DANIEL V OPPENHEIM

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VISION AND INNOVATION

Award winning visionary and thought leader with broad multidisciplinary experience in science, technology, art, and music. Factor complex cross-domain challenges into simple concepts people intuitively understand and can manipulate creatively. Architect, model, prototype, and lead large distributed teams. Pioneer of music technology, transformer of IBM's delivery model, and initiator of *Cross Enterprise Collaboration* (CeC) and *Work as a Service* (WaaS) as new disciplines. Over 27 published patents innovate supporting creativity, music models and tools, distributed work, and service delivery.

Education

- Doctor of Musical Arts (DMA), Composition and Computer Music, Stanford University. 1993.
- Master of Music (M.Mus), summa cum laude, Theory and Composition, Tel-Aviv University. 1986.
- Bachelor of music (B.Mus), Theory and Composition, Rubin Academy of Music, Jerusalem, 1982.

Awards and Recognition (select)

- IBM Corporate Technical Recognition Award, IBM's highest level of technical recognition (2011).
- 4 IBM Research Division Awards for innovation and outstanding technical accomplishments.
- Consumer Electronics (CES) award for an Amazing Accomplishment, for Kid Riffs (1996).
- Parents' Choice Honors, one of industry's most prestigious awards, for an Amazing Accomplishment, for *Kid Riffs* (1995).
- My compositions represented Israel the World Music Days (ISCM) in 1989 and 1993.
- Numerous national and international prizes for my compositions, 1980 through 1992.
- Numerous scholarships and fellowships between 1980 and 1992.

Experience: IBM Research, Senior Research Scientist

- Strategy 2006-2015
 Contributed to IBM corporate strategy by identifying new trends and co-leading several IBM Research Global Technology Outlook (GTO) reports. Topics included Cognitive Computing, The future of Big Data and Analytics, Cloud 3.0, Digital Marketing, The Future of Work, Contextual Enterprise, and Everything as a Service (XaaS).
- Simplifying Cognitive Computing, Big Data, and Machine Learning 2014-2015 To scale IBM's marketing and sales capabilities in growth markets, invented a framework that enables local sales SMEs creatively compose the insights they most care about in response to ever changing world events.
- Composition as means to create new Analytic Solutions (Mozart) 2014-2015 To support IBM's leadership in providing new and differentiating analytic solutions on the cloud, prototyped a framework for creating new solutions by composing flows that reuse existing data sources and analytics.
- Reinventing the Cloud 2014 Designed and implemented a framework for rapid cloud deployment of IBM solutions in a way that can be customized to individual client needs and maintained by DevOps throughout their lifecycle.
- Transforming IBM Marketing and Sales to Outcome-Based Business 2012-2013 To help IBM Marketing transform from selling solutions to selling business outcomes, architected and led the development of a causality framework that mapped desired client outcomes to their enabling IBM solutions.
- Automating Measurement and Optimization of Distributed Work 2010-2011 To address conflicting needs of numerous business-units, invented and implemented a metrics framework enabling any stakeholder specify the metrics he cares about with a guarantee they will get collected.

2001-2015

Transforming IBM's Delivery model: the Application Assembly Automation (AAO) 2005-2011 • To scale and accelerate IBM ability to deliver customized business solutions I invented and led the global development of its global delivery framework. With 17 published patents, a reduction in risk and over 20% in costs, I was awarded IBM's highest level of technical recognition: The Corporate Technical Recognition Award.

- **Business Process Management** 2004 To streamline a "follow the sun" delivery process I developed a new method that focused on process, governance, and measurements. Formally adopted by GBS and later replaced by my work on AAO.
- **Strategic Platform for Client Maturity Assessment** 2002-2003 Designed, implemented, and patented a strategic platform to create and execute any client maturity assessment (CMMI). Significantly accelerated IBM's ability to both tailor and deliver client solutions.

Experience: IBM Research, Co Founder: Computer Music Center

Drove core research into supporting creativity, music representation, expression, and collaborative work. 8 published patents, numerous publications. Core concepts later applied to mainstream business solutions.

