CAPACITY ISSUES DRIVE MEDIATION SYSTEM REPLACEMENT

**DigitalRoute**

Every bit counts.
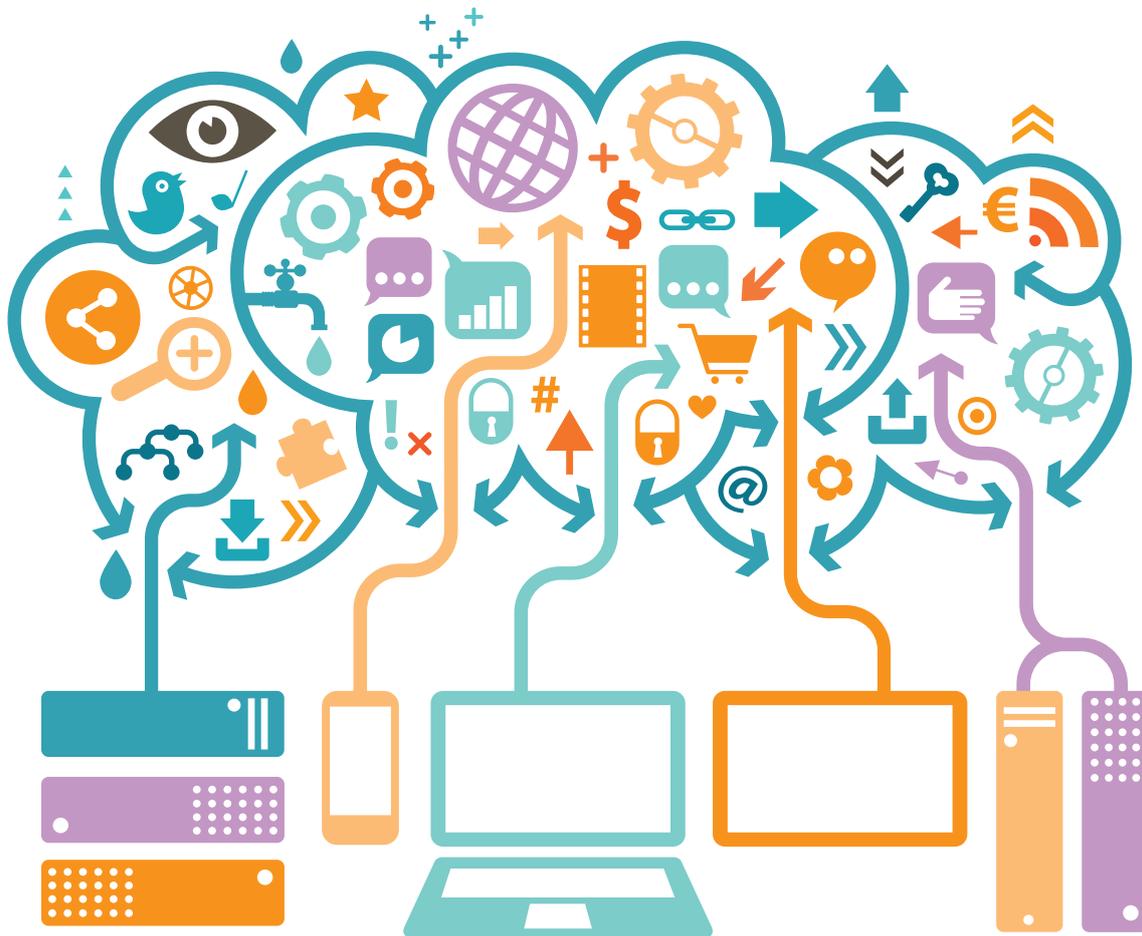
Management summary

2010
South African Tier-1 Vodacom realized its legacy mediation product for offline, batch processing could no longer cost effectively scale to meet the company's growing data processing requirements.
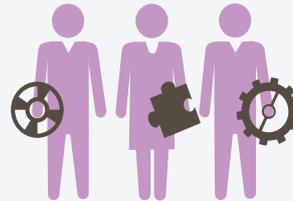
2012
Vodacom's mediation team forensically examined alternative vendor solutions available on the market, and selected MediationZone from DigitalRoute.
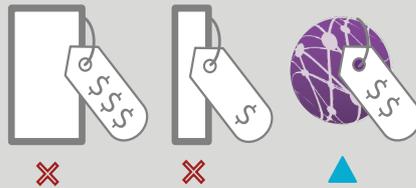
2013
A structured implementation process led by highly qualified teams on both the vendor and supplier sides ensured the desired solution was delivered and deadlines were met or, in some cases, exceeded.

2011
Vodacom examined the possibility of adapting an ETL tool to handle mediation. This, however, proved to be an impractical approach.

