
size of tested area

550 km
measuring distance

Score and breakdown

Vodacom achieved the highest overall score among competitors with 509 dots out of 1000.

**Total Score
1000 Dots**

⊛ **Crowd**
max. 250

📊 **Data**
max. 450

🎤 **Voice**
max. 300

Operator

509

156

268

85

Vodacom

439

182

182

75

Operator 2

→ Shown total scores are rounded.
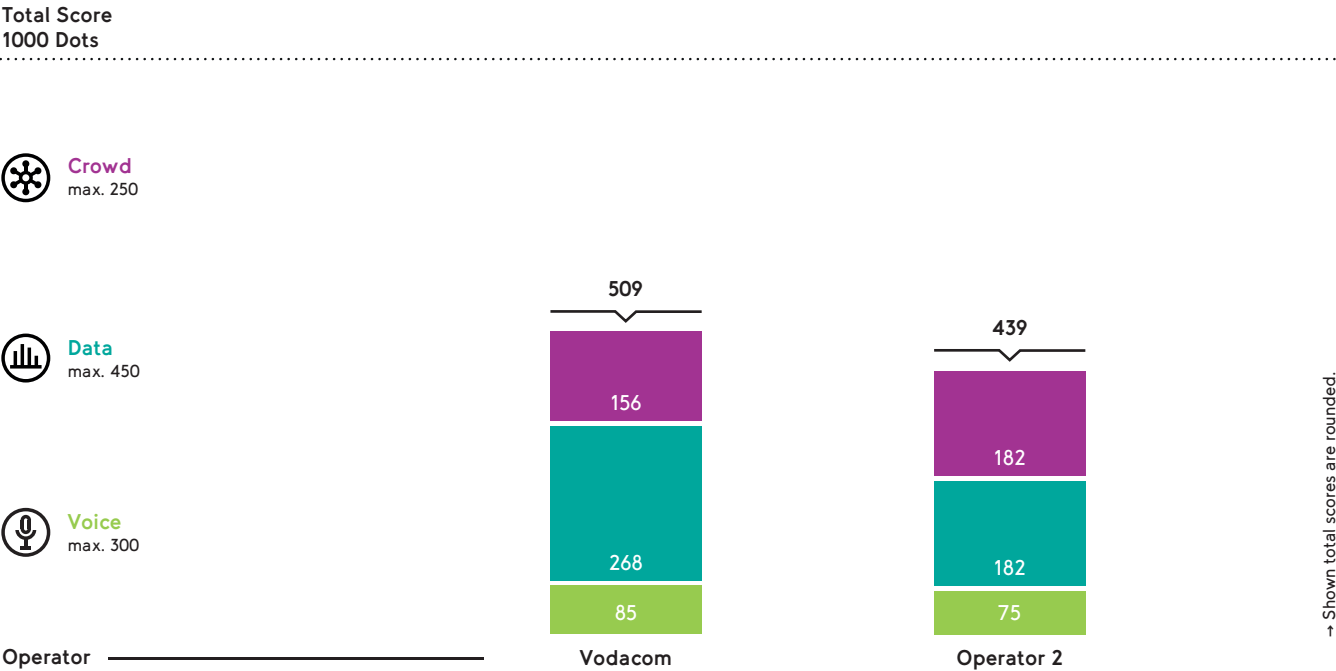
Overall score considering Voice, Data and Crowdsourcing.

Total score

		Vodacom	Operator 2
Voice	max. 300	85	75
Cities Drivetest	180	26%	12%
Towns Drivetest	60	27%	54%
Roads Drivetest	60	38%	34%
Data	max. 450	268	182
Cities Drivetest	270	53%	46%
Towns Drivetest	90	72%	31%
Roads Drivetest	90	65%	34%
Crowdsourced Quality	max. 250	156,1	181,5
Broadband Coverage	125	72%	85%
Download Speed	75	44%	39%
Latency	50	67%	92%
Total	1000	509	439

Shown scores are rounded.

Achieved percentage of the maximum score in each of the different data services.

