

How innovation and partnerships can save lives: Firmenich's positive contribution to the global sanitation crisis¹

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Abstract

The recent Reinvented Toilet Expoⁱ organized by the Bill & Melinda Gates Foundation identified some new opportunities and solutions to address the global sanitation crisis, demonstrating that *"21st century sanitation is business-ready"*. Firmenich played an important role at the Expo by exhibiting its breakthrough malodor control technology, which started reaching low-income consumers in South Africa and Bangladesh at the end of 2018 and early 2019 in the form of affordable toilet cleaning products. The issue of toilets used to be a taboo. Pungent toilets continue to force people in developing countries to relieve themselves outsideⁱⁱ. Now, toilets are a subject of global development efforts and research that aims to save and improve the lives of billions of poor people. In Bill Gates words, *"I continue to be amazed by the innovation that's underway in the field of sanitation"*ⁱⁱⁱ. This momentum propelled by increased enthusiasm and energy is a great opportunity for Firmenich to more forcefully take its legacy^{iv} forward. In the current global business environment characterized as "volatile and complex", Firmenich has an opportunity to reflect on what was achieved, assess where its future priorities lie, and revisit some of its objectives heading to 2030. Striking momentum like this should not be wasted.

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Basic Facts: Firmenich

Firmenich is the world's largest privately-owned fragrance and flavor company, founded in Geneva, Switzerland, in 1895. Driven by its purpose to “create positive emotions to enhance wellbeing, naturally”, Firmenich has designed many of the world's best-known perfumes and tastes, bringing delight to over four billion consumers every day. Renowned for its world-class research and creativity, as well as its leadership in sustainability, each year, Firmenich invests 10% of its turnover in R&D to understand and share the best that nature has to offer responsibly. Firmenich had an annual turnover of 3.7 billion Swiss Francs at end June 2018^v.

Roughly 4.5 billion people lack access to safely managed sanitation. Every year, over 800,000 people in low- and middle-income countries die as a result of inadequate water, sanitation and hygiene. Companies start recognizing that many of the sanitation problems pose threats to their businesses. At the same time there are unmet consumer needs in new markets that can be addressed through market-based solutions. As the momentum grows on circular economy, we are witnessing private sector's increased interest in the Sanitation Economy^{vi} and innovative ideas for impactful and scalable solutions. (See Appendix I: Global Sanitation Challenges and Opportunities.)

2018 was a key year for sanitation starting with a review of progress made against the Sustainable Development Goal 6 (SDG 6) at the High Level Political Forum in New York, followed by the Mahatma Gandhi International Sanitation Convention in Delhi, India, and the World Toilet Summit in Mumbai, India.

Firmenich's Holistic Approach

A few years ago, Firmenich engaged in the global sanitation initiative. (See Appendix II: Firmenich's Approach: Dealing with Complexity through Core Competences and Creative Partnerships.) Fiscal Year (FY) 2017-2018 was an important year for Firmenich sustainability journey. The transfer of global sustainability from Compliance to Human Resources, along with industry trends and growing momentum on business contribution to the Sustainable Development Goals (SDGs) have led Firmenich to rethink its activities and its contribution to the SDGs. While Firmenich aims to positively impact all of the SDGs, the sanitation initiative is focusing specifically on SDG 6 (Clean Water and Sanitation)^{vii} and Firmenich's recently launched new corporate purpose *For Good, Naturally* reinforces Firmenich's *Pathways to Positive* strategy and further drives Firmenich's science to serve greater good.

Co-Investing with the Bill & Melinda Gates Foundation in a Strategic Partnership

For years, the Bill and Melinda Gates Foundation (later referred to as “the Foundation”) has been involved in developing innovative tools and technologies to improve public health and quality of life. A proponent of creative capitalism^{viii}, Bill Gates (Gates) has been particularly interested in bringing science innovations to tackle the world’s deadly and costly sanitation problem^{ix}. The Foundation was looking for a partner with complementary values and competences, particularly in science and technology, to develop stink-free toilets. Firmenich, a leader in multidisciplinary research, has a long tradition in pushing the boundaries of science and creativity^x. As part of an ambitious effort to improve poor sanitation, Bill and Melinda Gates travelled extensively across many developing countries. They realized that one big problem that had been grossly overlooked was: *“More and better technology alone can’t change human behavior if the user experience is off”*. Firmenich came to the same conclusion. *“Because smell was so central to solving this serious public health issue, we knew we could be part of the solution,”* said Prof. Geneviève Berger, Chief Research Officer, Firmenich. *“The call for action was clear to us, not only because we had the science to counter bad smells, but also, because it resonated with our DNA to have a positive impact through our business and improve people’s quality of life.”*

In 2012 Firmenich and the Foundation decided to enter a co-financing agreement governed by the Foundation Global Access Strategy. The partners have been working together to “reinvent the toilet experience” by utilizing a unique multidisciplinary approach to discover, develop, and commercialize a new generation of toilet malodor-suppressing technologies that perform in hygienic toilets and can be widely used at a low cost. *“You cannot solve this problem with one company, you need an ecosystem where each organization brings to the table what they are good at”*, commented Satish Rao, Chairman and Managing Director, Firmenich India. Similar comments came from Dr. Bérangeère Magarinos-Ruchat, Vice-President Global Head of Sustainability Firmenich: *“We know we cannot solve such a great challenge alone. That’s why it is a great honor and great opportunity to receive support from the Bill and Melinda Gates Foundation to scale up our impact together. We are also a founder and steering committee member of the Toilet Board Coalition, which is dedicated to driving innovative business solutions to solve today’s sanitation crisis at scale.”*

In addition to complementary financial resources, the Foundation offered many other benefits, including appreciation for the importance of research and innovations, sense of business approach to problem solving, access to a network of national toilet builders and sanitation entrepreneurs, also known as sanipreneurs, and tremendous experience in working in emerging markets. Firmenich and the Foundation partnership’s main features include: organizations’ core competences and values; focus on market-based solutions; capital leverage and balancing short-

term wins and long-term strategy; while enhancing impact and mutual benefits.

Organizations' Core Competences and Values

At a project review in Seattle in May 2018, it was recognized that Firmenich was no longer only a grantee of the Foundation but also a strategic partner. Indeed, the partnership is based on partners' core competences with each party using their expertise and resources in a complementary way. They also share strong values and believe in the importance of innovation in dealing with complex global social issues. Cutting edge science: At the heart of the partnership is the focus on R&D and advances in technology that will result in a higher rate of toilet usage. *"Malodor is a key issue for sanitation. At Firmenich we analyze the headspace and the molecules. We work towards understanding how humans perceive odors. 400 types of receptors interpret what the smell actually smells like. The science can be leveraged through technologies to block receptors - so that when you are exposed to a bad smell, you don't smell it"* explains Marco Pacchiani of Firmenich, speaking at the TBC Summit in Mumbai.