2012
MediationZone was not the lowest-cost option available, but its functional and architectural strengths combined with DigitalRoute's subject expertise convinced Vodacom that the Swedish company would be the best partner to work with.

2013
MediationZone is now meeting Vodacom's offline mediation needs and, furthermore, has been nominated for an internal IT award, highly unusual for a non-customer facing project.

Background

For over a decade, South African Tier-1 Vodacom had been using UMS, a product originally developed and sold by Verizon in North America, for offline, batch mediation. Though satisfied with UMS' functionality, Vodacom was spurred to investigate alternatives as the legacy product headed towards its processing capacity and the cost of the hardware upgrades, in the region of 100 million SA Rand, necessary to extend this were prohibitive. In fact the UMS system, which was managed by a third party integrator, was already, though highly efficient, not particularly cost effective.

With an eye to the future, in early 2010 Vodacom's in-house mediation team began examining replacing the legacy mediation system with an ETL tool that was already installed in-house and included some basic mediation-like functionality. The Service Provider wanted to see if this could be extended and re-purposed to fully replace UMS, thus giving Vodacom a degree of future-proofing as well as solving its immediate capacity problem.

This idea, according to Vodacom Mediation Development Manager Keith Kriel, quickly proved unlikely to be viable. Although the ETL tool indeed offered a platform on which further functionality could be developed, the specific mediation requirements that needed to be addressed were far more complex than anticipated to meet. Functional areas that proved particularly challenging included auditing control, internal integrity, central reporting, modularization and parallel processing, as well as the operational handling of multi-indexing and compressed files. Additionally, issues of latency, benchmarking, resourcing management and error correction presented significant challenges as well.

Says Kriel today, *"while the ETL approach was ruled out (for one thing, we realized that developing a mediation system really wasn't our core skill set), the experience of trying to adapt it taught our team valuable lessons about what we really did need from an ideal mediation system replacement."*

By early 2011, the Vodacom mediation landscape had begun to change more rapidly. The capacity limitation on UMS was becoming increasingly problematic (and it was by then clear the ETL approach would not be the best way to resolve it). Extending the hardware footprint of the legacy system as a way of increasing capacity, was based on received quotes. The options there ranged from a completely refreshed technology alternative based on a non-stop blade architecture costing around R70 million to an approach based on re-cycling of de-commissioned hardware at around R48 million. Neither was considered financially viable.

An additional factor arose in early 2012 when Verizon announced that it would no longer support the UMS product and, while expertise would still be available to Vodacom via an Integrator and through other users, Vodacom nevertheless perceived Verizon's decision as representing a serious operating risk. It would be relying on a product no longer being developed or actively marketed, to fill a key function within its BSS. Thus, in the spring of 2012, Vodacom decided on a UMS replacement strategy, with a nine-month window to identify and launch a new mediation system.
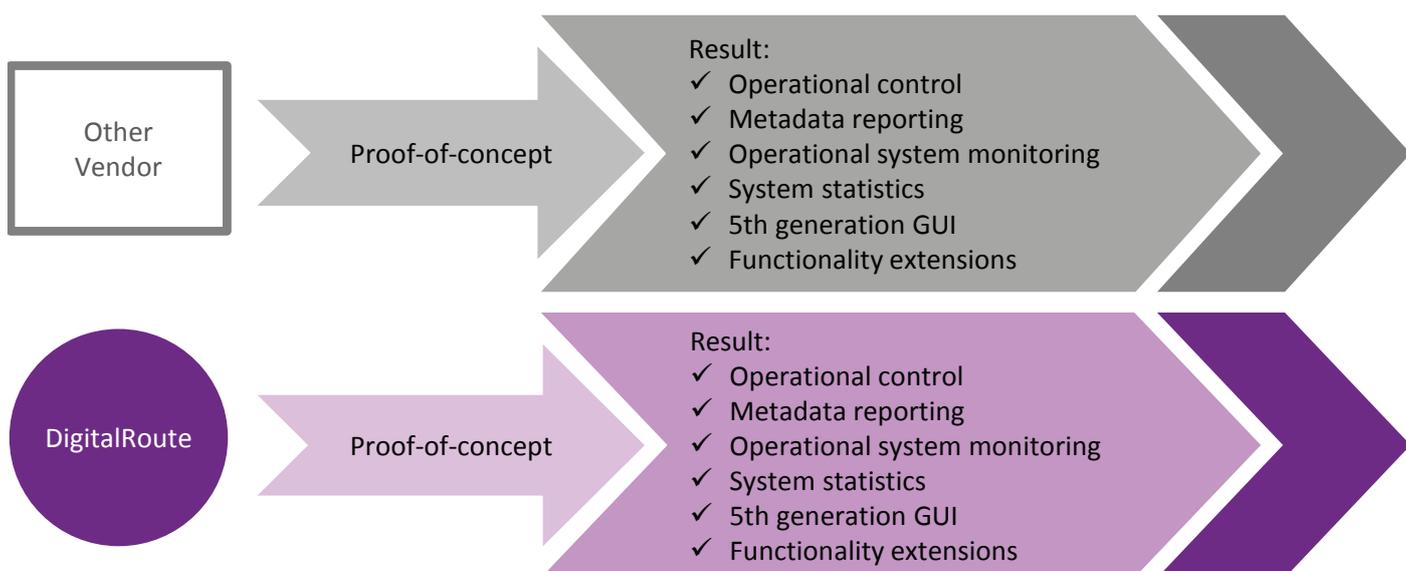
Selection