Data	Service Group	max	Vodacom	Operator 2
Cities	Web Browsing	67,5	26%	7%
	File Download	67,5	56%	66%
	File Upload	67,5	83%	70%
	YouTube	67,5	49%	40%
Towns	Web Browsing	22,5	57%	8%
	File Download	22,5	78%	40%
	File Upload	22,5	82%	40%
	YouTube	22,5	71%	37%
Roads	Web Browsing	22,5	55%	8%
	File Download	22,5	73%	44%
	File Upload	22,5	73%	51%
	YouTube	22,5	59%	32%

Achieved percentage of the maximum score in each of the different crowdsourcing services.

Crowd	Service Group	max	Vodacom	Operator 2
Crowdsourced Quality	Broadband Coverage	125	72%	85%
	DL Speed	75	44%	39%
	Latency	50	67%	92%

Voice KPI overview

Achieved values of all networks under test in each of the relevant Voice Key Performance Indicators (KPIs) for the geographical categories "Cities", "Towns" and "Roads".

Voice	Service Group	Unit	Vodacom	Operator 2
Cities	Qualifier	[%]	94,4	91,3
	Call Setup Time (P90)	[s]	10,0	8,4
	Speech Quality (P10)	[MOS–LQO]	2,1	2,4
	Multirab connectivity	[%]	11,9	90,5
Towns	Qualifier	[%]	94,5	98,3
	Call Setup Time (P90)	[s]	9,5	7,0
	Speech Quality (P10)	[MOS–LQO]	2,3	2,2
	Multirab connectivity	[%]	65,7	100,0
Roads	Qualifier	[%]	93,8	91,5
	Call Setup Time (P90)	[s]	8,6	7,8
	Speech Quality (P10)	[MOS–LQO]	2,2	1,9
	Multirab connectivity	[%]	29,9	95,5

Data Services KPI overview

Achieved values of all networks under test in each of the relevant Data Key Performance Indicators (KPIs) for the geographical category "Cities".

Data Cities	KPI Name	Unit	Vodacom	Operator 2
HTTP Web Page DL Smart-phone	Qualifier	[%]	92,7	71,7
	Overall Session Time	[s]	3,4	8,4
HTTP 10MB DL Smartphone	Qualifier	[%]	96,8	99,0
	Overall Session Time	[s]	6,3	11,2
	90% faster than	[Mbit/s]	7,3	7,1
	10% faster than	[Mbit/s]	48,8	51,9
HTTP 5MB UL Smartphone	Qualifier	[%]	98,9	98,0
	Average Session Time	[s]	2,6	9,1
	90% faster than	[Mbit/s]	12,0	5,9
	10% faster than	[Mbit/s]	36,7	19,9
HTTP DL FDTT	Qualifier	[%]	97,9	100,0
	10% faster than	[Mbit/s]	58,2	43,8
	faster than 5 Mbit/s	[%]	92,6	91,1
	faster than 20 Mbit/s	[%]	64,2	42,6
HTTP UL FDTT	Qualifier	[%]	99,0	100,0
	10% faster than	[Mbit/s]	48,6	35,5
	faster than 2 Mbit/s	[%]	97,9	96,9
	faster than 5 Mbit/s	[%]	95,9	87,8
YouTube	Qualifier	[%]	92,3	85,1
	Start Time	[s]	4,8	4,9
	AVG Resolution	[p]	904,3	860,7
YouTube Live Smartphone	Qualifier	[%]	94,0	6,1
	Start Time	[s]	6,6	7,0
	AVG Resolution	[p]	1080,0	1080,0
YouTube 4K Smartphone	Qualifier	[%]	89,6	98,0
	Start Time	[s]	4,9	6,6
	AVG Resolution	[p]	1300,5	785,4

Data Services KPI Overview

Achieved values of all networks under test in each of the relevant Data Key Performance Indicators (KPIs) for the geographical category "Towns".

