



THE ISRAEL NATIONAL INSTITUTE FOR HEALTH POLICY RESEARCH

International Workshop

PROMOTING BIG DATA IN ISRAEL HEALTHCARE

Chairman: Ronni Gamzu

September 9-10, 2015
Caesarea, Israel

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International Workshop: PROMOTING BIG DATA IN ISRAEL HEALTHCARE

September 9-10, 2015
Dan Caesarea Hotel, Israel

Wednesday, September 9, 2015

09:00-10:00 *Gathering & Morning Coffee*

10:00-13:00 **OPENING SESSION**

Chairperson: Orly Manor, *Chair, Board of Directors, NIHP*

Greetings: MK Yakov Litzman, *Minister of Health*

Moshe Bar Siman Tov, *Director General, Ministry of Health*

Ronni Gamzu - *Opening Remarks: What is Big Data in Healthcare?*
Tel-Aviv Sourasky Medical Center

Eyal Biran - *Big Data Strategy: Start Simple Think Big,*
Digital & Big Data Consulting Firm

Gabriel Escobar - *Big Problems, Big Data - Transitioning Research and*
Analytic Tools into Practice, Kaiser Permanente
Northern California's Experience

Discussion

13:00-14:00 *Lunch*

14:00-16:00 **CURRENT STATUS: REGULATORY AND OPERATIONAL**

Chairperson: Shlomo Mor-Yosef

Francesca Colombo - *Governing Personal Health Data for Healthcare*
Quality, Performance, Research and Innovations,
OECD, Paris

Varda Shalev - *Big Data in HealthCare: Big Deal? Maccabi HCS*

Yaron Oz - *The Science and Technological Aspects of Big Data,*
Tel-Aviv University

16:00-16:30 *Coffee Break*

16:30-18:30 **PANEL: IS THE HEALTHCARE SYSTEM IN ISRAEL AN OPPORTUNITY FOR BIG DATA?**

Moderator: Avi Israeli

Arnon Afek, Yair Birnbaum, Eyal Gura, Gavriel Hodik, Sara Tzafrir,
Arturo Weschler

Responders: Francesca Colombo & Gabriel Escobar

Discussion

19:30-20:15

Nir Chinsky - *Analyzing Your Data with Tomorrow's Tools, Google*

20:15-Dinner

Thursday, September 10, 2015

09:00-11:00 APPLICATIONS OF BIG DATA

Chairperson: Nachman Ash

Yoav Benjamini - *Big Health Data Analysis in the Human Brain Project: Vision, Challenges, and a Strategy, Tel-Aviv University*

Ziv Ofek - *The Vision for Connected Healthcare - A New Paradigm, Center for Digital Innovation*

Cristian Lovis - *Massive Clinical Data and Clinical Research: Scientific Questions and Policy Requirements, University Hospital in Geneva, Switzerland*

Discussion

11:00-11:30 Coffee Break

11:30-13:00 PANEL: MOVING TO ACTION

Moderators: Yair Schindel & Ronni Gamzu

Ran Balicer, Ya'akov Gal, Shira Lev-Ami, Michal Geva, Varda Shalev

13:00-14:00 Lunch

14:00-16:00 CLOSING SESSION

Chairperson: Ronni Gamzu

Michal Rosen-Zvi - *IBM Watson Health - The Art of Healing Through Big Data, IBM*

Summary Panel

Closing Remarks

Coffee to Go

Dear Colleagues,

Promoting the use of Big Data in healthcare cannot take place in any healthcare system without the leadership of a high-ranking official in the health or IT hierarchy of the country that champions a vision and promotes the necessary steps. The vision should include the provision of better healthcare services for patients by collecting, merging and analysing more health-related data in a manner that protects patient's privacy rights.

The muddy task of aligning taxonomies, rearranging data structure, establishing archiving policies and enabling data flows must be a constantly evolving process that aims to supporting the eventual development and use of big healthcare data.

There are no easy solutions that can be applied to promote Big Data in healthcare but a directive or a policy must be released to orient all stakeholders and thereby to nourish or even propel healthcare Big Data ventures. Openness, transparency and information sharing with stakeholders in healthcare, government and industry are essential. Collaboration with the healthcare industry, although bearing imaginable threats and risks, should be regarded as an opportunity to support healthcare Big Data. Previous success and experience within other fields, e.g., commerce, finance and transportation, provides insights into the advantages and promise of Big Data for the healthcare sector, and vice versa, Big Data innovations in healthcare may be replicated in other fields and may attract resources.

These are few of the many topics to be discussed in the conference that hopefully will lead to a strategic plan of Big Data in healthcare in Israel, now it is a MUST, now, more than ever.



Prof. Ronni Gamzu
Workshop Chairman

List of Speakers

1. **Prof. Arnon Afek**, Ministry of Health, Israel.
2. **Prof. Nachman Ash**, Director of the Health Division, Maccabi Health Services, Israel.
3. **Prof. Ran Balicer**, Director, Clalit Research Institute & Director, Health Policy Planning Department, Chief Physician office, Clalit Health Services. Associate Professor, Epidemiology Department, Ben-Gurion University of the Negev, Israel.
4. **Prof. Yoav Benjamini**, Department of Statistics and O.R., Tel-Aviv University, Israel.
5. **Mr. Eyal Biran**, Eyal Biran Digital & Big Data Consulting Firm, Israel.
6. **Dr. Yair Birnbaum**, Chief Medical Officer, Clalit Healthcare Services, Israel.
7. **Mr. Nir Chinsky**, Head of MEA Google Cloud Platform, Israel.
8. **Mrs. Francesca Colombo**, Head of the OECD Health Division, France.
9. **Dr. Gabriel Escobar**, Director of the Division of Research Systems Research Initiative; and Regional Director for Hospital Operations Research for Kaiser Permanente Northern California, USA.
10. **Dr. Ya'akov Gal**, Department of Information Systems Engineering at the Ben-Gurion University of the Negev, Israel.
11. **Prof. Ronni Gamzu**, Director of the General Hospital, Tel-Aviv Sourasky Medical Center, Israel.
12. **Ms. Michal Geva**, Managing Partner and Co-Founder of Triventures, Israel.
13. **Mr. Eyal Gura**, Co-Founder and Chairman of Zebra Medical Vision, Israel.
14. **Prof. Gavriel Hodik**, Head of the Epidemiology & Database Research, Maccabi Healthcare Services, Israel.
15. **Prof. Avi Israeli**, Chief Scientist of the Ministry of Health, Israel.
16. **Ms. Shira Lev-Ami**, CIO, Israel Ministry of Health, Israel.
17. **Prof. Christian Lovis**, Head of the Division of Medical Information Sciences at the University Hospital in Geneva, Switzerland.
18. **Prof. Orly Manor**, Chair, Board of Directors, The Israel National Institute for Health Policy Research and Professor of Biostatistics at the Braun School of Public Health and Community Medicine of the Hebrew University-Hadassah Medical Organization in Jerusalem, Israel.