The Mediation team had already been given the mandate to actively review mediation systems in the market and obtain the information required to allow for cursory evaluation. So, when Vodacom made the decision to purchase a new mediation system, the team already had an overall idea of the functionality and framework they expected to be included in such a system.

The Vodafone product catalogue already identified and recommended two mediation systems that had been thoroughly evaluated in order to ensure that they would meet the long term convergent strategy of the Vodafone Group. Both had been implemented at Operating Companies elsewhere within the Vodafone Group and were thus on the group's list of recommended solutions. This helped greatly in simplifying the selection process. After obtaining the Vodafone Product Catalogue, and with the requirements clearly understood, the team felt comfortable that both of the Vodafone Group's approved, chosen alternatives, were market-leaders and met their key functional requirements. This would ensure that Vodacom aligned with the group's preferred mediation software strategy.

Furthermore, after only preliminary investigation, it became apparent that replacement was a cost-effective option. Compared to the hardware extension prices quoted earlier, Vodacom calculated that if it aligned with the group strategy its savings as represented in Year 5 Total Cost of Ownership would be around R125 million for an estimated upfront spend of around 20% of that sum from its current year budget.

Both vendors under consideration were at this point invited to Cape Town to present their solutions via a Proof-of-Concept-type demonstration, prior to which Vodacom had performed a limited, high-level reference check with colleagues within the group. It quickly became clear that both products were able to address the company's mediation needs; according to Kriel both offered excellent alternatives from a functionality perspective.

Other Vendor → Proof-of-concept →

Result:
- ✓ Operational control
- ✓ Metadata reporting
- ✓ Operational system monitoring
- ✓ System statistics
- ✓ 5th generation GUI
- ✓ Functionality extensions

DigitalRoute → Proof-of-concept →

Result:
- ✓ Operational control
- ✓ Metadata reporting
- ✓ Operational system monitoring
- ✓ System statistics
- ✓ 5th generation GUI
- ✓ Functionality extensions

According to Vodacom, the platform and storage requirements for both products were similar. Each met all the company's operational control and metadata reporting requirements and both offered dashboard functionality that provided the required operational system monitoring capabilities as well as system statistics to be tracked and presented as necessary. Both systems also allowed configuration of business rules via a 5th generation GUI along with application interfaces that would support any functionality extensions that Vodacom felt it might require at a later stage.

Kriel notes that within Vodacom, the evaluation stage was made extremely *"open"*. Stakeholders of systems potentially *"touching"* the eventual working system were involved. Operational, Infrastructure, Systems and DBA personnel including the business teams were co-opted. This holistic approach was, in Kriel's view, a major factor in the project's ultimate success.

With the similarity between the two products in mind, Vodacom concluded that its selection decision would not be based strictly on functionality. So why was DigitalRoute's MediationZone chosen?

A key factor in the selection process was DigitalRoute's exclusive focus on mediation; this aligned with Vodacom's own vision of how mediation should be viewed and addressed within the broader stack (a perspective that would later determine the implementation process itself). DigitalRoute's technical expertise as demonstrated during the sales process was also instrumental in the decision:
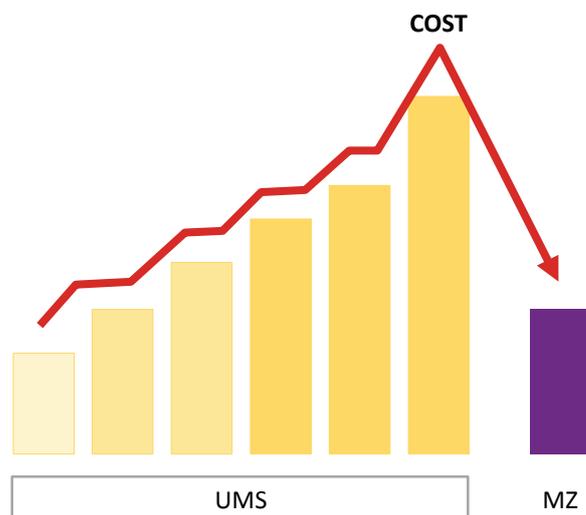
" MediationZone was sold by the technical team. With the other vendor the sales process was marketing-led. This made a significant difference to our level of comfort. "

Both vendors had been invited to submit commercial proposals. These proved comparable and thus were not a major point of differentiation. The operator also proceeded to visit reference sites which it considered crucial to confirming the decision to select MZ as Vendor. The visit to DigitalRoute's

European Tier-1 customer Swisscom proved highly convincing. Getting a view of the development life cycle and operational transitions that would be required with MediationZone in a similar working environment were influential.

