

**Imagine your future lab**  
*Designed using Virtual Reality  
and Computer Simulation*



# Bio

At Roche Healthcare Consulting our talented professionals are committed to optimising patient care. Our diverse range of strengths and experiences creates a balanced team with a wide range of expertise. The following individuals at Roche Healthcare Consulting have contributed their insights on the future of healthcare solutions.



*Giulia Asquer*

**International Product Manager Simulators  
Roche Healthcare Consulting**  
[giulia.asquer@roche.com](mailto:giulia.asquer@roche.com)

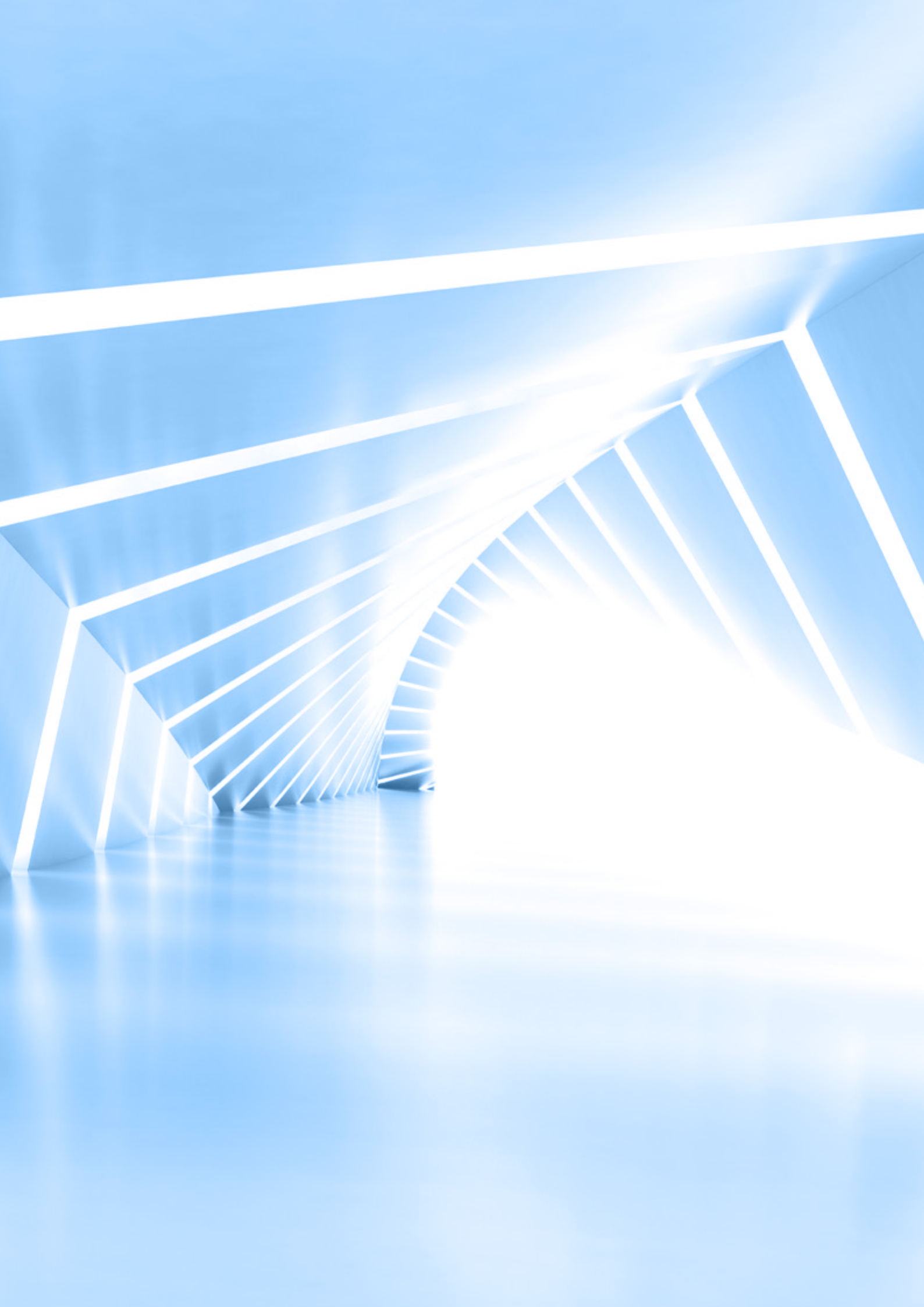
Giulia leads the development of Lab Solution Design tools, trains and supports Roche Healthcare Consultants across the globe. Manual analysis and repetitive steps are frustrating, kill creativity and enthusiasm; in addition to that, in recent scenarios she sees it's often challenging for the human brain to find a balance among performances, objectives and costs. The platforms and simulators she is responsible for have the ambition to leverage professionalism of the consultants, giving them the possibility to customize a laboratory solution by simulating results and showing potential workflow improvements. She holds a M. Sc. in Biomedical Engineering and started working in Roche Diagnostics as a Consultant and IT Specialist in the Italian affiliate and is today in the global Roche Healthcare Consulting team.