Involvement from the top: The top leaders from both organizations have been playing a very active role in making the partnership a big success.

Customer Relationships: Novel business models and customer engagement processes were developed to help manage the Global Access Strategy employed by the Bill & Melinda Gates Foundation and support the introduction of affordable product solutions to anyone with qualifying projects that targeted the intended beneficiaries.

Field Study and Hands-on: During its initial stage, the research focused on isolating what actually causes toilets to smell so bad. To understand the chemical stew Firmenich sent their scientists to study toilets in the developed and developing countries and collected samples from latrines^{xi}. Gates also travelled across many developing countries.

R&D

The collaboration with the Foundation helps Firmenich to better target its fundamental research and use the "world as a laboratory for innovations". This is much more than just another new innovative product or another breakthrough in "controlling and manipulating at the molecule and atom level". By broadening the space for innovations and motivating researches to solve important real-life problems and helping people meet their fundamental needs, the partnership pushes beyond the search for narrow scientific and technology solutions. It is about new technologies that push the boundaries of science and creativity to strengthen the corporate mind for breakthrough innovations and a new way to move faster from fundamental science to concrete products. It is also a new way of addressing consumers' needs while still embracing the purpose to create positive emotions and enhance wellbeing. Exposure to partners' activities and the operational reality on the ground is key for successful implementation, particularly in dealing with complex problems^{xii}. According to Dr. Charles Chapuis of Firmenich "Exposing Firmenich's researches to global issues and first-hand experience with the reality on the ground, makes it easier for them to capture knowledge first hand and learn to

better listen. The sanitation initiative helps to connect science with social science and human behaviors and emotions in solving important real-life problems and to avoid to be overdriven by patents.” Furthermore, the co-financing with the Foundation creates opportunities for Firmenich for more immediate wins as part of a much longer horizon of R&D and makes it easier to bring innovations to commercialization.

Focus on Market-based Solutions

The partners knew that insisting solely on “social returns on investment” will only bring temporary but not sustainable solutions^{xiii}. By making freshening products and effective toilet cleaning affordable, business can contribute to making the cleaning and use of toilets more acceptable and frequent. This in turn should lead to a sustainable improvement in people’s health, while also contributing to countries’ economic and social development. Bill Gates’ business sense has a lot to do with the unique positioning of the Foundation. His business instinct has been guiding the efforts for scalable and market-based solutions. Gilbert Ghostine, CEO, Firmenich, shares the same philosophy: *“I deeply believe that business is a force for good and can address today’s sanitation crisis at scale. To make sure our breakthrough technologies reach the populations most in need, we are actively engaging with our strategic customers and partners to co-create affordable solutions. This is part of our inclusive growth journey.”*

Capital Leverage and Balancing Short-term Wins and Long-term Strategy

Through co-financing, the partners have been strategically using the corporate and grant funds to develop a technology that inhibits activation of olfactory receptors by bad smell resulting into smelling a pleasant fragrance instead of feces. Mr. Gates comments: *“Their (Firmenich) willingness to help and fund the project with us and take risks has been very valuable”*. Furthermore, the partnership has been carefully balancing short-term wins and long-term strategy. By leveraging capital, it was easier to reduce an over focus on “harvesting low hanging fruits” that can make the future implementation of the strategy more difficult and more expensive. It also helped to make upfront investments, which this kind of projects typically requires, in return for more substantive impact and long-term payoffs. Recently, Gates told Co.Exist: *“This one is unusual for us, since there’s not really a similar sensory experience with other global health issues. But it is a good example of how we approach problems from a lot of different directions instead of trying to find a single solution. There are some things that we can solve right now that will make people’s lives better today, and there are other big, systemic changes that take many years to put in place and see improvement^{xiv}.”*

Enhancing Impact and Mutual Benefits

The joint research malodor project was completed in 2016. Bill Gates and his team came to Geneva to visit Firmenich Research Center and Perfumery manufacturing plant where they met the teams who worked on the project to develop cutting edge malodor counteracting solutions. The results were encouraging. Mr. Gates commented: *“They (Firmenich) are on a path to deliver an innovative product that also helps improve the world. It’s an amazing partnership... Firmenich sent their*

scientists to study toilets in the developing world, and they have created a breakthrough set of ingredients that make it possible to eliminate the foul odor associated with toilets (...). It's an amazing partnership." After doing sniff testing, he noted on his blog: "There was no evidence of repulsive odor I had experienced earlier. Instead of stinky sewage, sweat, and ripe cheese, I sniffed a pleasant floral scent." Mr. Gates' hope is that "continuing innovation from companies like Firmenich will lead to further solutions to improve the health and dignity of people living in places where the need for better sanitation is so great". This partnership has served as a catalyst for Firmenich to take its leading malodor control science to its next level propelled by Firmenich's deep understanding of olfactory receptors^{xv}. Firmenich scientists have published several research papers, sharing their malodor control discoveries with the public to ensure they all benefit.

Partnership with the Foundation

According to the Bill & Melinda Gates Foundation: *"There is this feeling of true partnership, there is a real sense of shared values, a shared commitment to our mission of really trying to work and use how technology and the strengths of the private sector can really come to serve this shareable purpose that we invest in. What we're hoping for in the future is that Firmenich has expanded into other program areas of our Foundation. Sanitation is not the only way that Firmenich is helping to further our mission, exploring avenues in nutrition, etc. Firmenich is a great example of where we see the private sector leveraging their strengths and being able to adapt that to new challenges"*.

Partnering for Social Innovation

Approaching complex social challenges through business solutions requires partnerships that can shape the enabling environment. This will in turn encourage business to accelerate the development of innovative solutions that contribute to universal access to water and sanitation and create new markets for the Sanitation Economy^{xvi}. Engaging beyond the private sector^{xvii} with other influential players with more experience in this space, such as governments, international organizations, and development banks is of increased importance^{xviii}.

For many years, Firmenich has been accumulating first-hand experience in this space. For example, Firmenich was the first in its industry to partner with the Danish Government in Uganda and a local vanilla processor to create a sustainable supply of Ugandan vanilla^{xix}. As one important step toward shaping the sanitation ecosystem, the role of development partners was discussed at the Toilet Expo in Beijing, China in a panel moderated by Dr. Magarinos-Ruchat^{xx}. This brainstorming highlighted the new role that development banks, such as the World Bank Group, can play in this space, including innovative forms of financing that can support early stage commercial projects with strong social and environmental impact^{xxi}.