The Swisscom visit provided Vodacom with a view of how MediationZone could be implemented in a distributed configuration to address Use Cases beyond basic billing mediation.

Equally if not more importantly, Swisscom demonstrated that Vodacom's underlying problem of scalability could be addressed at a realistic cost, and one vastly cheaper than continuing with UMS.

With further references from inside and outside the Vodafone Group proving satisfactory, allied to the results of the Proof of Concept, Vodacom selected DigitalRoute's MediationZone as the replacement for its ten-plus year old UMS mediation system.

Capacity and scalability was a key driver in order to improve latency. Potential for future-proofing and expertise in mediation were other crucial reasons for the decision.
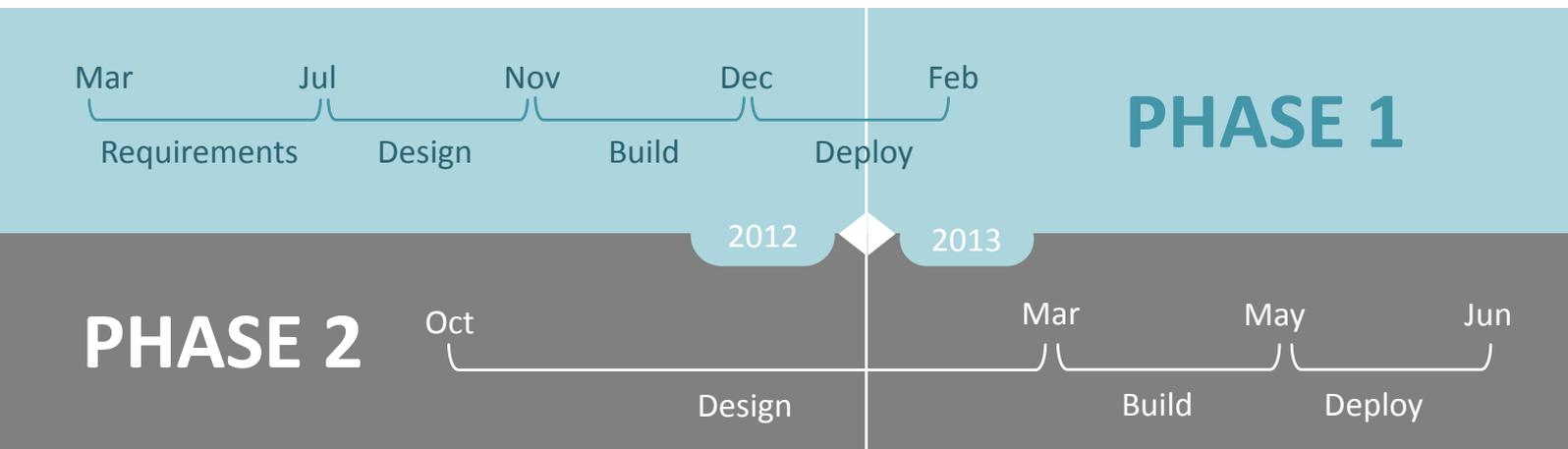
Planning

With MediationZone selected, the Vodacom mediation team set about drawing up an extensive Universal Requirements list. The underlying goal was not only to ensure that the functionality already in place with UMS would be mirrored in the new system, but to ensure that the design as implemented in the old system, would not be a limitation in the new system. Additionally, very specific and deliberate methodologies and processes were put in place to ensure the success of each phase of the migration project. MediationZone would be responsible for processing around 1.2 billion usage records a day to be used for rating and billing which, on a monthly basis, Vodacom calculates has a value of R4.6 billion in revenue.

As part of the transfer, the mediation team made the decision that it would like standardize data formats across all upstream and downstream systems fed by MediationZone. This strategy would require buy-in from a number of other departments within the company, but was expected to prove particularly important to the smooth running of the business in the long-term by removing unnecessary steps from the existing process when new lines of business were introduced in driving downstream system development. Other departments, once exposed to the gains of such an approach, proved willing to buy in.