19. **Prof. Shlomo Mor-Yosef**, Director General of Bituach Leumi, National Insurance Institute of Israel.
20. **Mr. Ziv Ofek**, Founder and former Chief Innovation Officer of dbMotion, Israel.
21. **Prof. Yaron Oz**, Dean of the Raymond and Beverly Sackler Faculty of Exact Sciences at Tel-Aviv University, and the Rector Elect of the University, Israel.
22. **Dr. Michal Rosen-Zvi**, Director of Healthcare Informatics at IBM Research, Israel.
23. **Dr. Yair Schindel**, CEO of the Israeli government's "Digital Israel" National Bureau at the Prime Minister's Office, Israel.
24. **Prof. Varda Shalev**, Director of Maccabitech, Israel.
25. **Mrs. Sara Tzafrir**, Director, Division of Information, Computing and Communications, Rambam Health Care Campus, Israel.
26. **Dr. Arturo Weschler**, Medical Director of Medial Research, Israel.

Abstracts

Big Health Data Analysis in the Human Brain Project: Vision, Challenges, and a Strategy

Prof. Yoav Benjamini

I shall describe the Health Informatics part of the European Human Brain Project and in particular the goals of its current Big Data analysis components.

I shall review the challenges needed to face, and describe the 3C-strategy developed by our research group.

I shall present initial results from a pilot on Alzheimer data and describe our next phase of work with the Parkinson research team at the Tel-Aviv Medical Center.

Big Data Strategy: Start Simple Think Big

Mr. Eyal Biran

Data leads and extends our business world. In the evolving digital eco-system, customer experience is being continuously furthered, however along with that, large quantities of data are created. This data can be a significant asset for any business and an important resource to leverage to target and accelerate business results.

This session focuses on the business potential of Big Data activity & will shed light on key questions, such as:

- What do healthcare systems and banking systems have in common, as it pertains to emerging digital and Big Data trends?
- Where to start – how to begin creating value from your Big Data and digital services?
- Lessons from the journey of Leumi in the Big Data world.
- What can organizations do with their Big Data, and how?
- How to develop ROI goals and metrics for your Big Data activity?
- Tips and tricks for success.

Governing Personal Health Data for Healthcare Quality, Performance, Research and Innovations

Mrs. Francesca Colombo

Big Data is transforming economies and societies. The presentation will reflect on the opportunities for Big Data to transform health systems through better clinical decision making, better governance and management of care co-ordination, opportunities for tackling waste in health care, and enhanced research. The presentation will argue that better care requires well organised and interconnected databases built on information about individual patients. This new performance-based governance for Big Data requires timely and accurate patient data that spans the continuum of care, including health outcomes and costs. However, while all countries are investing in health data, there are significant cross-country differences in data availability and use. For example, OECD countries are at very different stages in efforts to implement electronic medical records and in conducting, on a regular basis, national health data linkage across different sectors of their health systems. They are also at different stages of successfully balancing privacy concerns related to the use of personal health data with the need to make an effective use of such data for advancing medical research and clinical quality. Some countries stand out for their innovative practices enabling privacy-protective data use; while others are falling behind with insufficient data and restrictions that limit access to and use of data, even by government itself. Countries that develop a data governance framework that enables privacy-protective data use will not only have the information needed to promote quality, efficiency and performance in their health systems, they will become a more attractive centre for medical research. The presentation will argue that a number of steps are needed to successfully prepare a Big Data strategy for the health sector and thus make sure that the effective use of data will transform healthcare leading to better health for all. It will highlight key mechanisms identified by an international multi-disciplinary advisory panel of experts to help maximise benefits to patients and to societies from the collection, linkage and analysis of health data and, at the same time, minimise risks to the privacy of patients and to the security of health data.

Big Problems, Big Data – Transitioning Research and Analytic Tools into Practice, Kaiser Permanente Northern California's Experience

Dr. Gabriel Escobar

Kaiser Permanente Northern California is an integrated healthcare delivery system serving 3.7 M members (approximately 30-40% of the insured population in Northern California). Because of its robust information systems, KPNC has a long tradition of employing its data for population management, quality measurement, quality improvement, and clinical decision support.

In addition, KPNC actively supports research - on the average, one peer reviewed paper from the KPNC Division of Research is published every day of the working week.

In 2006, KPNC's use of information systems entered a dramatic new phase when the organization began the deployment of a comprehensive electronic medical record in all its clinics and hospitals, a process that ended in 2010.

In this presentation, Dr. Escobar will describe:

1. KPNC's use of comprehensive EMR data in various inpatient and outpatient care domains.
2. Evolving structures in KPNC for accelerating the transfer of research and related analytic tools into operations.
3. Some novel applications involving clinical decision support in real time.
4. The importance of "workflow" (defined as that mixed mental, electronic, and physical space where electronic data, the graphical user interface, clinician actions, and patient actions intersect).

Opening Remarks: What is Big Data in Healthcare?