Another example is the leadership role that Firmenich is playing in the Toilet Board Coalition (TBC)^{xxii}. In 2014 Firmenich joined TBC as a founding member. This global business-led partnership and platform brings together leading global companies, local SMEs, government agencies, sanitation experts and non-profit organizations. The Asian Development Bank recently joined the TBC. The objective is to develop, support, and accelerate commercially sustainable business solutions and models dedicated to building resilient sanitation systems^{xxiii}. In broader context, TBC engages in improving health and hygiene, particularly for the world's 2.5 billion people without adequate sanitation and safe drinking water. The vision of the TBC is to accelerate the Sanitation Economy.

Besides its financial commitment to the TBC, Firmenich brought its business perspective and core competences such as; leadership in sustainability, innovation in malodor control; and expertise in multi-stakeholder partnerships^{xxiv}. Its most direct and important contribution is the new technology to combat malodor in toilets, developed in partnership with the Bill & Melinda Gates Foundation. As mentioned, the technology can play an instrumental role in the development of market-based solutions^{xxv}. TBC is an important channel to transform innovative multifaceted solutions into commercial solutions. As a Vice-Chair of the TBC (Dr. Béragère Magarinos-Ruchat is a Chairman) and a member of their Partnership Council (Sarah d'Arbeloff, Director Technologies Business Development sits on the Council), Firmenich, together with other companies, will strongly support a new action agenda for the Sanitation Economy. TBC is also well positioned to strengthen its engagement at a country level^{xxvi}, with the creation of an Indian chapter as the latest addition.

Measuring Impact and Benefits

Leadership Role and Commitment

With rapidly increased importance of the Sanitation Economy and new value creation opportunities, one of Firmenich's strategic priorities is to build multi-stakeholder partnerships that shape the enabling ecosystem for business to invest in innovative solutions and create new markets. Sanitation is not only a human right with lasting social impact but could also create important opportunities from a business and environmental perspective in terms of water, energy through biogas, etc. Moreover, the sanitation initiative offers opportunities for Firmenich's senior management team to leverage their global networks for the sanitation cause. For example, Gilbert Ghostine, CEO, Firmenich has taken a leadership role in the sanitation movement at the global level. Commitment from the top makes it easier for the teams to more efficiently and productively engage in sanitation related-projects. Firmenich has been the only one in its industry to drive the toilet revolution with commitment that goes beyond "pure business".

Differentiation and Core Competences

At the most basic level, by providing opportunities for constant experimentation, learning, and adjustment, the sanitation work, helps Firmenich in strengthening the sustainability angle of its corporate strategy and in accelerating the integration of sustainability into its business. This also informs and supports the search for market-based solutions. Many companies involved in the Sanitation Economy have built their positions primarily through investment in physical products and infrastructure, so called “hardware solutions”. There are different types of toilet solutions, such as portable toilets, public toilets managed by entrepreneurs, old fashion latrines, etc., designed to address unique local circumstances, traditions, and culture. Often, even best technical-engineering solutions are not good enough. Little has been done on human centered sanitation solutions that take low-income consumers’ emotions and behaviors into account. Solutions need to consider the fact that sanitation is a human right with enormous social impact and that bad smell is a stigma of poverty and good smell drives social inclusion and dignity. Based on its core competences, including the innovative work on “positive emotions” that shape human behavior Firmenich has been positioning to continue being the leader in what we could call the “software solutions” of the Sanitation Economy.

Employees

The sanitation-related work fits with Firmenich’s deeply embedded corporate values and support and nurture employee’s imagination and passion^{xxvii}. While this commitment provides employees with greater motivation for their role, it is also an opportunity for them to deal with different challenges and countries, and to be more exposed to external and social issues. In line with Firmenich’s more externally oriented, transformational sustainability agenda, the initiative energizes employees to avoid over focus on internal activities. Firmenich’s commitments to ambitious environmental and social objectives and early embrace of sustainability have resulted in positive change on many fronts within the organization and with the relationship with its key stakeholders. This is further supported by non-financial rewards for top performers at all levels of the company. For example, the top performers can spend some time on sustainability-related projects on the ground to learn more, innovate, and explore market-based solutions. This approach called Firmenich 4 Society also creates interest from top class scientists and people with passion and holistic backgrounds to join Firmenich.

Looking ahead

Firmenich’s Leadership Role in Sanitation 2.0

Entering the 21st century - an era that is undergoing profound transformation with artificial intelligence, machine learning, big data, blockchain technology, and many other disruptive technologies that can improve processes but also human life - creates unprecedented opportunities and challenges for Firmenich. Unlike many other sectors, sanitation is one that hasn’t changed much over the last two decades. Yet, it

underpins one of the most basic needs and is an essential human right that is the right to water and sanitation. With new technologies coming to market and serious commitments from governments; development organizations and banks; and numerous companies^{xxviii}, ranging from big multinationals to local start-ups, a revolution – “Sanitation 2.0; Circular Sanitation Economy; ... ” is here to stay^{xxix}. Nevertheless, the future and success of the Sanitation Economy will depend on collective ability to build a joined-up system where the Toilet Economy can fully feed into the Circular Sanitation Economy with Smart Sanitation unlocking further opportunities. Moreover, the extent of real progress very much depends on the scale of investments that the key market players are ready to make; capacity to engage in innovative partnerships; access to innovative financing mechanisms; confidence in emerging disruptive technologies; etc. How this “\$6 billion global annual revenue market by 2030 for reinvented toilets alone” will be shaped depends very much on the leadership role that some of the key stakeholders will play^{xxx}. Leadership is particularly important as the sanitation systems are increasingly becoming more complex and decentralized^{xxxi}.

As a well-established corporate leader in the sanitation economy, Firmenich has a tremendous opportunity to shape the toilet economy. In this context, there are several important questions: What is the responsibility of business and how can Firmenich strengthen its leadership role? How to take full advantage of the Firmenich’s sustainability strategy in shaping its holistic approach to the Sanitation Economy? More specifically, based on its core competences, including the innovative work on “positive emotions” that shape human behavior: How should Firmenich continue being the leader in “software solutions” of the Sanitation Economy? What are the potential challenges in keeping the leadership position? How to further incorporate the “positive emotions” into actionable solutions?

Champion product development for all market segments

Low-income consumers - Products available on the low-income consumer market include the Harpic brand with Reckitt Benkiser being the first to launch an affordable cleaning product integrating the Firmenich malodor control technology. Amka, a family business in South Africa also showcased its product at the China expo.