To allocate additional resources to the MediationZone

Mar	Jul	Nov	Dec	Feb	
Requirements	Design	Build	Deploy		**PHASE 1**

2012 | 2013

	Oct		Mar	May	Jun
PHASE 2		Design	Build		Deploy

8 Downstream systems

1.2 Bn usage records
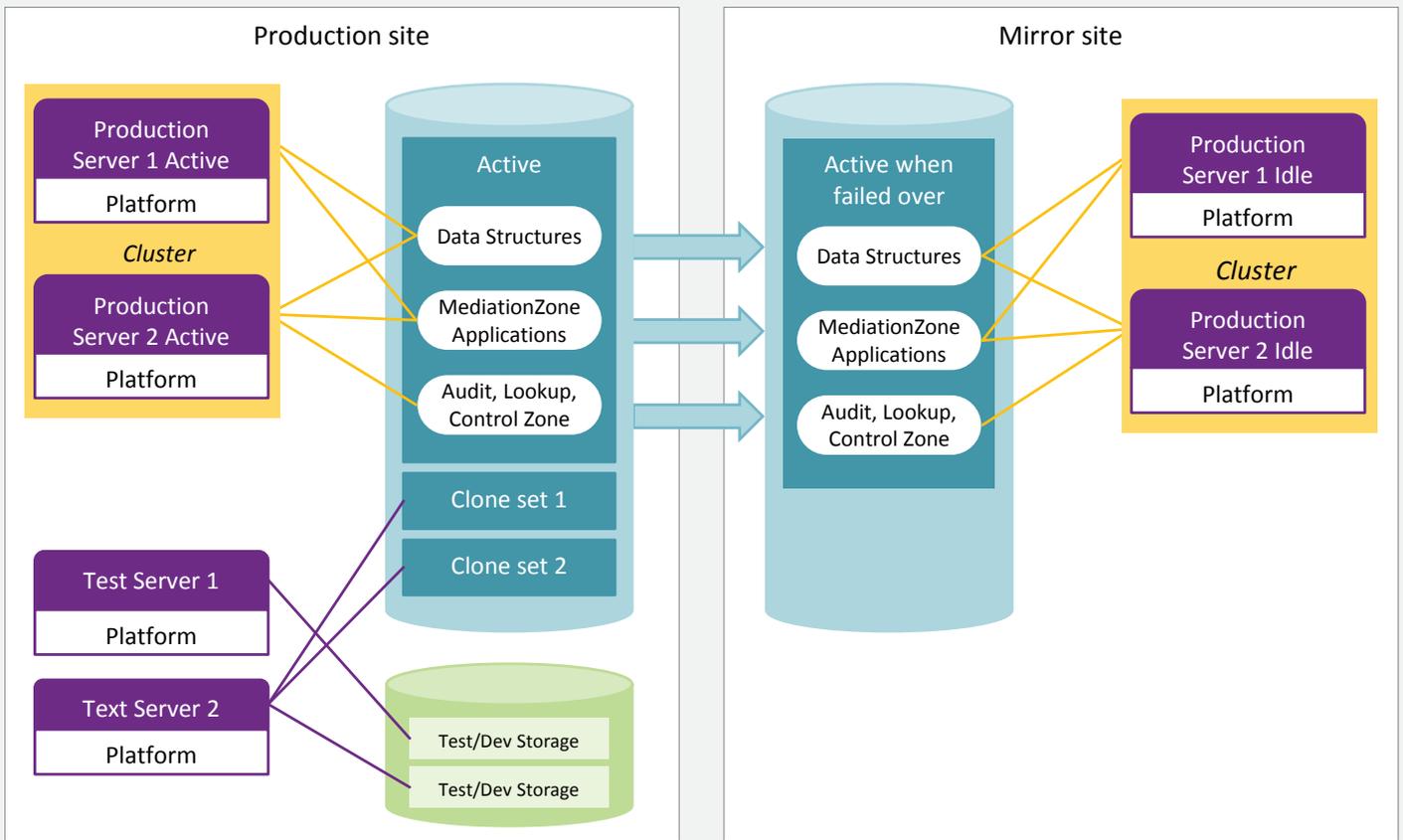
4.6 Bn Rands in revenue

Given the urgency of the capacity issue with UMS, Vodacom's first decision was to identify which lines of business it should initially transfer to MediationZone and, because of its high volume data streams, its packet-switched business was quickly selected as the priority. In fact, it was decided early in the project definition, that the project would be addressed in two distinct phases. Phase 1 would enable cutover of all Packet Switch Data (PSD) from UMS to MediationZone (MZ). Phase 2 would cater for all remaining data streams.