Data Towns	KPI Name	Unit	Vodacom	Operator 2
HTTP Web Page DL Smart–phone	Qualifier	[%]	97,8	76,3
	Overall Session Time	[s]	3,2	6,8
HTTP 10MB DL Smartphone	Qualifier	[%]	100,0	88,8
	Overall Session Time	[s]	5,3	9,4
	90% faster than	[Mbit/s]	9,2	7,4
	10% faster than	[Mbit/s]	48,5	51,6
HTTP 5MB UL Smartphone	Qualifier	[%]	100,0	97,1
	Average Session Time	[s]	3,3	10,4
	90% faster than	[Mbit/s]	5,4	2,8
	10% faster than	[Mbit/s]	40,8	21,1
HTTP DL FDTT	Qualifier	[%]	100,0	100,0
	10% faster than	[Mbit/s]	65,8	57,6
	faster than 5 Mbit/s	[%]	99,3	83,7
	faster than 20 Mbit/s	[%]	70,3	54,1
HTTP UL FDTT	Qualifier	[%]	99,3	89,6
	10% faster than	[Mbit/s]	50,2	36,8
	faster than 2 Mbit/s	[%]	97,4	95,8
	faster than 5 Mbit/s	[%]	92,7	90,0
YouTube	Qualifier	[%]	98,6	89,9
	Start Time	[s]	4,8	5,2
	AVG Resolution	[p]	892,2	862,3
YouTube Live Smartphone	Qualifier	[%]	97,4	26,5
	Start Time	[s]	6,3	6,3
	AVG Resolution	[p]	1080,0	1080,0
YouTube 4K Smartphone	Qualifier	[%]	97,4	84,8
	Start Time	[s]	4,7	5,3
	AVG Resolution	[p]	1195,5	1443,8

Achieved values of all networks under test in each of the relevant Data Key Performance Indicators (KPIs) for the geographical category "Roads".

Data Roads	KPI Name	Unit	Vodacom	Operator 2
HTTP Web Page DL Smart–phone	Qualifier	[%]	95,1	68,1
	Overall Session Time	[s]	3,5	8,0
HTTP 10MB DL Smartphone	Qualifier	[%]	99,5	80,1
	Overall Session Time	[s]	8,6	12,4
	90% faster than	[Mbit/s]	4,0	6,6
	10% faster than	[Mbit/s]	57,7	59,2
HTTP 5MB UL Smartphone	Qualifier	[%]	99,0	91,2
	Average Session Time	[s]	4,8	14,9
	90% faster than	[Mbit/s]	1,6	1,2
	10% faster than	[Mbit/s]	40,9	21,1
HTTP DL FDTT	Qualifier	[%]	98,4	90,6
	10% faster than	[Mbit/s]	71,8	62,6
	faster than 5 Mbit/s	[%]	89,9	78,7
	faster than 20 Mbit/s	[%]	64,6	48,8
HTTP UL FDTT	Qualifier	[%]	95,3	91,7
	10% faster than	[Mbit/s]	52,1	42,1
	faster than 2 Mbit/s	[%]	90,7	95,8
	faster than 5 Mbit/s	[%]	88,0	83,6
YouTube	Qualifier	[%]	93,7	80,0
	Start Time	[s]	4,7	6,4
	AVG Resolution	[p]	854,1	844,1
YouTube Live Smartphone	Qualifier	[%]	87,2	16,9
	Start Time	[s]	6,3	7,9
	AVG Resolution	[p]	1075,6	1056,0
YouTube 4K Smartphone	Qualifier	[%]	96,7	80,9
	Start Time	[s]	4,8	5,0
	AVG Resolution	[p]	1167,1	1100,8

Crowd KPI overview

Achieved values of all networks under test in each of the relevant Crowd Key Performance Indicators (KPIs) for the categories "Broadband Coverage", "Download Speed" and "Latency".

Category	KPI name	Unit	Vodacom	Operator 2
Broadband Coverage	Coverage Quali ty	[%]	85,3	90,4
	Coverage Reach	[%]	82,3	77,0
	Time on broadband	[%]	80,1	93,1
Download Speed	Basic internet class	[%]	78,9	76,7
	HD video class	[%]	49,2	48,2
	UHD video class	[%]	11,5	6,4
Latency	Gaming class	[%]	55,2	91,5
	OTT voice class	[%]	93,1	96,6

Methodology

The leader in mobile benchmarking, umlaut, has analyzed the mobile networks of Lesotho with regards to mobile network performance. We measure smartphone voice and data performance based on extensive drivetests – from major metropolitan areas to smaller cities and connection roads.