As beneficiaries of the products and key actors of such efforts, low-income consumers are at the heart of this project aiming to address the global sanitation crisis. It is therefore critical that affordable and cleaning products targeted at low-income consumers meet their olfactive preferences. However, standard consumer insight methodologies applied to this consumers category showed flat results in the past, indicating that such methodologies are not adequate. Utilizing the more adapted Shared Senses and Sensibilities methodology^{xxxii} and with financial support from the Bill & Melinda Gates Foundation, Firmenich in collaboration with AZAO consulting is conducting further studies in India, China, South Africa and Kenya to better understand the role of odor in sanitation-related decisions and in driving

behavior change. The new insights will be highly beneficial for private and public sector investments in various types of toilets from reinvented toilets to toilet latrines, twin pit latrines, etc. Firmenich is positioning itself as the partner of choice for malodor counteractant technology targeted at various levels of users.

Other consumers

According to Andrew Prescott, VP Technologies Business Development “*Our sustainable business model for the technology has been to offer it at heavily subsidised price levels to support more affordable cleaning products targeting low income consumers, in the knowledge that we would eventually offset this by bringing it to mass market products under more standard commercial terms*”. To that end, after two years of only working on qualifying projects^{xxxiii} that targeted lower income consumers in India and Africa, Firmenich is now starting to collaborate with its customers to integrate the technology into established cleaning and freshening products targeting higher-income consumers in developed markets. In effect, this dual model has not only enabled long term business sustainability but it incentivised customers to move faster into low income markets by supporting the need for product affordability, whilst at the same time giving them a head-start on a technology they knew would eventually also bring benefits and value to their mass market household products too.

Synergy with Existing Company Strategies

Firmenich’s holistic approach to the Sanitation Economy offers many new opportunities with existing business initiatives that touch upon SDGs 8 and 5 to reinforce its priority SDGs i.e. SDGs 12 and 6.

Agriculture and Sourcing:

Sanitation is a particularly relevant issue in agriculture because it has an impact on soil, water and the people who work and live nearby plantations. In light of the importance of this topic, the TBC is working with the Ethical Tea Partnership and a tea company on exploring the benefits of a sanitation economy in agriculture. The tea project is aimed at addressing two needs: rural sanitation and closing the loop by bringing back nutrients to the soil. A report published at the end of last year outlines the opportunity of applying Circular Sanitation Economy to agriculture where toilet resources can produce feedstock to create organic fertilizer and energy leading to cost savings and potentially new sources of revenues^{xxxiv}. Although Firmenich is not a major actor in the agriculture industry, it sources naturals in various countries and engages with smallholder farmers through its Deep Roots program which supports the livelihoods of farming communities impacting 68,000 farmers in June 2018 as audited by the SGS independent review. Some of Firmenich’s customers are also important actors in the agriculture industry: Can the Circular Sanitation Economy be applied to some of the commodities sourced by Firmenich and bought by customers? Beyond the Toilet Economy, can and should Firmenich play a role in the Circular Sanitation Economy? As a leader in responsible sourcing with smallholder farmers globally: How should Firmenich explore synergy between its sanitation work and its sourcing work?

Women Empowerment and Sanitation:

Committed to respecting and promoting human rights, Firmenich works towards gender equality and women empowerment among other issues. In December 2018, Firmenich became the 7th company in the world and the first in its industry to be globally certified by EDGE for workplace gender equality. Beyond equal pay, the certification includes gender balance, recruitment and promotion all the way to leadership training and mentoring and overall inclusiveness of Firmenich culture. It is therefore only natural that this commitment trickles down to Firmenich's supply chain and sanitation work as women are the first ones affected by lack of sanitation. Lack of safe and adequate sanitation is a serious issue not only in terms of safety for women and girls who are at risk of being raped when going to the open at night but also in terms of menstruation and hygiene which is one of the reasons why girls drop out of school. Looking at its whole supply chain, from corporate offices to collecting naturals at source, Firmenich's commitment is to ensure that every woman in the context of Firmenich's company and business relationships, regardless of where they live, is given a safe and secure work environment and equal chances of opportunities. By working on driving toilet use with its malodor counteractant technology, Firmenich can make toilets more attractive for women. One recent example of Firmenich's commitment to making sanitation available to women is the engagement with Saraplast and the Ti (Toilet Integration) Sanitation Centre, a one stop answer for all women looking for clean and safe toilets, health and hygiene products. As part of this collaboration, on 2018 World Toilet Day, Firmenich opened the doors of its new "Mobile Toilet for Her" in Pune, India^{xxxv}.

"A trail-blazer in the toilet economy, Firmenich was the first to create affordable and sustainable malodor control technologies for low income consumers," explained Rajeev Kher, Toilet Board Coalition Steering Committee Member, CEO of Saraplast Pvt Ltd and Founder of 3S (Sanitation Solutions Simplified). "Having a long-lasting and pleasant smell in the bus is essential, because no matter how efficient and innovative new toilets are, if bad smell prevents their usage, they will lack impact." Comments from Sarah d'Arbeloff, Director Technologies Business Development illustrate Saraplast's desire to making their buses smell good: "We've been working with Saraplast and supporting them for several months in developing the right fragrance solution and ensuring that the technology works in the most challenging conditions".

Furthermore, women also play a critical role in agriculture, particularly small farming which is why Firmenich is implementing women empowerment programs in some regions. What else can Firmenich do to increase its impact on women empowerment? What is needed to fully explore synergy with the existing initiatives?

Customers

Firmenich's focus on partnership with companies that have similar values and ethics makes it easier to materialize shared economic interest. By co-creating superior value for its customers, Firmenich is becoming an integral part of their

sustainability solutions. This helps customers be aware and take responsibility for their entire value chain of products and to deal with investors' pressure for sustainability. As the sanitation initiative is aligning with consumer trends around health, environment, and sustainability, it makes it easier for Firmenich to energize its customers and help them link "brands to purpose", as well as to move from products that improve lives to products that save lives. Changed consumer behavior is critical to sustain and scalable impact. As part of Firmenich's strategic priority to build multi-stakeholder partnerships, particularly working together with other businesses in a pre-competitive space, several specific questions need to be addressed. How to create a global toilet cleaning alliance modeled on the hand washing initiative to help large brands and others work together? How to motivate other companies who are not yet seeing the market opportunity to get engaged? How to work with companies that are sourcing their products to governments for the cleaning of public toilets for instance?

Firmenich's engagement in the ecosystem

It is critical for Firmenich to continue engaging with various stakeholders to shape the ecosystem that will make the Sanitation Economy successful. One example is the International Standard Organization (ISO) which has a key role to play in this ecosystem and will become a driver of private and public decision-making. Recognizing the important role of standards from the outset, the Bill & Melinda Gates Foundation invested early on developing a new standard for non-sewered sanitation systems (NSSS): ISO 30500^{xxxvi}. Specifying general safety and performance requirements for design and testing, the standard will build confidence and drive investment in new technologies and products. How can Firmenich work with ISO for a greater recognition or integration of the "software solutions" into the standard?