Packet-switched data was a data stream that the mediation team decided would, in spite of its inherent complexity, bring the most business benefit by being migrated first. Not only would this provide major gains, but would also buy a potential fall back capability for the legacy system due to the huge additional volumes of data expected to be generated over the festive season, including new year.

migration project, Vodacom outsourced certain support functions related to other systems in its infrastructure in order to free up members of its Operations team to focus on mediation and also worked hard to quickly develop the necessary documentation required to support its standardization initiative (for instance, by producing Interface Control Documents that provided a reference framework for the integration with other systems) and thus smooth the migration process. It then assigned a Business Analyst to each specific line of business to gather the requirements, as well as creating a prioritized timetable for transfer. A key strategy followed by the Mediation team, was to continuously evaluate new business and engineering requirements in order to prioritize and/or shift these out in order to place the focus on critical business functions so as not to delay the roll out schedule.

* 1 RAND = 0.07 EUR

Production site		Mirror site	
Production Server 1 Active / Platform	**Active**	**Active when failed over**	**Production Server 1 Idle** / Platform
Cluster	Data Structures	Data Structures	*Cluster*
Production Server 2 Active / Platform	MediationZone Applications	MediationZone Applications	**Production Server 2 Idle** / Platform
	Audit, Lookup, Control Zone	Audit, Lookup, Control Zone	
	Clone set 1		
Test Server 1 / Platform	Clone set 2		
Text Server 2 / Platform	Test/Dev Storage		
	Test/Dev Storage		

Vodacom also, perhaps with an eye on the demands of Big Data, decided that as part of the migration it wanted to take greater advantage of the information it held in its usage streams. In UMS, mediation had only decoded the fields necessary for rating and billing. In MediationZone, it decided it would decode everything in order to gain a broader view and understanding of the trends held in its data.

Aiming to create a best possible mediation architecture, Kriel says now that *"the team was worried about the end result turning out differently from what we expected. We were however confident that our methodology and approach would yield consistent results"* Vodacom decided early to accept DigitalRoute's hardware recommendation without question, *""but Linux/Veritas clustering was new to us and proved to be a significant learning curve. However, DigitalRoute provided invaluable guidance through the process and thus helped secure the successful implementation of the whole solution."*

A new approach to Release Management, coupled to the process flow framework, also presented a huge cultural change, albeit for the better. *"The new framework"*, says Kriel, *"supports the application architecture and will allow us to implement specific functionality into production without having to take the whole data streams down."*

Vodacom quickly came to the realization that MediationZone would be much easier to support. With separated workflows, it was faster to deploy new services and, where UMS was complex to manage (processing was configured at a CPU level), DigitalRoute's product was straightforward to operate. Furthermore, with most functionality in MZ being GUI-driven, it made most operational support functions particularly easy to operate. An expert on-site team from DigitalRoute along with a 9-man operations team from Vodacom was tasked with implementing the new platform.

Platform OS:
Linux Red Hat 5.7

Hardware:
HP BL680c G7
40 Intel Xeon Cores
128GB RAM

Implementation

With contracts approved, DigitalRoute's first task was to propose a detailed project plan. This, it was agreed, would reflect the two-phased approach noted earlier.

Phase 1 was projected to run between April 2012 and February 2013, and would involve the cutting over of Vodacom's packet-switched data business to relieve capacity issues in the legacy system as a matter of urgency. This amounted to about 30% of Vodacom's total data volumes.

Phase 2 would involve its core Circuit Switched business, as well as other smaller lines of business. Work on this Phase would begin in July 2012 with a target cutover date of May 2013.

The Universal Requirements lists that had been created by the assigned business analysts were carefully peer reviewed at the start of the implementation. These resulted in a detailed project scope and design being submitted to DigitalRoute. In turn, DigitalRoute then created detailed design documentation that translated the analysis into functional technical requirements that would mitigate any likelihood of subsequent issues in the resulting system.