Prof. Ronni Gamzu

Although the healthcare industry faces huge challenges and seeks smarter tools, the practical use of Big Data in healthcare is lagging behind other industries. There are many reasons why the promotion and implementation of Big Data strategies in healthcare has been slow. The main obstacles are the complexity of medical care; the patchy nature of many healthcare systems; the delicate nature of patients' privacy and autonomy; the sacred position of clinical decisions; and the speed of technological advancement in health care.

Indeed, the first layer of healthcare data consists of basic data processes and analyses within the digitized clinical or administrative workflow to provide critical value to improve quality and efficiency of care. Big healthcare data, on the other hand, would be an 'upper layer' of the system, because it involves greater complexity in data collection, storage and analysis and also has a higher potential for benefits for the healthcare sector management, performance, research and innovation. Thus, the layers of the health information system should be carefully planned, so that the system develops upward, maturing gradually toward higher value over time according to a defined strategic plan. Any country that aspires to develop and use IT to improve the efficiency and quality of its healthcare must build their information system upward in a systematic and incisive manner so that the complexities and challenges associated with developing healthcare Big Data are appropriately addressed and managed.

Massive Clinical Data and Clinical Research: Scientific Questions and Policy Requirements

Prof. Christian Lovis

“Big Data” is still unclear defined. It is the convergence of large amount of data, the usual understanding of it, but also of new characteristics such as streamed data, distributed heterogeneous sources, time persistence, and complex semantics to name a few. Thus, Big Data addresses numerous new challenges, such as distributed analytics, knowledge management or variable data quality.

One of the fundamental characteristic of Big Data is its capacity to allow developing new theoretical framework to support research without knowing the research question “a priori”, such as the traditional hypothetico-deductive approach. Stream of data exist, they can hardly be changed or improved, such as social networks data streams, or environmental data. What instruments can be developed to capture and use these data streams to address health or public health challenges. How to search, aggregate, and cross-reference large streamed data flows. Similarly to meteorology and climatology, the science of correlation and causality in medicine will have to evolve to complex models.

The Vision for Connected Healthcare - A New Paradigm

Mr. Ziv Ofek

The medical world is evolving at an astounding rate. For the last two decades, health information technology has played a significant and growing role in this progress, providing a wide spectrum of solutions and improved functionality: EMRs, PACS, HIS, finance, administration & registration, workflow management and more. However, the healthcare industry has lagged behind other industries on the use and implementation of innovative software solutions and clinical data.

Although healthcare organizations and the market in general, have heavily invested over the years in healthcare IT, many challenges have yet to be addressed. The cost of healthcare is constantly rising; medical errors are at a critical level, healthcare systems are often riddled with inefficiencies and improved productivity is a constant challenge.

Recognizing the power of information systems in general, and clinical data in particular, to drive and enable healthcare transformation, lead to the mandate for a new paradigm when patient information can be aggregated (data), integrated (information), understood and enriched by semantics (knowledge) and delivered as actionable patient information (wisdom) – transformational solutions can be introduced in multiple areas of healthcare.

The lecture will outline some of the major challenges the healthcare industry faces today and some new innovative paradigms (and solutions) that might address some of these challenges.

The Science and Technological Aspects of Big Data

Prof. Yaron Oz

The quantity of data generated and collected in the world at any given moment is growing at a dizzying pace. This data comes from anywhere: from sensors that collect climate information, wearables that record personal medical data, posts on social media sites, digital pictures and videos uploaded to the network, etc. In this ocean of data are hidden the keys to creating important economic opportunities, solve social problems, improve productivity and efficiency, paving the way to novel discoveries in medicine, science, and society. To do so, however, the data by itself is not enough. The hidden potential can be realized only if the data is analyzed and turned into knowledge and insight.

From a research standpoint, the unprecedented quantities of data present enormous challenges when it comes to effective management, semantic search, and processing the massive amounts of Big Data. Dealing with this challenge requires breaking, and then rebuilding, the traditional boundaries of existing technologies for data management and related disciplines.

In this talk, we will highlight some of the research performed in Tel-Aviv University in this direction. Specifically, four researchers will overview a selected sample of innovative research: Prof. Saharon Rosset will talk about "Building Prediction Models from Medical Data", Yaron Ziner, a PhD student, will discuss "Big Data, deep vision, and easy modelling", Prof. Yishai Mansour will talk about "Classification with Low Rank and Missing Data", and Prof. Ronit Rubinfeld about "Something for almost nothing: Sublinear time algorithms for understanding data".

IBM Watson Health – The Art of Healing Through Big Data

Dr. Michal Rosen-Zvi

Healthcare Big Data is composed of six major parts: structured clinical data, structured finance/utilization data, textual notes, images and videos, genomic data, and quantified-self data. The pharmaceutical industry recently identified the promise of real world evidence (RWE) studies, in which this data is collected post launch to shorten trial and error, direct new drug development, support marketing teams, and more. Compared to clinical trials phase two and three, in which patients with a single disease are recruited, much richer conclusions can be drawn by learning from the Big Data collected from patients' reactions to drugs in a non-sterile setting; here the patients may suffer from multiple conditions or even consume more than one drug. This can provide insight into who can benefit most from specific drugs and what therapy regimen is optimal for a specific patient with co-morbidity. Indeed, the vast amounts of digital information about human disease and health that are now becoming available in the form of providers' medical records, insurers' claim records, and self-monitoring data that patients collect from wearable devices, are changing the landscape of medicine. IBM is now partnering with leading players in this domain, including Medtronic and Apple, focusing on its health kit and research kit. Explorys, recently acquired by IBM, brings to this arena a platform that was specifically designed to master Big Data for healthcare. This includes the rapidly growing clinical, financial, and operational data from within an enterprise, plus the vast amount of disparate data from payers, employers, and independent providers. As part of Watson Health, Explorys is now working together with IBM Research to develop an array of RWE technologies that will be described in this talk.