The Role of Multilateral Development Banks

Development banks, such as the World Bank Group, and big private investors are more actively introducing innovative financial instruments for sanitation related projects^{xxxvii}. One example is Blended Finance – a strategic use of development finance for the mobilization of additional finance towards sustainable development in developing countries^{xxxviii}. International Finance Corporation (IFC) uses blended finance to create markets and bring about development impact^{xxxix}. An important step toward building new partnerships with development banks was the panel at the *Reinvented Toilet Expo* (RTE) in Beijing, which was moderated by Dr. Bérange Magarinos-Ruchat. Development banks are well positioned to leverage their experience working in developing countries to improve policy, regulatory, and investment environments. By building on their relationships with governments and providing "low cost" loans and innovative financial instruments developed banks can contribute to an ecosystem supportive to more and better sanitation infrastructure and disruptive-technology-driven solutions. At the RTE in Beijing, China, the World Bank, the African Development Bank and the Asian Development Bank announced that they commit \$2.5bn to non-sewered sanitation solution and city-wide

inclusive sanitation. This also creates new partnerships opportunities for companies and foundations^{xl}. Do companies need to adjust their business and partnerships models to better utilize these new partnership opportunities with development banks? What role, if any, should Firmenich play?

There is no doubt that the sanitation journey has helped Firmenich with its sustainability agenda by focusing on building external partnerships to support and amplify its good work. Still, the big question is: How should Firmenich position itself in addressing each of the challenges outlined above? These are large and complex questions facing Firmenich's leadership team. Is Firmenich at a major inflection point in the sanitation program? Should Firmenich explore options for creating an intrapreneurial culture to fuel innovative ideas?

More broadly: Is Firmenich at a crossroad where sanitation among other societal issues is coming on board making up for a new blueprint?

Appendix I: Firmenich: Basic Facts

Firmenich is the world's largest privately owned company in the fragrance and flavor industry, with 7,000 employees, 31 manufacturing sites, and 4 R&D centers. Firmenich operates in two business divisions: Fragrance & Ingredients as well as Flavors and has created many of the world's best-known perfumes and flavors. It operates in 33 countries with annual sales of 3.7bn CHF in net sales in FY18. Firmenich is a company that innovates utilizing its unique innovation culture, effective internal organizational structure, knowledge exchange, and capacity building. Through its renewed purpose *For Good, Naturally*, its new generation of ingredients; leading delivery systems; eco-design products; and focus on health and wellbeing as well as hygiene and sanitation, Firmenich has anchored sustainability in the long-term interests of employees, local communities, customers, and the environment. Firmenich's *Pathways to Positive* strategy, is structured around three pillars – *Governance, Growth, and Green* – the 3Gs. This simplified framework is supported by 2020 goals within each pillar and provides a strong basis for action, reporting and engagement. Being a supplier to the world's largest consumer goods companies, Firmenich's environmental footprint and governance standards are of great importance to its customers. A few years ago, Firmenich engaged in the global sanitation initiative. See Appendix II: Global Sanitation Challenges and Opportunities and Appendix III: Firmenich's Approach: Dealing with Complexity through Core Competences and Creative Partnerships.

Appendix II: Global Sanitation Challenges and Opportunities

In many developing countries, particularly the poorest ones, sanitation remains a neglected issue with financial investments representing only one-fifth of all water, sanitation, and hygiene sector expenditures^{xli}. Roughly 4.5 billion people lack access to safely managed sanitation. More than 800,000 children in the developing world, under age of five, die each year from diarrhea, pneumonia, and other common infections caused by unsafe water and sanitation. Diarrhea diseases are the second-leading cause of child deaths, and one in three women risk shame, disease, harassment, and even attack because they lack access to adequate sanitation.

Companies recognize that many of the sanitation problems, ranging from children mortality to negative impact on economic growth pose threats to their businesses. The problems are likely to intensify as demand for health increased along with the global population. It's also about unmet consumer needs in new markets. If these needs are properly addressed, they will increase the demand for sanitation and thus create new business opportunities. In dealing with the sanitation crisis there are two priority issues that need to be immediately addressed: a) access to toilets and

b) Poor service and maintenance for the existing ones. Today, nearly 1 billion people don't yet have toilets. The first step in finding a solution to sanitation problems in the world's poorest countries was to provide more toilets. Donors, local governments, villages, and NGOs built millions of new toilets to curb rampant open defecation and to keep human waste from contaminating^{xlii}. Although about three billion people have toilets, offending malodors associated with toilets and latrines make people avoid them, using the outdoors as their potty^{xliii}. This creates public-health threats. Allowing bacteria and disease to spread leads to suffering and slow economic growth^{xliv}, undermining the progress that has been achieved in global sanitation.

There is an urgent need for innovative solutions. This includes “segmentation of the toilet market” so that more targeted solutions can be found. It is also important to address softer elements of the problem such as motivating communities to use toilets and seeking out appropriate maintenance that can sustain toilet use. Softer issues are sometimes more challenging than the physical construction of toilets. Traditional and religious beliefs are important factors of decision-making. No substantive progress can be achieved without addressing the emotional aspect of the problem – human nature. Smell has an important impact on emotions. Emotions are powerful drivers of change. They shape behavior. The challenge is how to change people's lives through behavioral change and eliminate malodors as a stigma of poverty.

Appendix III:

Firmenich's Approach: Dealing with Complexity through Core Competences and Creative Partnerships

Complexity and Market Creation

As with any global initiative, the complexity of the sanitation problem partly comes from the fact that the sanitation challenge has a fluid structure and many critical elements are highly dependent on the specific circumstances of a given locality. Specificity of the location also impacts the perception, expectations, and incentive structure of various stakeholders^{xlv}. Although numerous businesses operate across commercial segments of the sanitation market, many have no interest in engaging in the low-margin segments in emerging economies. Simply there is no well-developed market. Commercialization of the low-margin segment is more of a collective action issue than a task for individual company^{xlvi}. Better commercialization based on market-based solutions can only be achieved through continuous improvement in the business and policy ecosystem and stronger government support, at the national, state, and municipality level^{xlvii}.

Firmenich realized that its engagement in sanitation was going to be a very complex undertaking, requiring a holistic approach along multiple dimensions. In the search

for implementable solutions, Firmenich's initial analysis and activities were primarily driven by the need to better understand the complexity of the sanitation problem and discover the challenges and opportunities that were not immediately obvious. Through an in-depth segmentation of the sanitation problem and search for market-based solutions, it was much easier to recognize the value creation and value destruction activities, the cost associated with each of them, complementarity, optimal utilization of partners' core competences, and the role and impact of various stakeholders and their expectations and perceived values. Firmenich focus has been on utilizing its core competences; fundamentals, including good governance; excellence in R&D and technological solutions; and innovation in targeted and blended finance and partnerships.