Project Development Manager Wasfi Adams, notes that there was extensive and valuable co-operation between Vodacom and DigitalRoute in mapping Vodacom's established ways of doing business . MediationZone's development methodology was driven by the Vodacom strategy of developing a common
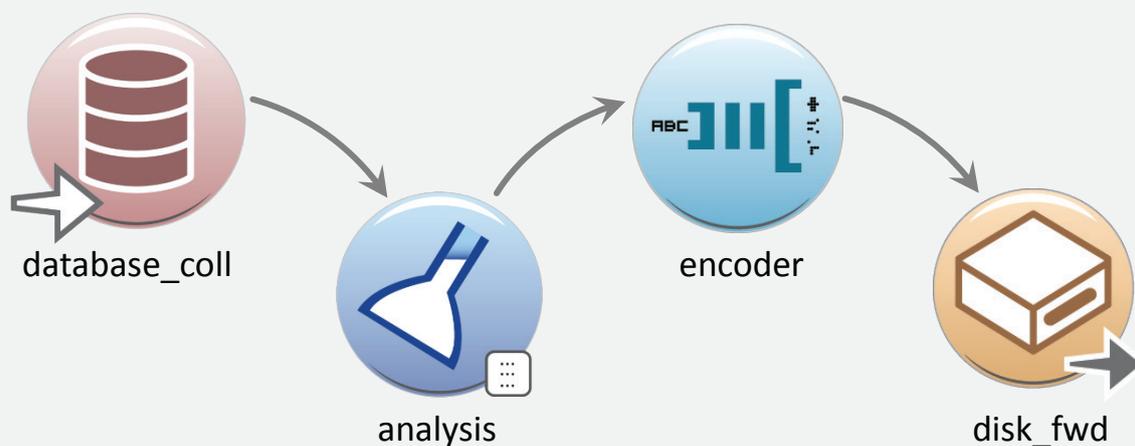
According to Kriel, Phase 1 really served as an insurance policy against anticipated capacity issues as much as anything else, but, such was the need to gain confidence from that policy, that the launch date was brought forward three months, to November 2012. Says Kriel now, *"it (Phase 1) really represented a trial run and after full compliance testing, we decided to cut over limited downstream systems at go-live. Knowing that we had the ability to do so was critical. It gave us time and built confidence in our choices and approach."*

framework for all data streams. This was an insightful approach for all parties. In particular, Adams notes that this catered to a strength of MediationZone's being able to re-use common modules, which he sees as a core product strength.

Meanwhile, the Mediation team was continuing the process of influencing stakeholders in the organization who would be impacted by the new mediation system. The strategy was characterizes by asking each of the teams *"tell us exactly what you want…let us decide on how to develop it"*!

With Scope and Design approved with no major issues, the project moved to development early in the summer, 2012. As this happened, the newly acquired hardware arrived at Vodacom's Cape Town headquarters and again a combined team of Vodacom and DigitalRoute experts worked to set it up and install the base MediationZone product. This was then put through failover testing. According to Kriel *"Progress on parallel, if not directly connected fronts like this was important to the team as it allowed us to demonstrate internally that we were reaching project milestones within the planned delivery timescales",* he says.

> *With Phase 1 complete before its projected deadline around Christmas 2012, Phase 2 proved to be more complex.*

Correlated logic from certain NSN switches provided one difficult problem to address, and many of the remaining data streams proved more challenging to handle than their packet-switched counterparts, for instance in one case there were issues pulling data from specific MSS's. However, says Kriel, "these were typical implementation challenges and they were identified by the operational support team and competently and quickly resolved."

BSS Downstream systems

Network layer

Ultimately, User Acceptance Testing took four weeks, longer than anticipated albeit in part because of a high number of new requirements including some related to new LTE lines of business. These generated significant data volumes and had been introduced much later into the project plan. Phase 2 thus started going live in July 2013 with a phased migration planned over a four-week period. This approach, agreed between the mediation and operations teams, grouped streams together for cutover, for instance by which downstream systems consumed the data, or by coded input formats such as ASCII or binary.

> *In all, there were seven blocks of data streams which went live at approximately three- day intervals during the launch period. It was, says Adams, "generally problem free. Revenue loss was negligible. Where revenue issues arose, turnaround was fast."*

Phase two involved cutting over to many more downstream systems than phase one which, ultimately, had gone live with only Fraud Management, Billing, Interconnect, Fraud Monitoring, Reporting, Customer Warehouse, and the Data Clearinghouse were among the eight systems involved, each of which required unique development work. In the event, five of these went live during the phased launch window with the other three following soon thereafter.

The launch itself, in July 2012, saw the ETL product retained as a back-up until the end of October 2012 in case it was needed to feed old dependencies though regardless, from July onwards MediationZone was the master system for mediation. Kriel attributes much of the success of the migration to the Vodacom executive team: *"we were allowed the freedom to perform our duties without interference, and we made sure we did them in a very transparent way. Everyone knew what was happening; the status of the project was always clear. We had the room we needed to succeed, and when we did need executive decision making, it was available."*
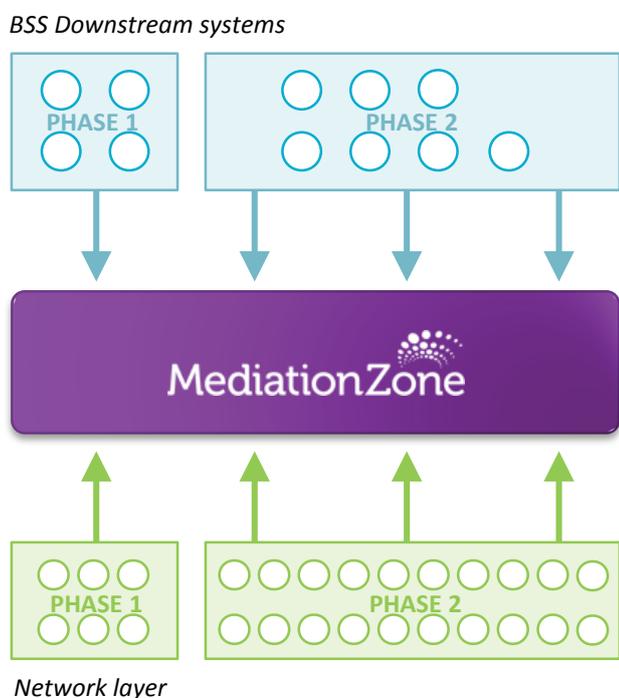
Launch