Big Data: The Next Big Thing in Healthcare

Prof. Varda Shalev

The hype over Big Data in the technology world and particularly in healthcare requires a serious discussion over its potential and challenges. While big (or high volume) structured relational databases are gaining growing popularity in medical research, relatively little research has been done in healthcare using truly high volume, high velocity (e.g. real-time algorithmic), and high volume data from sensors like wearables processing), and high variety data (e.g. natural language processing, image processing, voice and video analysis etc.). The major reason is not only technical challenges, or issues but the need for a novel research philosophy and a fundamental shift in the way science is done.

As was previously suggested, data is the Fourth Paradigm in science (following experimental, theoretical, and computational), and therefore Big Data research may rapidly overcome the currently dominant hypothesis-driven approach. In this context, Big Data allows an integration of multi-level biomedical research by combining data from micro-level (e.g. gene expression), tissue level (e.g. lab data, imaging), patient-level (e.g. EMR data), to population-level (GIS, social-media, climate). With the rapid development of new disciplines, Big Data analytics has an enormous potential not only to improve patient care and management, but to fundamentally transform the way research is performed and the way caregivers are being trained and practice. Big Data will dramatically affect not only the future patient but more so, caregivers and science.

Biographies

Speakers & Chairpersons



Prof. Arnon Afek

Arnon Afek is a graduate in Medicine from the Hadassah and the Hebrew University School of Medicine and in Health Administration *cum laude* from the Ben-Gurion University of the Negev.

He completed residency in Anatomical Pathology at the Sheba Medical Center, and fellowship in Medical Administration under the Director General of the Israeli Ministry of Health and the CEO of the Sheba Medical Center.

Prof. Afek was the Director General of the Israeli Ministry of Health until July 2015 and is to be the Associate Director General. He was personally nominated as a member of the leading Bureau of the OECD Health Committee.

Prof. Afek's previous positions include:

1. Director of Medical Affairs, Israeli Ministry of Health
2. Deputy Director of Sheba General Hospital
3. Head of Occupational Medicine & Medical Classification Branch and Head of the Department of Medical Administration, IDF Medical Corps.

Prof. Afek is the Director of the NY State/American MD Program and Professor of Pathology at the Sackler School of Medicine, Tel-Aviv University, where he teaches both pathology and Medical Administration.

Prof. Afek's areas of research fields include: the association between BMI, cancer & cardiovascular risk factor in adolescents, Pathogenesis of Atherosclerosis, Art and History of Medicine. He has published more than 120 papers in medical literature including in *NEJM*, *JAMA* and *Circulation*.

Prof. Afek was invited as guest speaker and has participated in numerous medical conferences. He was awarded the Kellerman Award, the Goldberg Award, both for research in Cardiology, the Israel National Quality Improvement Award and an Award for Excellence in Military Medicine and the Rector Award for Lecturers.



Prof. Nachman Ash

Born in Israel 1961. Received his MD degree from Sackler School of Medicine, Tel-Aviv University on 1986. Completed his residency in Internal Medicine at the Sheba Medical Center on 1997.

In 2001 received MS degree in Medical Informatics from the Harvard-MIT Division of Health, Sciences and Technology, Boston, USA.

Prof. Ash has also a Master degree in Political Sciences from the University of Haifa.

Prof. Ash has been a military physician for 25 years. He retired in the rank of Brigadier General on 2011, after completing intensive 4 years as the Surgeon General of the IDF.

Between Jan 2012 and July 2013 served as a senior Deputy Director General for Health Informatics in the Ministry of Health.

On August 2013 Prof. Ash joined Maccabi Healthcare Services (MHS) as the Chief Director of "Sharon" district. A year later he was promoted to be the Director of the Health Division of MHS, a position that he currently holds.

Nachman Ash is a Professor at Ariel University, the School of Health Sciences, the Department of Health Systems Management.



Prof. Ran D. Balicer

Prof. Ran Balicer serves as Founding Director of the Clalit Research Institute, the WHO Collaborating Center on Non-Communicable Diseases Research, Prevention and Control. In Parallel, he serves as Director of Health Policy Planning for Clalit Israel's largest healthcare organization.

In these roles, he is responsible for strategic planning of novel organization-wide interventions for improving healthcare quality, reducing disparities and increasing care effectiveness. These include the introduction of innovative data-driven tools into practice - predictive modeling, real-life effectiveness studies, decision support tools and proactive care models.

In his academic roles, Prof. Balicer serves as Associate Professor at the Public Health Department, Ben-Gurion University, Israel, and as a Track Director in its MPH program.

He received his Medical Doctor degree from the Tel-Aviv University, PhD in Healthcare Management and an MPH from the Ben-Gurion University. Prof. Balicer's research is focused on two major fields: the study vaccines and infectious diseases dissemination, and in parallel, the study of extensive clinical databases in care provision and policymaking, health systems integrated care, and quality management.

Prof. Balicer serves in the WHO Regional Office for Europe non-communicable diseases strategy 'Sentaor Group', and advisory groups on Healthy Aging and Coordinated Integrated Healthcare Systems. He also serves as Chair of the Israeli Society for Quality in Healthcare, and as a Board Member of the International Foundation for Integrated Care.



Prof. Yoav Benjamini

Yoav Benjamini is the Nathan and Lily Silver Professor of Applied Statistics at the Department of statistics and operations research at Tel-Aviv University. He holds BSc in physics and mathematics and MSc in mathematics from the Hebrew University, and PhD in Statistics from Princeton University.

He is a member of the Sagol School of Neuroscience, and taught as a visiting Professor at Wharton, UC Berkeley and Stanford. Prof. Benjamini is a co-developer of the widely used and cited False Discovery Rate concept and methodology. His current research topics are selective and simultaneous inference, replicability and reproducibility in science, model selection, and data mining.

His applied research fields are Biostatistics, Bioinformatics, and Brain Imaging, and as a member of the European Human Brain Project he is involved in health informatics research.

Prof. Benjamini received the Israel Prize for research in Statistics and Economics at 2012, and is an elected member of the Israel Academy of Sciences and Humanities.



Dr. Yair Birnbaum

Dr. Yair Birnaum is the Chief Medical Officer of Clalit Healthcare Services in Israel (Largest HMO in Israel).