Fundamentals and Core Competences: Firmenich analyzed the sanitation project in the context of its core competences and new sustainability commitments for 2020. Firmenich's Fundamentals^{xlvi} drives its communities of perfumers, chemists, process engineers, and regulatory experts to pioneer extraordinary ingredients through dedication, passion, and knowledge. Fundamentals are also a key driver behind its engagement with sanitation challenges.

Good governance: Without improved transparency, accountability, and responsibility across the sanitation space, greed and corruption can easily undermine even the best-designed projects.

R&D and Technological Solutions: Firmenich's leadership in using breakthrough science and excellence in innovation and execution in developing game-changing perfumery and flavor ingredients to help solve global issues is well recognized^{xlix}. A multidisciplinary team was formed to address the hygiene and sanitation challenge. The focus has been on R&D and advances in technologies, driven by market-based incentives, which will result in higher rates of toilet usage. New investments in R&D should result in declining technology costs, thus improving the efficiency of the value chain. The challenge is that bringing innovations from basic research to marketable products takes years.

Innovation in Targeted Finance: Investing in R&D that would provide affordable access to stink-free toilets, at least in the initial stage, is more on the public good side. For Firmenich, it was difficult to justify to fully finance R&D from its own resources. In the later stage, it would be easier to finance the development of the products from the core business, and to rely on market demand. During the process of identifying market-based solutions and in order to deal with "market failure" Firmenich needed an innovative approach to partnership, not only along the core competences of the partners but also more targeted access to financial resources that most effectively support the implementation^l. The Firmenich team was exploring "innovative" ways of getting access to more targeted financial resources through strategic partnerships with donors, foundations, and development banks^{li}. This would also allow Firmenich to meaningfully complement many other initiatives in the

broader space of sanitation and make it easier for other players to engage in a more informed and substantive way. Complementarity is of key importance as the global sanitation initiative can't be centrally coordinated.

Innovative Partnership: Firmenich has a long legacy of successful collaboration and partnering. Engaging with clients, customers, suppliers, governments, NGOs, donors^{lii}, academia, industry associations, and government agencies has been critical in dealing with complex issues and to the success of its 2010-2015 Sustainability Strategy. Firmenich is not only developing long-lasting fragrances. Through innovative partnerships Firmenich has been launching sustainable initiatives and co-creating and catalyzing innovative solutions to very complex problems of improving quality of life and protecting the planet. With a focus on “market-based solutions”, the complexity of framing the problems and the search for adequate solutions and partnerships became clearer. “Business discipline” is not enough. It is equally important for the partners to have appropriate expertise and a skill mix needed to more explicitly explore and create market-based solutions. In addition to segmenting partnerships according to its needs, for Firmenich, it has been equally important to minimize the “transaction cost” associated with building partnerships and implementing real life solutions. Building successful partnerships takes time. Firmenich decided to deliver on its commitment to improve access to sanitation and to reduce epidemics and child mortality through partnerships with:
(1) the Bill & Melinda Gates Foundation and (2) the Toilet Board Coalition.

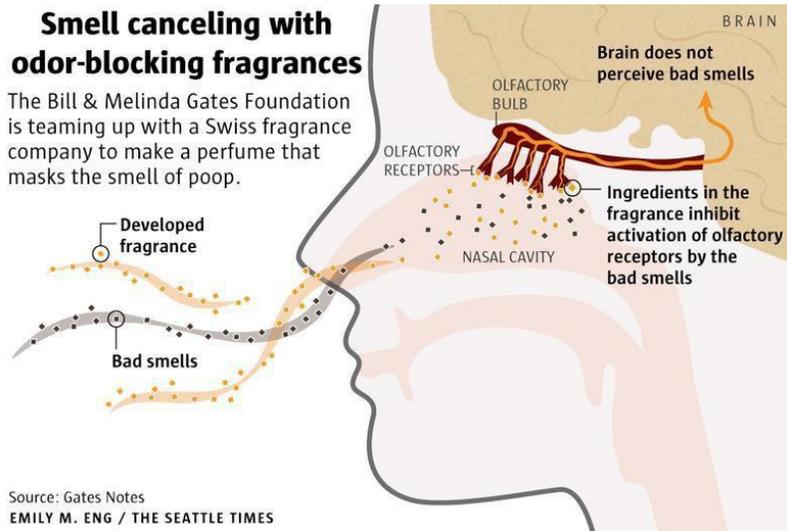
Appendix IV

Basic Research: Firmenich's Odor-blocking Perfume - Reinvent the Toilet Experience

Beyond Covering the Malodor: While pleasant fragrances are often used to cover tough odors, Firmenich was determined to try and find a different, cutting-edge innovative solution. In the initial stage the research focused on isolating what actually causes toilets to smell so bad and on attacking the problem on a molecular level at the connection between “noses and brains^{liii}”.

Localization and Contextualization - Field Study and Hands-on: To understand the chemical stew Firmenich sent their scientists to study toilets in the developed and developing countries and collected samples from latrines in India; Africa, in Kenya, Uganda, and South Africa; the US; and Switzerland^{liiv}. Next, Firmenich created mock latrines with customizable heat, humidity, and ventilation inside their research facility in Geneva^{liv}. The scientists managed to isolate the four chemical compounds that are responsible for the terrible smell in toilets and then developed an odor-neutralizing compound that inhibit the activation of certain receptors in human noses, making them unable to register certain malodors. Bill Gates tested them first

hand.



Endnotes

ⁱ The Reinvented Toilet Expo took place just a couple of weeks before World Toilet Day. Gathering government representatives, businesses, NGOs, and academia, the objective of the Expo was to display new solutions that can bring safe sanitation to all and to highlight the opportunity for businesses and governments to invest in these solutions.