By mid-August, Vodacom was already feeding some 42 million peak gateway events and up to 60 million CDRs a day into MediationZone, sourced from 25 data streams pulled from elements across its entire network.

According to operations manager Ferouzah van der Schyff, *"the magnitude of the change was enormous, and in terms of performance the benefits were immediately apparent. The GUI was significantly easier to use than had been the case with UMS; MediationZone gave us far better visibility into what was happening on our network; configuration was easy and deploying changes was generally less labor intensive. One immediate conclusion was a mitigation of operating risk."*

Further, adds van der Schyff, *"it quickly became apparent that MediationZone would reduce times-to-market for new products and services simply because it required less process steps. Its modular architecture also reduced unnecessary work. Today, if there's a business-critical requirement we are confident we can deploy it without delay."*

Added flexibility in the deployment process was another advantage accrued by Vodacom. For instance, the MediationZone system quickly separates online and offline feeds which when they enter the system are joined together. In UMS, this had required development changes followed by recompiling the cache. In MediationZone the straightforward nature of the function again mitigates risk for the operator.

Concludes Herschel Nomdoe, senior business specialist at Vodacom, *"for all the technical gains, we still recognized that the relationship we built with DigitalRoute was at the heart of the project's success. We know from experience that a brilliant tool supported by a supplier that can't communicate effectively, won't get used optimally. But our relationship with DigitalRoute gave us the confidence and the trust required to make the necessary leaps forward with the product."*

Nomdoe says further, *"the issues that did come up haven't been related to the integrity of the data. Furthermore, the quality of DigitalRoute's support has given us a significant level of comfort throughout both the migration project and the launch. The degree of knowledge-transfer has enabled us to achieve post-integration sustainability and independence quickly."*

For mediation development manager Keith Kriel, the impact of MediationZone, which he says delivers an immediate OPEX saving of around R15 million a year, has been significant. He states, *"the advantages have been immediate and substantial. We've been able to de-commission a number of legacy systems. We now have fewer platforms, with all related infrastructure, to maintain. Our architecture is simpler and our efficiency has improved. In fact, the introduction of MediationZone has promoted a shift to a better architecture across our entire BSS infrastructure. We've also acquired new skills in mediation and MediationZone itself that we believe can be leveraged across the Vodafone Group."*

Kriel concludes, *"we now have a world-class mediation product that gives us, Vodacom, a long-term growth path."*

In recognition of the significant impact of the mediation replacement project, the MediationZone implementation was in November 2012 nominated for a Vodacom CEO Award 2013 – a rare achievement for a non-directly customer facing implementation. No fewer than four separate executives nominated the project, noting that *"mediation plays a critical role at Vodacom, yet rarely gets the recognition it deserves."*

Vodacom's own words best sum up its achievement in tandem with MediationZone from DigitalRoute: *"If replacing a billing system can be likened to replacing the engine of an F1 car while it's out on the track, replacing the mediation platform is akin to replacing the chassis. We have accomplished this tricky transplant without having the car veer off track, without spilling any fuel or oil and without the driver even noticing!"*

About Vodacom

Vodafone is one of the world's largest telecommunications companies with approximately 411 million customers in its controlled and jointly controlled markets as of 30 September 2013. Vodafone has equity interests in telecommunications operations in nearly 30 countries and around 50 partner networks worldwide. Vodacom is an African mobile communications company providing voice, messaging, data and converged services to over 50 million active customers across South Africa, Tanzania, the Democratic Republic of Congo, Mozambique and Lesotho.

About DigitalRoute

DigitalRoute has been providing new approaches to enterprise data management since 1999. Its MediationZone solution offers high throughput and provides a unique degree of user configurability. This means customers achieve greater cost efficiencies, new service offerings,the ability to monetise any data, and greater end-customer satisfaction. It also ensures that the right downstream systems receive the right data in the required format regardless of source or destination, without losing a single bit. MediationZone is the foundation from which multiple, mission-critical Use Cases can be addressed in the areas of Online Control and Data Management.