*Christopher Grieser*

**Head of Roche Diagnostics' Lab Design,  
Visualization & Virtual Reality department**  
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Head of Lab Design, Visualization & Virtual Reality department at Roche Diagnostics and has previously held the roles of Project Manager in the Project Development & Consulting teams, Coordinator in Visualisation and Animation, and Specialist in IT and New Media. As a key member of the Site Engineering Team, Christopher was also responsible for all visualisation and animation aspects in the planning and design of new offices or production buildings for Roche Diagnostics across EMEA/LATAM. His main background is in IT and graphic design and he is motivated every day by the challenge of delivering high-quality solutions for our customers that remain accessible and user-friendly, no matter how complex they may be.



# Executive summary

Until recently, the only way for leaders of diagnostics laboratories to examine what future lab set-ups might look like was to view a cardboard model. Unfortunately, cardboard representations of proposed lab architecture provide limited insights into how this future lab might work, or if it would work at all.

Now, with the emergence of new technologies such as virtual reality (VR) and computer simulations, it is much easier for lab leaders to test whether their potential new labs work as envisioned, even before any of the components have been ordered.

7 million  
VR headset  
worldwide in 2016

37 million  
by 2020

> 1 billion  
by 2021

VR healthcare market  
\$5,1 billion  
by 2025

**Another technological innovation in healthcare, virtual reality (VR), is growing rapidly in importance, value and impact.**

The consultants at Roche Healthcare Consulting – a new service established by Roche Diagnostics – are experts in how to use VR and computer simulations to aid lab leaders' decision making.

VR is growing rapidly in importance, value and impact. A recent report found that while there were around 7 million VR headsets in use worldwide in 2016, this number is expected to swell to 37 million by 2020, and to more than a billion in 2021.<sup>1</sup> Although the primary use of VR is still gaming, the use of VR in hospitals is expected to rise exponentially, with the VR healthcare market projected to be worth \$5.1 billion by 2025.<sup>2</sup>

With its advanced, high-quality VR models, Roche Healthcare Consulting now leads the diagnostic laboratory consulting sector in its use of VR in healthcare. Roche Diagnostics is also pioneering the techniques required to design entire labs in real-time VR, down to the smallest architectural details and specifications of each instrument. This approach opens the door to a new level of engagement between consultant and client. As a customer, you can walk around and interact with your lab systems even before construction work has begun on the building itself. Using VR, the lab leader becomes the 'director of their own movie', with customer and consultant able to kickstart collaborative discussion from the outset.

The experience of walking through their new lab and experiencing it for the first time as an interactive, immersive environment can be a revelation for lab managers. In some cases, lab managers have even been able to identify potential architectural problems with their building designs at an early stage, simply by entering a high-detail VR model of their new laboratory.

