Digital health technologies as a catalyst for personalized nutrition

Dr. Volker Spitzer, May 2019

Event: Vitafoods | Geneve | Switzerland
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Disruption in the Consumer Health Industry
The digital revolution is changing the industry landscape everywhere

Personalization of services and personal control is the key trend

- Travel = Disaggregation
- Retail = Disintermediation
- Camera = Disruption

How will “Digital” impact the nutrition category and personalization in Consumer Health?
Demographical and socio-economic trends direct the health industry into the prevention and wellness space as a new growth area

Changing demographics
- Ageing society
- Increase in life expectancy
- Higher incidence of lifestyle diseases

Healthcare systems on the edge
- Cash-strapped public health budgets
- “System” fosters self-care
- Prevention instead of treatment

Consumer involvement and power
- Rise in disposable incomes
- Health and self-focused consumers
- Digital platforms trigger decisions
- Diagnostic technologies on the rise

Focus on Wellness and environment
- Consumers seek “healthy” products
- Naturals & alternatives wanted
- “Clean label”/sustainability on rise

Is the industry ready to provide relevant solutions?
Consumers Are Engaged and Want Solutions that Work Best for Them

<table>
<thead>
<tr>
<th>Consumers are no longer satisfied with just what is made available to them</th>
<th>Options for consumers are growing</th>
<th>The industry has been slow to respond in terms of innovating to modern consumer needs</th>
</tr>
</thead>
</table>
| • Changing attitudes  
• Rise of the digital communications  
• Consumers voice what they expect | … they will swap to an alternative if they believe it will work better for them | … but no industry is protected from disruptive innovation |

Is a higher degree of personalization of nutritional solutions needed?
The Past Main Innovation Approach Around Line Extensions is Not Yet Aligned To a Support “Personalization”

Narrow focus on formulations, packaging

Investment in science, claims & understanding consumer needs is stagnant?

Main drivers are commercial viability & brand fit

...do line extensions meet the needs of modern consumers?
### Four Signs the Current Food Supplement Innovation Model Is Leaving the Industry Open to Significant Disruption

<table>
<thead>
<tr>
<th>Warning Signs of Risk</th>
<th>Relevance for Food Supplements</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Business as Usual</strong></td>
<td>Recent innovations not providing significant new benefits but model remains largely unchanged</td>
</tr>
<tr>
<td><strong>Financial Issues</strong></td>
<td>Margin pressure vs. increasing investment risks blocking more advanced innovation</td>
</tr>
<tr>
<td><strong>Changing Consumer Demands</strong></td>
<td>Less connected to individual brands and driven to find best value/cultural fit for their individual needs</td>
</tr>
<tr>
<td><strong>Threats from Elsewhere</strong></td>
<td>New entrants – such as FMCG, startups, local companies – are offering new solutions and outcomes</td>
</tr>
</tbody>
</table>

**Legend:**  
- **High** 🔴  
- **None** 〇
Four Signs the Current Food Supplement Innovation Model Is Leaving the Industry Open to Significant Disruption

Warning Signs of Risk

- No significant new benefits
- Margin pressure block advanced innovations
- Not brand but value focused
- New competitors offering new solutions / outcomes

Relevance for Food Supplements

Legend: High ✒ None
Beyond Line Extensions –
The Next Level of Innovation Targeting Personalization
In the last few years the increased ability to influence health outcomes proactively changed...

**Health factors**

<table>
<thead>
<tr>
<th>Component</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Health care</td>
<td>10%</td>
</tr>
<tr>
<td>Genetics</td>
<td>20%</td>
</tr>
<tr>
<td>Environment</td>
<td>20%</td>
</tr>
<tr>
<td>Health behaviour</td>
<td>50%</td>
</tr>
</tbody>
</table>

**Digital health can play an important role at all levels**

- Nutrition
- Physical activity
- Mental <<hygiene>>
- Information & action

Data source: What Makes Us Healthy vs. What We Spend on Being Healthy, 2012
[https://bipartisanpolicy.org/library/what-makes-us-healthy-vs-what-we-spend-on-being-healthy/](https://bipartisanpolicy.org/library/what-makes-us-healthy-vs-what-we-spend-on-being-healthy/)
“Digital Health” is about tools for **improving health outcomes**

*Connected mobile devices supporting consumers from different angles*

- **Empowering consumers to take action to improve their health**
- **Enhancing “analog” products**
  - Provide digital alternatives
- **Capturing and leveraging data**

- Health Management Apps
- Consumer Wearables
- Diagnostic Algorithms
- Web-based Interactive Programs
- Smartphone Cameras
- Consumer Mobile Apps
- Telemedicine and virtual Physician Visits
- Connected Biometric Sensors
- In-home Connected Virtual Assessments
- Clinical Trail Data Collection Tools

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*The Growing Value of Digital Health*  
Evidence and Impact on Human Health and the Healthcare System

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Information Classification: General
The digital health landscape is growing in size and diversity...