He completed his Medical Degree at the Hadassah-Hebrew University School of Medicine and a residency in Pediatrics at the Shaare Zedek Medical Center.

He also received an MA degree in Public Administration from Harvard University in 1999 and completed a residency in Medical Management.

Prior to joining Clalit he served as head of the Medical Division of Maccabi Health Care Services. (Second largest HMO in Israel).

Previous positions included the following: Associate Director General and Head of Medical Services of the Hadassah Medical Organization, Director of the Hadassah Ein-Kerem Medical Center, Associate Medical Director of Maccabi Health Care Services and Deputy Director General of Shaare Zedek Medical Center in Jerusalem.

In addition to medical training Dr. Birnbaum is also an ordained Orthodox Rabbi who wrote his thesis on "The Status of the Physician in Jewish Sources".



Mr. Eyal Biran

Eyal is the Founder of Eyal Biran Digital & Big Data Consulting Firm, launched in July 2015.

Prior to forming the boutique advisory firm, Eyal was Bank Leumi's Deputy Head of Retail Division & the Head of Digital & Big Data Services.

Eyal has twenty years of experience in banking and financial services; the last ten of those were spent leading Leumi's Digital & Big Data strategy & activities.



Mr. Nir Chinsky

Nir is Head of MEA Google Cloud Platform, responsible for business strategy and growth across Greece, Cyprus, Turkey, Israel & South Africa.

With a rich and diverse background across cloud services, mobile applications and information security, from sales, marketing and product management, Nir has a vast experience in delivering results through strategic planning, understanding market trends and leveraging partnerships with customers.

Prior to Google, Nir was an Online Services Lead at Microsoft leading the MEA subsidiaries efforts getting customers into Microsoft Online Services, driving international collaboration with business and product groups to adjust the services required for the region needs and building & developing Cloud Services Programs for partners.



Mrs. Francesca Colombo

As Head of the OECD Health Division, Francesca Colombo is responsible for OECD work on health, which aims at providing internationally comparable data on health systems and applying economic analysis to health policies, advising policy makers, stakeholders and citizens on how to respond to demands for more and better health care. She works with the Director and Deputy Director of the OECD Directorate for Employment, Labour and Social Affairs to support the strategic orientations of the Secretary-General and their implementation in the area of health.

Mrs. Colombo was a Senior Health Policy Analyst in the Health Division and since November 2013 has been acting Head of the Health Division. She has led projects on the performance of health systems in OECD countries, covering a wide range of topics, including quality of health care policies, health financing and the impact of private health insurance on health systems, health workforce and the international migration of doctors and nurses. She has been responsible for OECD Asian Social and Health activities with non-member countries, working with the OECD/Korea Policy Centre. More recently, she was responsible for a major review of health care quality policies across over a dozen OECD countries. She is a leading international expert on health and care issues for elderly populations and also held responsibilities for co-ordinating OECD involvement at high-level meetings such as on diabetes and dementia.

Mrs. Colombo joined the OECD in 1999. Prior to that, she was seconded to the Ministry of Health and Labour of Guyana as Acting Head of the Planning Unit, where she was instrumental to the implementation of financing and governance reforms of the health system, and also worked at UNCTAD. Over her career, she has travelled extensively in Europe, South America and Asia, advising governments on health system policies and reforms.

Mrs. Colombo holds a MSc Development Studies from the London School of Economics and Political Science (United Kingdom) and BSc in Economics and Management from Bocconi School of Economics (Italy).

<http://www.oecd.org/health/>



Dr. Gabriel Escobar

Dr. Gabriel Escobar is a Research Scientist III (equivalent to full Professor at a university) at the Kaiser Permanente Division of Research; director of the Division of Research Systems Research Initiative (a research program focusing on adult hospital processes and outcomes); and Regional Director for Hospital Operations Research for Kaiser Permanente Northern California (where he develops ways to improve Kaiser Permanente's internal reporting and quality measurement).

He has published 140 peer-reviewed articles, and his research now focuses on the processes and outcomes in the care of hospitalized adults. It includes risk adjustment, predictive modeling, severity of illness scoring, the use of comprehensive inpatient and outpatient electronic medical records for health services research, and the use of real-time decision support tools that are embedded in the electronic record.

Between 1991 and 2001, he developed a research program in neonatology for Kaiser Permanente Northern California. In 2001, he began work on the Systems Research Initiative and in 2009 turned over the neonatology research program to Dr. Michael Kuzniewicz at the Division of Research so that he could focus on adult hospital research.

Dr. Escobar still practices medicine at the Kaiser Permanente Medical centers in Walnut Creek and Antioch, where he works in the neonatal intensive care nursery and as a hospital-based pediatrician.

Dr. Escobar received his MD degree from the Yale University School of Medicine; completed a pediatrics residency at the University of California, San Francisco; and was a Robert Wood Johnson Clinical Scholar at the Stanford University School of Medicine.



Dr. Ya'akov (Kobi) Gal

Dr. Ya'akov (Kobi) Gal is a faculty member of the Department of Information Systems Engineering at the Ben-Gurion University of the Negev, and an associate of the School of Engineering and Applied Sciences at Harvard University. He

received his PhD from Harvard University in 2006. His work investigates representations and algorithms for making decisions in heterogeneous groups comprising both people and computational agents.

He has worked on combining artificial intelligence algorithms with educational technology towards supporting students' in their learning and teachers' understanding of students' learning strategies. He has published over 40 papers in highly refereed venues on topics ranging from artificial intelligence to the learning and cognitive sciences.

He is a recipient of the Wolf foundation's 2013 Krill prize for young Israeli scientists, a Marie Curie International fellowship, and a three-time recipient of Harvard University's outstanding teacher award.



Prof. Ronni Gamzu

A Director of the general hospital, Tel-Aviv Sourasky Medical Center; Former DG of the MINISTRY OF HEALTH; Professor of Gynaecology and PhD in physiology research, he has graduated business and law school.