Through collaborating with lab managers using these tools, Roche Healthcare Consulting and VR teams have discovered the numerous advantages of VR and other new technologies in redesigning lab set-ups or incorporating new systems and instruments. In this way, these technologies can contribute to making labs more efficient, well-organised and better placed to handle the rising diagnostic needs of the populations they serve.



The simulation of laboratory workflows can play a valuable role in configuring modular analyzers, automation solutions and facility layouts



A woman with her hair in a bun, wearing VR goggles and a dark t-shirt, stands in a laboratory setting. She is looking towards a piece of medical equipment. The background shows a clean, modern lab environment with white cabinetry and large windows.

# Introduction

**Diagnostics labs add considerable value to healthcare and diagnostic test results diminish subsequent health** problems for patients, reduce hospitalization and avoid unnecessary treatment. Despite only accounting for around 2% of healthcare expenditure, in vitro diagnostic testing guides approximately 66% of all clinical decisions.<sup>3</sup> A 2016 study on the cost benefit of diagnostic laboratories found that they are cost effective, improve clinical outcomes and reduce direct and indirect healthcare costs.<sup>3</sup>

Diagnostic labs are also expanding our ability to obtain data at the molecular level. These data are being combined in new ways and translate into new insights that offer higher medical value for physicians and patients.

Recent studies conducted in the US and Germany have noted that laboratories are under increasing cost pressure, driven by concerns over spiraling healthcare expenditure in countries with aging populations.<sup>3</sup>

One review of laboratory performance in England's National Health Service found that staffing shortages have increased workload to breaking point, resulting in "burn out, low morale, high sickness absences, increased error rate, poor team spirit, diminished productivity and suboptimal laboratory service delivery."<sup>4</sup>

Consultants can provide guidance on how to optimise laboratories' workflow.

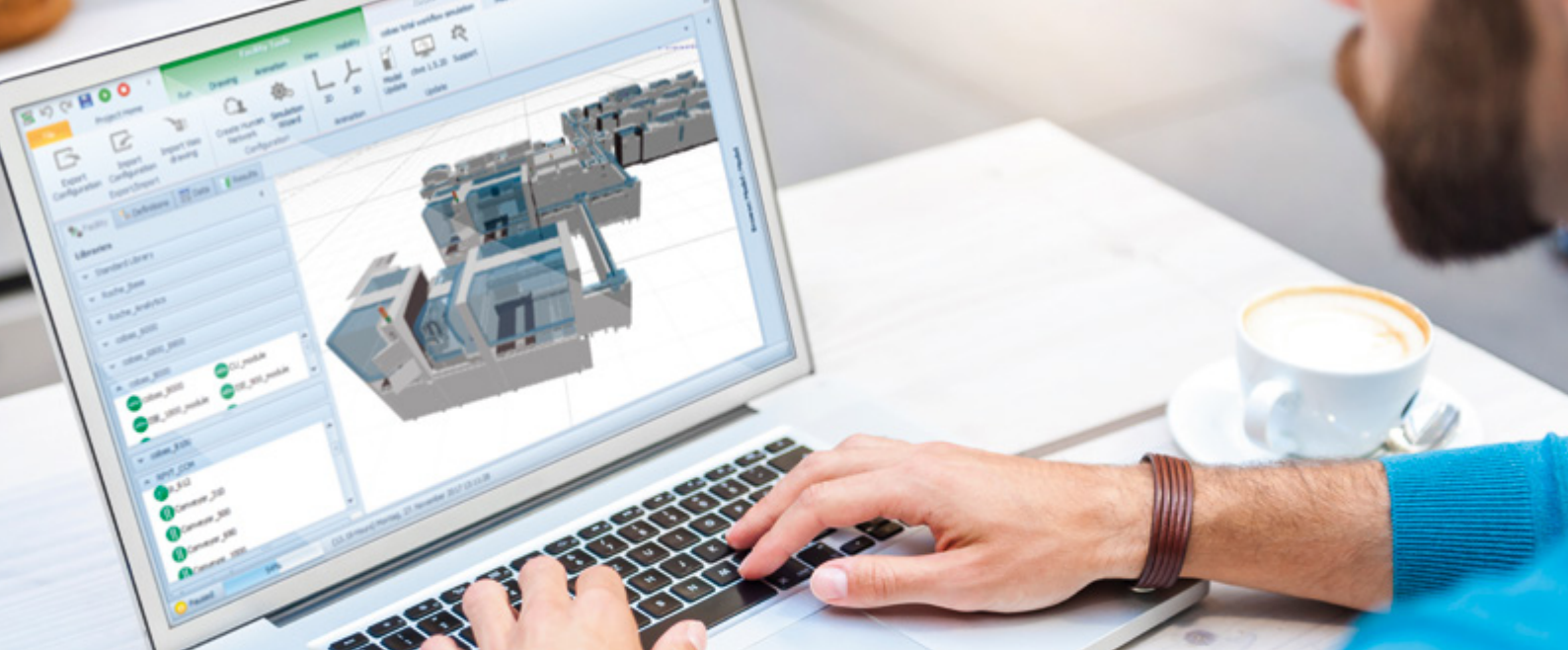
However, in the face of dwindling staff numbers and