- **Film Scoring** 1998-2000 Collaborated with Berklee School of Music on a high end environment for composing music for film. Added video support to our creative suite of musical manipulations while addressing specific creative needs.
- **Generic Models of Tonality** 1997 Invented a general model for Tonality that enabled a new class of pitch transformations (3 patents). Pitches would correctly adhere to the underlying harmonic context, melodies moved to different tonal contexts would correctly adapt, changes in harmony would automate changes in pitch that preserve harmonic roles.
- Hierarchical transformations of music through Blocks and Modifiers 1996-7 Developed and patented a high-level hierarchical representation of music. Chunks of music were represented in blocks that could be arbitrarily nested. Music transformations could be applied on any level of the tree.

Compositional Morphing 1995 Invented, patented, and implemented a real-time framework that could morph between any attribute/s of any music input/s. Bach could be "jazzed up", morphed into a Tango, and end up as Mozart.

Kidd Riffs

Educating children in music. Rhythm, pitch, tonality, improvisation, and composition were taught through real-time interaction and creation, emphasizing the musical experience itself. Won numerous awards.

Experience: Center for Computer Research in Music and Acoustics (CCRMA)

- Created DMIX, a visionary environment supporting the creative flow of composing and performing music.
 - 0 Slappability (patented) supported an uninterrupted workflow through diverse compositional paradigms, including improvisation, algorithmic composition, functional programming, and graphic manipulation.
 - A performer could be both conductor and composer, generative algorithms responded to real-time input. 0
 - Tools dedicated to enable composers articulate musical expression and nuance. 0
 - Large scale interactive compositions created by several composers worldwide.
 - Adopted by major academic centers including US, UK, Taiwan, Argentina, and Israel. 0
 - 0 ParcPlace CEO, Adele Goldberg, supported porting DMIX to the NeXT platform (a \$250,000 gift).
 - Discussions with Miller Puckette and David Zicarrelli to integrate with Max ended when hired by IBM. 0

Teaching Experience (select)

Bar Ilan University, Department of Music (Israel). Invited lecturer. Condensed 2 week course on algorithmic • composition using my DMIX environment. February 1998.

1993-2001

1989-1993

1982-1998

1994

- International Computer Music Conference in Thessaloniki, Greece, August 1997. Workshop on interactive composition and performance techniques, together with Chris Chafe, Director of CCRMA, and Stephen Horenstein, Director of the Jerusalem Institute of Contemporary Music). This was the most attended workshop at the ICMC.
- Stanford University, Department of Computer Science. Teaching Assistant. Introduction to Object-Oriented Concepts and Smalltalk (with Dr. Adele Goldberg, CEO of ParcPlace systems, 1991 and 1992).
- Laboratorio de Investgación y Procucción Musical (LIPM), Buenos Airs, Argentina. Invited lecturer. Advanced techniques for composition and performance using DMIX (1992).
- Stanford University, Center for Computer Research in Music and Acoustics (CCRMA). Lecturer. Special Seminar on Advanced Compositional Techniques using DMIX (Mu 242, Winter 1993), History and Aesthetics of Electroacoustic Music (Mu 154, Spring 1993), Introduction to Music Synthesis and Programming Using MIDI Based System (Music 120, Spring 1991).
- San Jose State University, Department of Music. Lecturer. Advanced Theory (Comprehensive Musicianship-V, Autumn 1992-3), Music Appreciation (Music 10A, Winter 1993), Introduction to Music (Music 10B, Winter 1993).
- Bar Ilan University, Department of Music (Israel). Invited lecturer. Summer courses. (1) Introduction to Computer Music (2) Advanced Compositional Techniques Using Object-Oriented Concepts (summer 1992), The DMIX environment for Composition (Summers of 1990 and 1991).
- National Chaio Tung University, Taiwan, Republic of China. Invited lecturer. Summer Seminars. Computer Aided Performance and Composition, Object Oriented Languages in Concept and Practice (NCTU 3rd Annual Seminar in Computer Music Applications, 1990).
- Stanford University, Department of Music. Teaching Fellow. Introduction to Music Theory (Music 19, Spring 1989).
- Tel Aviv University, Department of Music (Israel). Teaching Fellow. Electroacoustic Music (1984-1987), Harmony, Counterpoint, Ear Training (1982-5).