Until recently he served as an OECD Senior Health Policy Analyst; Focusing mainly on how to promote Healthcare Big Data use as well as addressing waste issues in healthcare. In Israel he is as well the chair of the digital Healthcare information national council.



Ms. Michal Geva

Ms. Michal Geva is the Managing Partner and Co-Founder of Triventures.

Michal has 20 years of professional experience in Israeli and American medical device companies.

Since the founding of Triventures, Michal has co-led the funding of two venture funds with strategic and financial investors. She has also led nine investments in the fields of cardiovascular, orthopedic, surgery, women's health and digital health. Michal's investments have been from pre-seed stage all the way to late stage deals.

Michal currently sits on the boards of a number of companies, including Apica and ApK (transitioned to Thoratec), OrthoSpace (partnered with Smith & Nephew), MST (a robotic laparoscopic surgery platform), MediSafe (a patient engagement platform) and BioGaming (rehab gamification).

Prior to Triventures, Michal held executive roles in regulatory & clinical affairs, and in business development at a number of startups including ByPass (collaborated with J&J), AST (acquired by Boston Scientific), and GI View (in the field of gastroenterology).



Mr. Eyal Gura

Mr. Gura is the Co-Founder and Chairman of Zebra Medical Vision, a next-generation medical imaging research platform that will enable scalable healthcare for the 1 billion people to join the middle class by 2020.

Eyal is an Angel investor and venture capitalist with Pitango Venture Capital, the largest venture capital fund in the Middle East. Formerly, Co-Founder: PicScout (acquired by Getty Images); PicApp (acquired by Ybrant Digital); The Gifts Project (acquired by eBay). Adviser, WebTeb.com, the leading Arabic medical portal. Member, Advisory Board, Tmura.org. Member of the Board, Latet. Founding Member, Tovanotb.org. Eyal is a faculty member at IDC's Zell entrepreneurship program and a graduate of the Wharton Business School of the University of Pennsylvania. Eyal was named in 2014 as Young Global Leader by the World Economic Forum.



Prof. Gavriel Hodik

Education

- 2006** Quantitative Decision Making, Johns Hopkins University School of Public Health, Washington DC, USA.
- 1999-2003** Doctor of Philosophy (PhD), Epidemiology & Preventive Medicine, Faculty of Medicine, Tel-Aviv University, Tel-Aviv, Israel.
- 1996-1998** Master in Health Administration (MHA) (Magna Cum Laude), School of Business Management, Tel-Aviv University, Tel-Aviv (Israel).
- 1995-1997** Master of Science (MSc) in Epidemiology & Preventive Medicine (Magna cum Laude), Faculty of Medicine, Tel-Aviv University, Tel-Aviv (Israel).
- 1991-1994** Bachelor of Science (BSc) in Life Sciences (Magna cum Laude), Dep. of Life Sciences, Ben-Gurion University, Israel.

Academic Positions

- 2000-present** Head of the Epidemiology & Database Research, Maccabi Healthcare Services.
- 2000-present** School of Public Health Tel-Aviv University, Tel-Aviv. Epidemiology & Preventive Medicine Department, Faculty of Medicine. Associate Professor.
- 2007-present** Adjunct Research Position, Radiation Epidemiology Branch, Division of Cancer Epidemiology & Genetics, National Cancer Institute, NIH.
- 2005-2007** National Cancer Institute, National Institute of Health, Bethesda (MD), USA, Division of Cancer Epidemiology and Genetics. Post-doctoral Fellow.
- 2002-2005** University of New England's College of Arts and Sciences, Tel-Aviv, Lecturer.
- 2001-2005** Clark University (branch campus in Israel). Tel-Aviv College of Professional and Continuing Education Graduate Programs, Lecturer.
- 1999** Fulbright Visiting Scholar, University of North Carolina School of Public Health Chapel-Hill, North Carolina, USA.



Prof. Avi Israeli

Prof. Abraham (Avi) Israeli is Chief Scientist of the Ministry of Health, and the Head of the Health Policy, Health Care Management and Health Economics Department at the Hebrew University-Hadassah Faculty of Medicine.

Prior to this he was the Director General of the Israel Ministry of Health (2003-2009) and the Director – General of Hadassah Medical Organization (1998-2001).

He holds the Chair of Dr. Julien Rozan Professorship of Family Medicine and Health Promotion Chair at the Hebrew University-Hadassah Medical School, Jerusalem (since 1996) and teaches there regularly.

Prof. Israeli chaired the national committee to update the Israeli national standard basket of health services.

Prof. Israeli received his Medical Degree and his Master in Public Health from the Hadassah-Hebrew University Medical School. He completed residencies in Internal Medicine and in HealthCare Management at Hadassah University Hospital and has certification in both specialties. He received his Master's Degree from the Sloan School of Management at MIT, Boston.

His scientific activities are related to applied, methodological and theoretical research in the fields of health policy, healthcare management, and the epidemiological, economic, social and cultural basis for decision-making.

His publications deal with translation of academic knowledge and inputs from the field into policy setting and decision-making processes.

Two additional key research foci are rationing / priority setting and comparative healthcare systems.



Ms. Shira Lev-Ami

Leading the National eHealth strategy definition and implementation, under the direction of the National eHealth Council.

Holds three master degrees from Tel-Aviv University: Political Science, Business Administration and Law. Served as an officer in the Intelligence Technology Unit and as an Organizational Consultant in the IDF.

Comes from a business background at the Fishman Group headquarters (where she worked on IPO's and other business transactions), and at Shaldor – the leading Israeli strategic business consulting firm.

Experience with third-sector strategy and process at Yad-Hanadiv, one of Israel's largest philanthropic foundations, as Director of Grant-operations and Strategy implementation.



Prof. Christian Lovis

Christian Lovis is Professor of Clinical Informatics at the University of Geneva and leads the Division of Medical Information Sciences at the Geneva University Hospitals.

He is a medical doctor trained in Internal Medicine with special emphasis on emergency medicine, is graduated in public health from the University of Washington, Seattle, USA.