increased workload, hospitals increasingly require specific, measurable and realistic projections on how investment in new laboratories will lead to enhanced performance and greater return on investment.

Thanks to the granular insights generated by its propriety simulation platform, Roche Healthcare Consulting is in a unique position within the healthcare diagnostic consulting space to reliably offer analyses to this level of detail and precision. Roche's service is founded on decades of experience and draws upon a global network of expertise across hospitals and other healthcare environments. Roche Healthcare Consulting approach working with lab leaders as a genuine partnership, with an equal investment from both parties in working toward a common goal. Roche Healthcare Consulting is committed to long-lasting relationships that can grow and endure for decades.

**The future of sustainable healthcare depends on diagnostics.**

**Virtual reality opens the door to a new level of engagement between Consultant and client**



Roche Healthcare Consulting's proprietary simulator empowers our consultants to optimize the workflow of diagnostic laboratories based on analysis of real laboratory data

# Roche Healthcare Consulting's proprietary simulator platform

 in 2017  
200 PROJECTS

60  COUNTRIES

250 ROCHE HEALTHCARE CONSULTANTS 

**To determine the impact of new laboratory configurations,** Roche Healthcare Consulting uses a proprietary simulation platform that has been developed by simulation experts at the Zurich University of Applied Sciences and is based on the well-established Simio software, widely acknowledged as a pan-industrial benchmark of quality in professional simulation.<sup>5</sup>

This platform provides a starting point for the consulting process by allowing Roche Healthcare Consulting teams to run a simulation of a specific laboratory's workload and test profiles, which is based on data exported directly from the informatics system of the laboratory.

From this complex information, the platform produces a simulation that pinpoints exactly how factors such as throughput, workload distribution and turn-around time are affected by the proposed solution.

For instance, consultants can identify peaks in the workload and then align with the lab manager in planning a solution that will fulfil a laboratory's KPIs now and in the years to come.

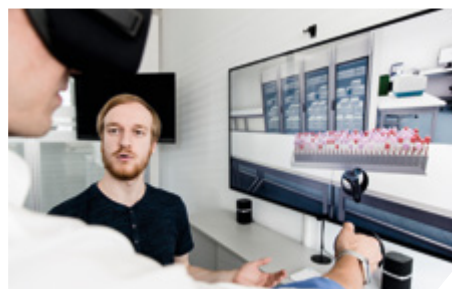
Across more than 60 countries - in all regions - most of the 250 Roche Healthcare Consultants are fully trained in using the simulation platform.



**Roche Healthcare Consulting** provides detailed simulations of laboratory workflows in combination with both consulting services and the hardware and software needed to power diagnostic laboratories.

It is precisely because it is Roche technology that forms the physical infrastructure of diagnostics laboratories that the simulation platform can operate to such a high degree of accuracy. The technical specifications of individual analyzers manufactured by Roche and key partners are fed into the simulation models directly by Roche's R&D department and Customer Support experts. The performances of real systems are compared with simulated ones in order to guarantee simulation accuracy.