ⁱⁱ *"I have seen what toilets are like for the world's poorest and I have used—and smelled—them myself. It is pretty awful,"* Gates tells Co.Exist in an email. *"I wanted to see if we could fix the malodor problem, which would help people right now, while we also design new toilets and help governments solve the big infrastructure challenges of getting better sanitation systems."*

ⁱⁱⁱ <https://www.gatesnotes.com/Development/Omniprocessor-From-Poop-to-Potable>

^{iv} Firmenich's performance has been driven by the trust of its customers, who rely on its fragrances and flavors every day to help win the hearts of billions of consumers; its industry-leading investment in world-class research and creativity to offer its customers cutting-edge solutions; and the passion and commitment of its colleagues, firmly focused on value creation. Firmenich aims to uphold the values of sustainable development in its industry and the world through its three-pillar strategy – Governance, Growth and Green. See: Firmenich Performance & Sustainability Report, 2018

https://www.firmenich.com/uploads/files/sustainability_report_2018.pdf?ee61df9

^v More information about Firmenich is available at www.firmenich.com. See also Appendix I: Firmenich: Basic Facts

^{vi} See for example <http://www.toiletboard.org/sanitation-economy>

^{vii} A signatory of the United Nations Global Compact since 2008, Firmenich actively embeds the UN's Ten Principles and SDGs across its business. Firmenich was featured as a champion of the UN Global Compact in a movie produced by the organization's Swiss network, showcasing pioneering Swiss companies advancing its Principles and SDGs alongside Nestlé Waters, Bank J. Safra Sarasin and Caran d'Ache. Watch the movie at <https://www.globalcompact.ch/>

^{viii} See <http://www.bizsum.com/summaries/creative-capitalism> and <http://harvardmagazine.com/2008/10/bill-gates-on-creative-capitalism>

^{ix} Bill Gates's faith in science was at high display when in 2017 he drank water converted from human waste.

^x Firmenich is recognized by its commitment to research and 10% investment of turnover annually in breakthrough science. Its global research team runs four centers of excellence in Switzerland, the U.S., India, and China and collaborates closely with a network of open-innovation partners including leading academic institutions and innovative startups. Through innovation and research, Firmenich contributes to addressing global health, hygiene, and sanitation challenges and explores sustainable lifestyles. Its multidisciplinary research allows Firmenich to differentiate its broad flavor and fragrance ingredients portfolio. See Firmenich Performance & Sustainability Report

https://www.firmenich.com/en_INT/sustainability.html

^{xi} The countries included India, Kenya, Uganda, South Africa, the U.S, and Switzerland

^{xii} For example, the opportunity at the Global Toilet Business Innovation and Investment Summit to get exposed to the future of the "digital future of sanitation technology" and moving from monitoring data to extracting relevant data from toilet resources will allow companies to proactively intervene in improving the diet of local populations or prevent epidemics.

^{xiii} Market-based solutions are equally important for both local SMEs and multinational companies and will attract more partners to tackle sanitation issues globally.

^{xiv} According to Gates, the foundation took a similar approach with malaria, *"where we work on solutions for today, like distributing bed-nets, while also funding research for vaccines and eradication."*

^{xv} Firmenich's creativity stood out at 2019's Fragrance Foundation Awards, as Firmenich won over 20 accolades around the world.

^{xvi} This includes shaping the changing external policy and regulatory environment. Creative partnerships with governments can drive policies that support and encourage innovative private sector solutions for sanitation. This includes (1) design for smart, sustainable toilet and waste management that consider universal and safe access to toilets as well as ongoing operations, maintenance and improvements; (2)

circular resource recovery that considers the re-use of biological resources from sanitation for water, energy and nutrients; and (3) the use of data-driven applications and technologies to optimize system efficiencies and that consider new applications for preventative healthcare. Furthermore, partnering with new players, such as cities and municipalities will increasingly become critical for the success of sanitation initiatives. Pune is a good example of how smart cities are creating a new playing field for sanitation, for more details see <https://www.nbcnews.com/news/world/building-sanitation-system-future-india-where-toilets-are-hard-find-n954276>. This creates additional opportunities to influence local policy and attract local investment. By inviting business to have a seat at the table as global agreements are being developed, the United Nations and other international organizations will benefit from private sector's increased interests related to the Sanitation Economy and innovative ideas for impactful and scalable solutions.

^{xvii} Laguna Water is a public-private partnership and a piped service provider owner by Manila Water Philippine Ventures and the Province of Laguna:

https://fsm5.susana.org/images/FSM_Conference_Materials/Wednesday/Opening_plenary/Manila-Water-Story_FSM5-CONFERENCE-submitted.pdf

^{xviii} For an example of the importance of multispectral partnerships in addressing complex development issues, watch the video version of the interview with Djordjija Petkoski: <https://global.oup.com/us/companion.websites/9780190871819/res/vid/036/> published in Ray Goldberg, *Food Citizenship – Food System Advocates in an Era of Distrust*, Oxford University Press, 2018.

^{xix} Djordjija Petkoski, *Firmenich in Uganda*, 2014:

<https://www.wbcds.org/contentwbc/download/2870/35917>

^{xx} For more information please visit <http://tv.people.com.cn/n1/2018/1103/c43911-30380234.html>

^{xxi} See for example:

https://www.ifc.org/wps/wcm/connect/CORP_EXT_Content/IFC_External_Corporate_Site/Solutions/Products+and+Services/Blended-Finance

^{xxii} The TBC founding corporate members include Unilever, Kimberly-Clark, Firmenich, and LIXIL Corporation who are bringing their commercial acumen, combined with the sanitation expertise of the WSSCC, UNICEF, WaterAid, WSUP, BRAC, and the social investment expertise of DFID, AFD, GCC, USAID, the World Bank and the Stone Family Foundation. These organizations share a joint vision and mission to support and accelerate commercially sustainable business models dedicated to building resilient sanitation systems. The TBC also provides support to SMEs in low-income markets that have the potential to contribute to sustainable and resilient sanitation for all. The TBC Summit's momentum culminated in the Global Citizen India festival on World Toilet Day 2016 where the TBC announced private sector commitments of \$15million USD. For more information, visit www.toiletboard.org

^{xxiii} An overview of lead entrepreneurs working on commercially viable businesses across the Sanitation Economies and supported by the Toilet Board Coalition through the corporate accelerator program is available here:

http://www.toiletboard.org/accelerator#section-toilet_accelerator-impact

^{xxiv} For example, Firmenich brought best practices from the engagement of Dr. Bérange Magarinos-Ruchat, Vice-President Global Head of Sustainability, in the creation of the Global Alliance for Improved Nutrition (GAIN) see: <http://www.gainhealth.org/> and in particular the GAIN Business Alliance; see HBS Case Studies: Goldberg, R. A., Petkoski, D., Herman, K. *Fighting Malnutrition and Hunger in the Developing World*. Harvard Business School, April, 2009. (N9-909-406) and Ray Goldberg and Kerry Herman, "Alleviating Poverty and Malnutrition", Harvard Business School Cases Study, No. 9-907-409, 2008.

^{xxv} See https://www.firmenich.com/en_INT/company/news/World-Toilet-Day-2016.html

^{xxvi} TBC's recent decision and announcement to create a new India Chapter is an exciting milestone and another opportunity for Firmenich and its Indian subsidiary to further its understanding of the Indian sanitation market.