The value of DH tools to human health and the healthcare system is further evolving

<table>
<thead>
<tr>
<th>&gt;318,000 health apps</th>
<th>Less than 50 apps</th>
<th>&gt;340 Consumer wearables</th>
</tr>
</thead>
<tbody>
<tr>
<td>&gt;55% apps use sensor data</td>
<td>&gt;10 million downloads</td>
<td>40% of DH apps are wellness oriented</td>
</tr>
<tr>
<td>Many DH tools replace clinical devices</td>
<td>&gt;85% apps less than 5,000 installs</td>
<td>&gt;860 clinical trials now incorporate DH tools</td>
</tr>
<tr>
<td>Some DH tools may even substitute physical health products</td>
<td></td>
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</tr>
</tbody>
</table>

The digital health landscape is growing in size and diversity…

Consumer DH apps targeting wellness management have dropped and the share of apps focused on health condition management increased.

Sources: 42 Matters, Jul 2017; IQVIA AppScript Database, Jul 2017; IQVIA Institute, Jul 2017
In the healthcare industry overall “digitization” is fundamentally changing relationships between stakeholders leading to more personalization

“... enough data and analytic ability to craft a health and medical strategy for an individual that is absolutely uniquely tailored to their body and their way of life”

Big Data
- Data collection via biometrics & sensors
- Analysing data via AI/machine learning
- Digital engagement via smart devices, clouds

Medical technologies
- DNA sequencing
  - Treatments based on genetic profile
- Microbiome
  - Mood, metabolic disorders and gut health
- Nano technology
  - Programable DNA and ingestible computers
- Mobile diagnostic tricorders
  - Forefront of preventative intervention

Change of control over product’s value narrative
- Patients generate information on their personal experience
- Social media increasingly important channel for experience data
- Former recipients of data becoming suppliers of information about real-world product value
- Democratization of control over content

1Forbes Technology Council, Aug 10, 2018,
Till now, growth in the digital health space is being driven mainly by pharma players, tech giants & start-ups ... not so much by consumer health companies

Range of players in digital health

Pharma
- Sanofi
- GlaxoSmithKline
- Philips

Tech Giants
- Apple
- Google
- Ultra
- ORIG3N

Start-ups
- Onduo

Sanofi & Verily
- MyAsthma
  Asthma self management with an app

SureSigns VS4
- Vital sign monitoring

Health
- Health wearable

DeepMind
- Technology for alerting clinicians if a patient’s health deteriorates

Violet® Plus
- Advice on sun ultraviolet exposure

Nutrition
- DNA test & nutritional advice
More Consumer Health focused companies have dipped their toes...

Most of the efforts to date center around connectivity to a phone

Wearable fever monitor, sends alerts

Neutrogena

“Brings dermatologist-grade technology straight to your phone”

L'Oréal

Wearable skin sensor to measure UV exposure and connect to a mobile application

Ava

Wearable ovulation and women’s health tracker

Mobile app to educate consumers about when to take allergy medication
In the area of Nutrition Combining New Technologies Can Deliver More Holistic Health Solutions

- **Nutritionals**
  - Fertility
  - Digestion
  - Skin/Beauty
  - Energy
  - Sexual health

- **Wellness**
  - General health
  - Immunity
  - Sleep
  - Weight management

- **Prevention**
  - Mental health
  - CVD
  - Diabetes
  - Metabolic syndrome
  - Bone health

- **Eye health**
  - Immunity
  - Obesity
  - Muscle function
  - Joint health

- **Digital Health**
  - Information and action
  - Mental hygiene
  - Physical activity

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Information Classification: General
Personalised solutions can be developed by combining the digital and the analog world

... and are the First Steps Towards More Personalized Solutions

- Quantified Self
  - What do I need?
  - Pre-diagnosis & diagnosis
    - Health records
    - Genomics & microbiome data
    - Analog & digital biomarkers
    - Predictive analytics/AI

- Tailored Intervention
  - Which solutions are best for me?
  - Intervention by
    - Personalized products
    - Lifestyle changes
    - Behaviour changes

- Monitoring
  - Continual monitoring and refinement of solutions
  - Ad-hoc and real-time monitoring
    - Analog & digital biomarkers
    - Telehealth
    - AI/Machine learning
    - Wearables & sensors

Optimized Self

Value oriented and personalized
Suddenly The «Dietary Reference Intakes» Seem to Come Out of Age…