In parallel to medicine, he studied biomedical informatics at the University of Geneva, focusing on clinical information systems and medical semantics.

He led the development of the computerized patient record for the university and public health sector of Geneva.

Christian is the author or co-authors more than 150 publications focusing on semantics and interoperability in health Big Data; Clinical Information Systems and Advanced Human-Machine Interfaces, including Bio-Captors.

He is editorial board member of major peer-reviewed journals in medical informatics, such as the Journal of the American Medical Informatics Association (JAMIA), PLOS One, the Journal of Medical Internet Research (JMIR), and Applied Clinical Informatics (ACI).

Christian is the European representative and vice-chair of the board of managers of HIMSS Global and member of the board of innovation of GS1, co-chair of the Architecture and standard working group of e-Health-Suisse.

He is co-founder of three startups.



Prof. Orly Manor

Orly Manor is the Chairwoman of the Board of Directors, The Israel National Institute for Health Policy Research and is a Professor of Biostatistics at the Braun School of Public Health and Community Medicine of the Hebrew University-Hadassah Medical Organization in Jerusalem.

Prof. Manor is a former Director of the School.

Prof. Manor received her first and second degrees in Statistics from the Hebrew University and her PhD in Statistics from Stockholm University.

Currently Prof. Manor leads the Israel National Program for Quality Indicators in Community Healthcare.

Prof. Manor is the founder of the Israel Longitudinal Mortality Studies.

Prof. Manor's research interests include health inequalities, the developmental origin of adult disease and quality of care.

In 2012, Prof. Manor was the recipient of The Hebrew University Rector's award for outstanding faculty member.



Prof. Shlomo Mor-Yosef

Prof. Shlomo Mor-Yosef is the Director General of Bituach Leumi, National Insurance Institute of Israel.

Prof. Mor-Yosef was the Chairman of the Board of the Israel National Institute for Health Policy Research between the years 2008-2014.

In 2011, Prof. Mor-Yosef completed his tenure as Director General of the Hadassah Medical Organization (HMO) in Jerusalem. His eleven years as Director General were the crowning glory of his 38 years at Hadassah, from his first year of medical school until 2011, with just a few brief exceptions.

Prof. Mor-Yosef graduated from the Hebrew University-Hadassah Medical School in 1980, completing his obstetrics and gynecology specialization at Hadassah. He served as a senior physician in the Department of Obstetrics and Gynecology at Hadassah with special focus on cervical cancer.

From 1988-1989 Prof. Mor-Yosef completed a subspecialty in Gynecological Oncology at Queen Elizabeth Hospital, Gateshead, England.

In 1990, Prof. Mor-Yosef assumed the position of Deputy Director of the Hadassah Ein-Kerem Hospital, following which he studied at the Harvard University JFK School of Government where he received his Master's Degree in Public Administration. In 1994, he assumed the post of Deputy Director General of HMO and then served as Director of Hadassah Ein-Kerem. Prior to assuming his post as Director General of HMO, Prof. Mor-Yosef served as Director General of the Soroka Medical Center of the Negev.

Prof. Mor-Yosef has authored more than 100 scientific publications and has served on the faculty of several universities and boards of various organizations and companies. From 2001-2012, Prof. Mor-Yosef served as Chairman of Hadasit, HMO's Technology Transfer Company. Among his present responsibilities, Prof. Mor-Yosef serves as Chairman of the Public Committee for Fertility and Birth appointed by the Director General of the Ministry of Health to recommend legislation in the field of fertility and birth in Israel; and Member of the Master Plan for Transportation Committee of the Association for Planning, Development & Urban Preservation – Jerusalem.



Mr. Ziv Ofek

Ziv Ofek is a serial entrepreneur, the founder and former Chief Innovation Officer of **dbMotion** (www.dbmotion.com), recently acquired by **Allscripts** (www.allscripts.com) for 235M\$. Ziv is the originator of the dbMotion concept for clinical information integration and semantic interoperability that includes advances applications and tools for coordinated care and population management. His 20 years expertise in the field of medical informatics covers a wide range of areas, both in theory and in practice, including in-depth understanding of the different approaches and initiatives in international markets.

Prior to dbMotion, Mr. Ofek served as VP R&D and Business Development at Ness-ISI, a subsidiary of Ness Technologies (NASDAQ:NSTC). In this role, he initiated and oversaw development and implementation of multiple large-scale healthcare IT solutions for data warehousing, business intelligence and interoperability. The dbMotion platform is successfully in use today by many healthcare organizations around the world, including the entire Israel health system where 100% of the physicians, hospitals, community clinics, HMOs and citizens in Israel are all part of the dbMotion national network.

Mr. Ofek has a BS in Industrial Management Engineering, specializing in Information Systems, from Ben-Gurion University of the Negev, Israel.



Prof. Yaron Oz

Professor Yaron Oz is the Dean of the Raymond and Beverly Sackler Faculty of Exact Sciences at Tel-Aviv University, and the Rector Elect of the University.

Professor Oz is a Theoretical Physicist. He has written about 140 research articles and has been given more than 150 talks in international conferences and workshops.

He is the recipient of numerous prizes including the Humboldt Prize.

Professor Oz has been a Staff Member at CERN, he is the President of the Israel Physical Society, the Chair of the National Committee for Pure and Applied Sciences and a member of the National High Energy Committee.



Dr. Michal Rosen-Zvi

Dr. Michal Rosen-Zvi is the Director of Healthcare Informatics at IBM Research. She also heads the Healthcare Informatics department at IBM Research - Haifa, with close to 40 researchers and healthcare informatics experts and developers.

Michal is a machine learning expert who has led a number of multidisciplinary projects in which physicians, data scientists, and experts from pharmaceutical companies join forces to analyze post-launch patient data.

These projects explored the value and insight that can be gained from the data of patients with HIV, epilepsy, diabetes, mental illness, cancer, and more.

Michal holds a PhD in physics and completed her postdoctoral studies at UC Berkeley, UC Irvine, and the Hebrew University.

She joined IBM towards the end of 2005 and has since led various projects in the area of machine learning and healthcare.