^{xxvii} For example, in the context of its collaboration with the TBC, Firmenich offered two of its employees to use their skills and expertise to give advice to sanipreneurs that are part of the TBC's accelerator cohort program.

^{xxviii} <http://stepsforsanitation.org/rte/>

^{xxix} For more information on technologies, commitments and initiatives from multiple actors, the Fecal Sludge Management Alliance hosts a biennial conference that brings together many case studies available here:

<https://fsm5.susana.org/en/downloads/conference-materials#DAY%202,%20KEYNOTE%20PRESENTATIONS>

^{xxx} A study by Boston Consulting Group talks about a \$6 billion global annual revenue market by 2030 for reinvented toilets alone.

^{xxxii} For example, with new technologies such as the omni-processors and the like of reinvented toilets, sanitation, once a centralized system, will become increasingly decentralized and will see the rise of an off-grid system in places where sewers cannot access and water is scarce. Not only will these new systems consume less energy and water but they will also offer new facilities for the many people who do not have access to safely managed sanitation. Smart and digital technology can help to detect early harmful pathogen or diseases which also pose the question of the content of cleaning product content so they do not disturb efficient technologies. Progress in this area will also impact the broader engagement in the Circular Sanitation Economy and waste, including plastics. As the world population increases, human waste will increase too which presents an incredible opportunity to treat more waste but also to create by-products that can be reused in a circular economy mindset.

^{xxxiii} In view of obtaining more accurate results, Firmenich collaborated with the Naandi Foundation and AZAO and developed a unique methodology, the Shared Senses and Sensibilities methodology, through which young adults from local low-income communities are trained and coached as interviewers to conduct non-intrusive dialogues with the consumers. A detailed overview of the methodology and work carried out in that regard is available in the case study *Firmenich in India: Changing the Rules of Engagement with Low Income Consumers, 2014*.

^{xxxiii} Qualifying projects are projects for which a product must be affordable and targeted at Base of Pyramid consumers in low-income consumer markets as per the global access policy of the Bill & Melinda Gates Foundation: <http://globalaccess.gatesfoundation.org/>

^{xxxiv} http://www.toiletboard.org/media/46-TBC_2018AgricultureReport_11242018_FINAL.pdf

^{xxxv} https://www.firmenich.com/en_INT/company/news/firmenich-opens-door-of-mobile-toilets-for-women-in-pune-smart-sanitation-city-india.html

^{xxxvi} For more details, see <https://www.iso.org/standard/72523.html>

^{xxxvii} For example, in the past 25 years, the World Bank Group has committed over \$10 billion to sanitation and water services, reaching millions of people in developing countries; see: <https://www.worldbank.org/en/news/press-release/2018/11/06/world-bank-group-and-bill-melinda-gates-foundation-commit-to-innovation-to-speed-up-sanitation-for-all>

^{xxxviii} <http://www.oecd.org/development/financing-sustainable-development/development-finance-topics/blended-finance.htm>

^{xxxix} IFC uses a disciplined and targeted approach when it comes to blending concessional donor funds with its own commercial funds by applying the following five principles: Additionality and Rationale for Blended Concessional Finance; Crowding-in and Minimum Concessionally; Commercial Sustainability; Reinforcing Markets; and Promoting High Standards. See:

https://www.ifc.org/wps/wcm/connect/corp_ext_content/ifc_external_corporate_site/solutions/products+and+services/blended-finance/blended-finance-principles

^{xl} For example, The World Bank Group and the Bill & Melinda Gates Foundation have committed to work together to unlock at least \$1 billion in investments in innovative sanitation solutions; see: <https://www.worldbank.org/en/news/press-release/2018/11/06/world-bank-group-and-bill-melinda-gates-foundation-commit-to-innovation-to-speed-up-sanitation-for-all>

^{xli} It has been estimated that reaching sanitation for all will require about \$1 trillion investment over the next 15 years.

^{xlii} For example, in India there is a massive new toilet construction program underway.

^{xliii} To learn more watch this video: <https://www.gatesnotes.com/Development/Smells-of-Success>

^{xliiv} "Beyond the tremendous human suffering, it's a problem that slows economic development. In India alone, poor sanitation costs nearly USD 55 billion each year, more than 6 percent of GDP," Bill Gates wrote on his Gates Notes blog.

^{xliv} Scaling up and bringing best practices from other countries are not about simple replication. There are big differences in (1) tradition and culture, (2) the way sanitation activities are organized, and (3) the role of various stakeholders, particularly the local governments, and NGOs.

^{xlvi} It is about collective action and innovative partnerships. No single company can create a significant impact without bringing in and aligning resources with other companies. Improving market efficiency and market-based solutions requires exploring new forms of innovative partnerships with key local stakeholders, donors, and development organizations, as well as reaching to other related industries.

^{xlvii} Building market-based solutions from scratch is a profoundly challenging task. In many cases there are no immediate market-based solutions. These solutions are highly dependent on the efficiency of the market, the value chain, related institutions, and the incentives and the role of the key stakeholders. That is why it is important to explore possibilities for “hybrid solutions,” which would provide a base for and in time would lead to market-based solutions. Furthermore, the increased demand for a significant progress in addressing many of the world’s formidable social and environmental problems requires a careful balance between business needs and pressure for more immediate positive social and environmental impact, thus adding to the overall complexity of sanitation initiative.

^{xlviii} On Fundamentals see www.firmenich.com

^{xlix} A little known fact is that in 1939, Firmenich’s head of research won a Nobel Prize for work that included developing a line of synthetic musks originally harvested from the glands of mountain goats.

ⁱ How financing is structured affects the viability of a specific solution. Obviously, not all of the potential solutions will be win-win for everyone involved. A more in-depth, fact-based financial analysis is needed to better understand the extent to which a particular solution will be win-win or win-no-win. This will provide a base for more informed and fact-based decision-making allowing various stakeholders to better understand their interest and the role they would like to play.

ⁱⁱ Firmenich has a very positive experience from its partnership with the Danish Development Agency DANIDA; see Djordjija Petkoski, *Firmenich and Danida in Uganda: Sustainable Vanilla Sourcing through an Innovative Partnership*, 2015.

ⁱⁱⁱ See for example, Djordjija Petkoski, *Firmenich in India: Changing the Rules of Engagement with Low Income Consumers*, 2014

ⁱⁱⁱⁱ Of the 350 olfactory receptors, which relay smells between the noses and brains, only a few capture the unpleasant smell. The research is done in collaboration with neuroscientists at Columbia University, New York.

^{lv} For example, more than 400 people in Kenya, South Africa, and India participated in a consumer insights project.

^{lv} Localization and contextualization is critical as things waft differently in different situations, requiring a complicated chemical cocktail to counteract them