**Dietary Reference Intakes (DRIs): Recommended Dietary Allowances and Adequate Intakes, Vitamins**

<table>
<thead>
<tr>
<th>Life Stage</th>
<th>Vitamin A (µg RAE)</th>
<th>Vitamin C (mg)</th>
<th>Vitamin D (µg)</th>
<th>Vitamin E (mg)</th>
<th>Vitamin K (µg)</th>
<th>Riboflavin (mg)</th>
<th>Niacin (mg)</th>
<th>Vitamin B6 (mg)</th>
<th>Folate (µg)</th>
<th>Folic Acid (µg)</th>
<th>Vitamin B12 (µg)</th>
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<tbody>
<tr>
<td>Infants</td>
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<tr>
<td>0-6 mo</td>
<td>40*</td>
<td>45*</td>
<td>10*</td>
<td>4*</td>
<td>2.0*</td>
<td>0.2*</td>
<td>0.3*</td>
<td>2.1*</td>
<td>0.1*</td>
<td>65*</td>
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<tr>
<td>6-12 mo</td>
<td>50*</td>
<td>55*</td>
<td>10*</td>
<td>5*</td>
<td>2.5*</td>
<td>0.3*</td>
<td>0.4*</td>
<td>4.0*</td>
<td>0.3*</td>
<td>90*</td>
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<td>Children</td>
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<td>Males</td>
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<tr>
<td>19-30 y</td>
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<td>120*</td>
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<tr>
<td>31-50 y</td>
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<td>Females</td>
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<td>Pregnancy</td>
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<td>1.4</td>
<td>18</td>
<td>1.9</td>
<td>600</td>
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</tr>
</tbody>
</table>

“**No one is average – Not you. Not your kids. Not your employees**”

Todd Rose – 2016

Food and Nutrition Board, Institute of Medicine, National Academies, USA

https://www.ncbi.nlm.nih.gov/books/NBK56062/def-item/appendixes.app1.g11-d27/
What does Personalization Mean for Future Developments?
Digital Health is a way to engage with and address the needs of all parties in the healthcare system – and supports further “personalization”

<table>
<thead>
<tr>
<th>Consumers</th>
<th>Industry</th>
<th>Health insurance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Are using <strong>wearables</strong> and other <strong>technologies</strong> to better monitor their health</td>
<td>See the opportunity to <strong>better manage outcomes</strong> with greater and more timely information</td>
<td>Are starting to <strong>reimburse</strong> (and incentivize) digital health interventions</td>
</tr>
<tr>
<td>Have better tools to <strong>connect</strong> with peers, consumer “experts” and their HCPs</td>
<td>Want <strong>evidence</strong> from a variety of settings, <strong>not just controlled studies but Real World Evidence</strong></td>
<td>Believe that digital health will <strong>decrease spending</strong> over time on medical services</td>
</tr>
<tr>
<td>Have greater <strong>visibility</strong> and <strong>influence</strong> on the outcomes associated with their health regimens</td>
<td><strong>Use digital health to connect</strong> with their consumers</td>
<td><strong>See how it encourages the transition from a ‘fee for service’ to a value based model</strong></td>
</tr>
</tbody>
</table>
Capturing the Consumer Experience Is the Key to Supporting New Benefits and Claims

<table>
<thead>
<tr>
<th>Speak to consumers</th>
<th>Select or design a fit-for-purpose instrument</th>
<th>Demonstrate that it works</th>
</tr>
</thead>
</table>
| • Concept elicitation  
  • Concept model design  
  • Co-design with consumers | • Content validity  
  • Align to clinical/Real World Evidence needs  
  • Integration of consumers | • Validation/reliability  
  • Ability to detect change  
  • Meaningful for consumers |

Scientific rigor & early engagement with regulators is important to succeed with advanced claim strategies
Development of new science and claims by usage and integration of digital data and technologies in clinical trial can improve quality and shorten timelines.
Digitally connected biosensors can provide new insights or substitute complicated processes

**Activity monitors**

Activity monitors primarily track various aspects of patient motion.

**Parameter-specific biosensors**

Parameter-specific biosensors purporting to diagnose must gain regulatory approval.