We objectively define the routes and test methodology and publish the results through certificates or public benchmark reports.

As the de–facto industry standard, our benchmarking methodology focuses on customer–perceived network quality and covers a wide range of mobile services. Today, more than 200 mobile networks in more than 120 countries are being evaluated by our unique scoring methodology. It allows a technical analysis that is unpre– cedented in its level of detail and enables comparisons between the network performance and capability of each mobile network. Our public benchmarks as well as the certificate benchmarks help network operators to demon– strate how well they are delivering wireless connections to consumers, business users and enterprises and reveals the areas of improvement.

Key takeaways

Vodacom achieves the highest umlaut score with 509 out of 1000 points in the nationwide assessment in Lesotho.

Vodacom shows the best user experience for web browsing and YouTube services.

In the voice category as well as data performance, Vodacom leads with the highest score.
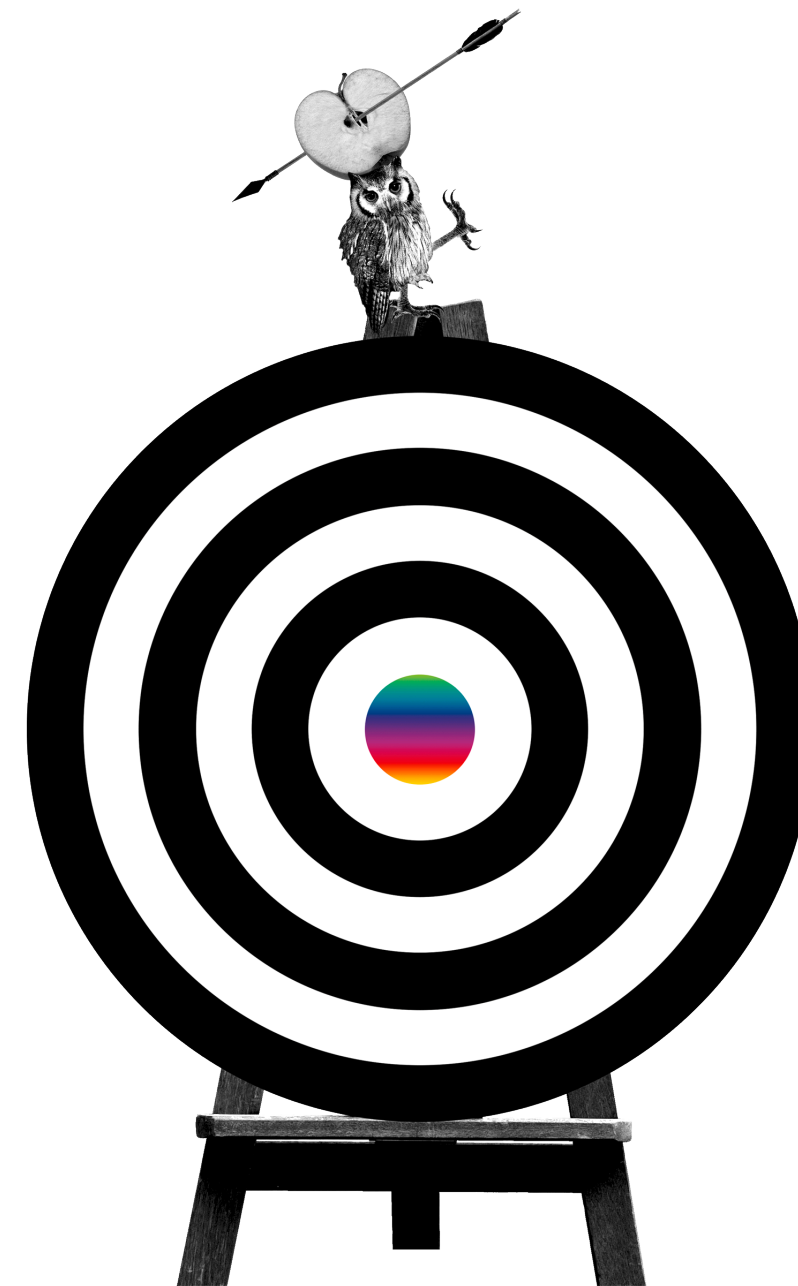
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