Roche Diagnostics' simulation software never stops. Keeping pace with the constant evolution of the diagnostics industry, new versions of the simulator are rolled out on a quarterly basis. Roche is as committed to continuous improvement in its own practice as it is for its clients. Lab leaders need cutting-edge solutions to best serve physicians and their patients, so Roche Diagnostics' simulation and consulting services must also be right at the forefront of what is achievable in this space.







Virtual reality allows our customers to 'glimpse into the future'

## *Solving complex, lab-based problems with gaming technology*



**For many years**, and across many countries, Roche has specialized in designing laboratories. Some 11 years ago, we pushed the envelope of what was then possible with modern technology and began to design laboratories in 3D. These three-dimensional models were extremely intricate, containing comprehensive architectural information and detailed reproductions of the laboratory's systems and equipment.

**Since 2012**, Roche has broken new ground by presenting these complex 3D models as immersive, real-time VR experiences. As a lab manager, you can walk around, interact with and troubleshoot your VR lab systems with our Consultants even before construction work has begun on the building itself.

VR also plays a powerful role in the change management services we provide. Introducing VR early into the consultancy process helps to onboard customer-side colleagues from laboratory staff to C-suite, engaging them creatively right from the project's inception.

VR even allows our customers to 'glimpse into the future' and see what the lab of 5 or 10 years' time will look like. Again, because Roche also supplies the laboratory hardware, we can preview unreleased products and concepts virtually, helping our customers to future-proof their laboratories and services.



# Conclusion

**137 million**  
patients  
treated with Roche



**19**   
billion tests  
conducted with  
Roche

**30 Roche**  
medicines  
on the WHO Model List  
of Essential Medicines<sup>6</sup>

**In vitro diagnostics** are a crucial source of objective information for improved disease management and patient care, and Roche Diagnostics strongly believes that the more questions laboratories can answer, the more lives can be saved.

**Roche Healthcare Consulting** embraces the best technology and partnerships that leverage the power of its unique structure to advance science and develop new therapies. Roche Diagnostics' innovations in simulation and VR provide key benefits to modern diagnostic labs that actively address the challenges lab leaders are currently facing.

**Roche Healthcare Consulting's simulation platform** allows lab managers to evaluate and compare a variety of setup options, enabling consultants to advise labs on the best options for containing costs and increasing response time. The simulator also helps laboratories to be more versatile, by providing easy-to-read data on how throughput, workload distribution and turn-around time are affected by a comprehensive range of setups.

**Roche Healthcare Consulting's innovative** use of technology sets the organization apart from other diagnostic consultants. Whether it is with the proven methodology of Roche Healthcare Consulting's simulator, or how the decisions made through consultation with the simulator output into a fully-designed VR laboratory, Roche Healthcare Consulting is proud to be helping laboratories to do now what their patients need next.

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1. **Statista (2018). Virtual reality (VR) – statistics and facts.**  
Available at: <https://www.statista.com/topics/2532/virtual-reality-vr/>
  2. **Grand View Research (2017). Augmented reality (AR) & virtual reality (VR) in healthcare market analysis by component (hardware, software, and service), by technology (augmented reality, virtual reality), and segment forecasts, 2018 – 2025.**  
Available at: <https://www.grandviewresearch.com/industry-analysis/virtual-reality-vr-in-healthcare-market>
  3. **Rohr U.P., et al. (2016). The value of in vitro diagnostic testing in medical practice: A status report. PloS One.**  
Available at: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4778800>
  4. **Osaro, E., et al. (2014). Challenges of a negative work load and implications on morale, productivity and quality of service delivered in NHS laboratories in England.**  
Available at: <https://www.sciencedirect.com/science/article/pii/S2221169115302173>
  5. **Simio (2017). Healthcare simulation and scheduling software.**  
Available at: <https://www.simio.com/applications/healthcare-simulation-software>



**Doing now what patients need next**