Note: Activity monitors include fitness trackers, smartwatches, sleep trackers and actigraphy devices; Sources: IQVIA Institute, Sep 2017
Wearables provide activity related data in a real-life setting

Understand patient experience better and improve outcome at personal level

Interacting directly with consumers to generate new evidence

Understand consumers’ real life experiences through recorded data

For some Nutritional categories new types of «digital» biomarkers and evidence could be translated to new claims

Consumers Are Already Seeking Out Personalised Health Data…

and regulators are approving services that provide data on a range of health risks

23andMe

23andMe’s DNA Test was a best-seller on Black Friday, and it’s discounted again for Cyber Monday

Wellness

Learn how your genes play a role in your well-being and lifestyle choices

• Alcohol Flush Reaction
• Caffeine Consumption
• Deep Sleep
• Genetic Weight
• Lactose Intolerance
• Muscle Composition
• Saturated Fat and Weight
• Sleep Movement

+ details genetic risk report (FDA approved)

Providing advise on nutrition and exercise to control risk factors

Leads to further usage of digital health tool support

https://www.23andme.com

Maren Estrada
BGR News  November 27, 2017
Habit – Leading to Personalization of Nutrition

From clinical markers to individual nutritional advice

Measures metabolic markers after stimulation through protein drink

Design of a personalized nutrition plan

https://habit.com

Recommendations for

• Weight loss
• Energy
• Sleep
• Avoidance of certain nutrients
MyDNA – Genetic profiles and personalized recommendations

From weight management to general health & wellness advise

7 genes are analyzed

- FTO gene (weight/appetite)
- PPARG gene (fat storage)
- APOA5 gene (triglycerides)
- ADIPOQ gene (fat burning)
- MTIF3 gene (body size, weight)
- LIPC gene (Chol/TGs)
- FADS1 gene (w3/w6 FA)

https://www.mydna.life/en-uk/

Nutrition Report

- Profile explanation
- Which diet is best suited
- Serving size guide
DayTwo – Leading to Personalization of Nutrition

From clinical markers to individual nutritional advice

Stool sample (DNA sequencing of microbiome) and blood test results, including HbA1c

Algorithm predicts optimal foods (rating 1000s of different foods based on biometrics, gut microbiome analysis, lifestyle factors and health questionnaire)

Personalized nutrition app prepares unique personalized nutrition recommendations (e.g. to normalize blood sugar levels)

https://www.daytwo.com/
Carbiotix – PersonalGut™ Enables Personalization of Gut Health

Enabling the selection of the most relevant soluble fibers

Monthly gut health test to measure gut microbiome

Personalized fiber supplement in sachet format

Tracking of gut health and see the impact of personalized fiber

https://carbiotix.com/
Savor Health – Personalization of Nutrition of Cancer Patients

Clinically appropriate nutrition recommendations and support based on evidence-based science

Evaluation of specific cancer diagnosis, other medical conditions, medications, side effects, energy level, support network, eating preferences and food allergies

A chat bot (“Intelligent Nutrition Assistant”) develops highly personalized nutrition recommendations

Safe and evidence-based solutions that empower patients with actionable information and resources

Direct-to-consumer nutritional counseling, menu/meal planning and personalized meal delivery through a related partnership

http://savorhealth.com/
Edamam – Instant nutritional analysis of any recipe or ingredient list

From calorie tracking to full personal diet management – a threat for food supplements?

- Analyze any recipe or ingredient list
- Database of 700,000+ food items
- 1.7+ million nutritionally analyzed recipes
- Detailed macro and micronutrient data plus allergens
- Lists 25 nutrients
- Personalizes the percentage of daily value based on height, weight, gender, age, and activity level

https://www.edamam.com/
Conclusion
“Digital Health” and Personalised Solutions Will Certainly Impact the Nutritionals Category

- How consumers are **influenced** in their thinking about nutrition and health
- How consumers **select** the food/supplements that is right for them
- How and where consumers **shop** for the best products
- How consumers **manage** their health & wellness
- How industry, HCPs, insurance provider and consumers **interact**
- How companies **generate** scientific evidence for their products
Thank you for your attention

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Current responsibility
Volker is based in Basel developing and implementing a new business area targeting Consumer Health R&D consulting & services

Profile overview
• Joined IQVIA in October 2017
• Prior to IQVIA Volker was Managing Director of “analyse & Realize” – a Berlin based Consumer Health consulting & clinical research company & Head of Innovation, Zaluuida (CH)
• More than 25 years of global R&D and marketing leadership experience in Consumer Health industry/academia:
  - Roche
  - DSM Nutritional Products
  - Bayer Consumer Health
  - University professor in pharmaceutical sciences

Education
• Chemistry, Food Chemistry and Pharmaceutical Science, University Bonn
• Ph.D., Life sciences, University of Bonn

Areas of expertise
• Broad range of R&D areas related to OTC medicines, nutritionals, and natural health products and ingredients (herbals, dietary supplements & ingredients, medical devices)
• Scientific & regulatory strategies incl. Rx-to-OTC switches
• Innovation & portfolio strategies
• Product development & project management
• Strategic partnering, licensing/M&A
• HCP marketing
• Previously member of board of directors at GVF and ILSI international
• More than 65 publications (text books on nutrition/vitamins, review papers, original papers in pre-clinical, clinical research, consumer health science related topics)
Thank you