Aside from teaching in various academic forums, Michal has published more than 35 peer-reviewed papers, and serves as a Program Committee member and reviewer for leading machine learning, health informatics, and bioinformatics conferences and journals.

She co-chaired ten international workshops, including the 2015 Gothenburg workshop on the Pan-European roadmap towards future healthcare.



Dr. Yair Schindel

Dr. Yair Schindel is the CEO of the Israeli government's "Digital Israel" National Bureau at the Prime Minister's Office. The bureau is in charge of the strategic planning and implementation of a national cross-ministry program to upgrade all digital services and infra-structures in the Israeli public sphere.

Prior to Digital Israel Dr. Schindel was the CEO of START-UP NATION CENTRAL (www.startupnationcentral.org), a non-profit aimed at accelerating Israeli innovation and entrepreneurship through deeper connections and co-innovation between Israel and the world. The goals of SNC include driving economic prosperity through innovation, as well as connecting with world thought leaders to collaborate with the Israeli hub for global innovation.

Prior to SNC Dr. Schindel was Co-founder and CEO of MAOZ (www.maoz-il.org), a non-profit he co-founded along with American and Israeli investors. In partnership with Harvard University, IDC Herzliya, Begin Center & Rabin Center, MAOZ is focused on developing senior leadership for the Israeli public & social sectors.

Prior to MAOZ Dr. Schindel served as Vice President with OmniGuide Inc. (www.omni-guide.com).

Dr. Schindel spent 6 years co-building the Massachusetts based MIT start-up, which invented and is commercializing the world's most precise optical laser fibers used as scalpels for minimally invasive surgery. OmniGuide operates in the fields of Neurosurgery, Otolaryngology, Gynecology and Urology. The privately held company is profitable selling over \$30MM annually, employing ~150 employees in the US and Israel and growing top line at 20-30% annually. Dr. Schindel managed OmniGuide's clinical, marketing & business development activities for 5 years and then managed the company's international expansion into 10 countries in Europe, 2 in the Arab speaking Middle East and 2 in Australia & New-Zealand. To date, OmniGuide's technology treated over 100,000 cancer patients successfully worldwide.

Prior to OmniGuide Dr. Schindel served as a Combat Medical Officer and then Chief Medical Officer with the IDF NAVY SEALS (Shayetet 13). Yair spent a total of 5 years with IDF Special-Forces. In 2003 he was awarded an IDF Medal of Honor for saving the life of a wounded teammate under fire.

Dr. Schindel earned his MBA from Harvard Business School in Boston/US and his BSc and MD degrees from the Goldman Med. School at Ben-Gurion University of the Negev, Israel. He is married and a father of three.



Prof. Varda Shalev

Prof. Varda Shalev, MD MPH, is the director of Maccabitech (Big Data and Epidemiology research), and an active primary care physician.

With an MD degree from Ben-Gurion University Medical School, she completed her residency in family medicine and earned an MPA in Public Health Administration at Clark University.

After a two-year fellowship in medical informatics at the Johns Hopkins University Hospital, Prof. Shalev established the Department of Medical Informatics at Maccabi and was responsible for planning and developing its computerized medical systems.

She has pioneered the development of multiple disease registries to support chronic disease management.

She served as the director of primary care division in Maccabi.

Shalev's research interests are in epidemiology, medical informatics and predictive analytics in community healthcare.

She is a member of the European Health Telematics Association and the American Medical Informatics Association.

Prof. Shalev is an Associate Professor at the Tel-Aviv University School of Public Health, the head of Big Data medical research in Tel-Aviv University and authored or co-authored over 90 publications in peer-reviewed journals.



Mrs. Sara Tzafrir

Sara Tzafrir is a graduate of the Faculty of Industry and Management at the Technion-Israel Institute of Technology, and holds an MA degree in Health Systems Management from the Department of Public Administration at the University of Haifa.

Mrs. Tzafrir currently serves as Director of the Department of Information, Computing and Communications, and is a member of the Senior Management Committee at Rambam Health Care Campus.

In 1993, Mrs. Tzafrir established the Department for Planning and Organization at Rambam, which served as the reserve infrastructure for hospital administration management. During a three year leave of absence in the United States, she established a computer system for operational support of accreditation at the Kaiser Permanente Hospital in California. Upon her return, Mrs. Tzafrir assumed management of Rambam's information systems, then went on to take responsibility for the Communications Department. She eventually established the Division for Information Computing and Communications, which has become a technological leader within the Israeli healthcare system, with numerous achievements at the national level.

Mrs. Tzafrir has led pioneering projects within the Israeli hospital system, including initiating, developing and integrating the "Prometheus" system for computerized medical records in the early 2000's. Prometheus has been adopted by all government psychiatric and geriatric hospitals. This project was awarded a prize by the Information Systems Analysts Bureau in Israel.

Other prize-winning projects led by Mrs. Tzafrir include:

- "Emergency" – a system for hospital management during emergency situations, awarded the first prize for excellence in the special projects category of the "ITAWARDS" competition. The system gained national acclaim when it was selected as the solution for management of the Ministry of Health's Emergency Services Branch. The "Adam" computerized hospital management system for tracking casualties during emergency situations, developed at Rambam, has now been adopted in every hospital in Israel.
- "Insight" – an information system for managers, won a prize for excellence in the BI Systems category of the "ITAWARDS" competition.



Dr. Arturo Weschler

Dr. Arturo Weschler is the Medical Director of Medial Research, a pioneer research institute in the field of algorithmic analysis of medical data.

Prior to joining Medial Research, he was co-founder and chief medical officer of Healarium, a digital health startup in the field of digital health / self-management support.

Until 2008, for more than a decade Dr. Weschler was the CIO of the Tel-Aviv Sourasky Medical Center, the second largest and one of the most progressive full-service healthcare institutions in Israel.

He holds an MD (Cum Laude) from the Technion – Israel Institute of Technology, and served as lecturer in Medical Informatics in Tel-Aviv and Bar-Ilan Universities.