Publications (music related only)

Additional 25 scientific publications, see: www.researchgate.net/profile/Daniel_Oppenheim/publications

- Oppenheim, D. (2003) "Supporting Creative Work." Invited paper. CHI International, Crete, Greece.
- Abrams, S., Bellofatto, R., Fuhrer, R., Oppenheim, D., Wright, J., Boulanger, R., Leonard, N., Mash, D., Rendish, M., Smith, J. (2002) "QSketcher: An Environment for Composing Music for Film." Revised and expanded version of the 2001 publication with same name. Proceedings of *Creativity and Cognition*, Loughboro, England.
- Abrams, S., Bellofatto, R., Fuhrer, R., Oppenheim, D., Wright, J., Boulanger, R., Leonard, N., Mash, D., Rendish, M., Smith, J. (2001) "QSketcher: An Environment for Composing Music for Film." Proceedings of the International Computer Music Conference, Havana, Cuba (long paper).
- Abrams, S., Fuhrer, R., Oppenheim, D., Pazel, D., Wright, J. (2000) "A Framework for Representing and Manipulating Tonal Music." Proceedings of the International Computer Music Conference, Berlin, Germany (one of eight long papers accepted at the conference).
- Pazel, D., Abrams, S., Fuhrer, R., Oppenheim, D., Wright, J. (2000) "A Distributed Interactive Music Application using Harmonic Constraint." Proceedings of the International Computer Music Conference, Berlin, Germany.
- Abrams, S., Oppenheim, D., Pazel, D., Wright, J. (1999) "Higher-level Composition Control in Music Sketcher: Modifiers and Smart Harmony." Proceedings of the International Computer Music Conference, Beijing, China.
- Holland S., Oppenheim D. (1999) "Direct Combination" Proceedings of the Human Factors in Computing Systems (SIG CHI), Pittsburgh, USA.
- Wright J., Oppenheim D., Jameson, D., Pazel D., Fuhrer R., (1997) "CyberBand: A "Hands On" Music Composition Program." Proceedings of the International Computer Music Conference, Thessaloniki, Greece.
- Oppenheim D., Wright J., Pazel D., Fuhrer W. B., Radtke B., (1997) "CyberBand: Creative Music Composition—design and user interface." IBM Internal publication, available upon request.
- Oppenheim, D., Wright, James. (1996) "Towards a Framework for Handling Musical Expression." Proceedings of the International Computer Music Conference, Hong Kong.
- Wright J., Oppenheim D. (1996) "Computer Music Center—Studio Report." Proceedings of the International Computer Music Conference, Hong Kong.

- Oppenheim, D. (1996) "DMIX—A Multi Faceted Environment for Composing and Performing Computer Music." Computers and Mathematics with Applications, Volume 32, Issue 1, pages 117-135, 1996.
- Oppenheim, D. (1995). "Demonstrating Mmorph: A System for Morphing Music in Real-Time." Proceedings of the International Computer Music Conference, Banff, Canada.
- Oppenheim, D. (1993) "Slappability: A New Metaphor for Human Computer Interaction." in: *Music Education: An Artificial Intelligence Perspective,* published by Springer Verlag, London.
- Oppenheim, D. Anderson T., et al (1993) "Perceptually Meaningful Parameters: An Object-Oriented Technique for their Specification and Interpretation." Proceedings of the International Computer Music Conference, Tokyo, Japan.
- Oppenheim, D. (1993). "DMIX—A Multi Faceted Environment for Composing and Performing Computer Music: its Philosophy, Design, and Implementation." Fourth Biennial Arts & Technology Symposium, Connecticut.
- Oppenheim, D. (1992). "Compositional Tools for Adding Expression to Music." Proceedings of the International Computer Music Conference, San-Jose, California.
- Oppenheim, D. (1991). "Towards a Better Software-Design for Supporting Creative Musical Activity (CMA)." Proceedings of the International Computer Music Conference, Montreal, Canada.
- Oppenheim, D. (1991). "SHADOW: An Object-Oriented Performance-System for the DMIX Environment." Proceedings of the International Computer Music Conference, Montreal, Canada.
- Oppenheim, D. (1990). "Quill: An Interpreter for Generating Music Objects within the DMIX Environment." Proceedings of the International Computer Music Conference, Glasgow, England.
- Oppenheim, D. (1989). "DMIX: An Environment for Composition." Proceedings of the International Computer Music Conference, Ohio.
- Oppenheim, D. (1987). "The P-G-G environment for Music Composition." Proceedings of the International Computer Music Conference, Illinois.
- Oppenheim, D. (1987). "Graphical Programming Tools for Music Composition." Proceedings of the "Personal Systems and Computer Music" conference, IRCAM, Paris, France.
- Oppenheim, D. (1986). "The Need for Essential Improvements in the Machine Composer Interface used for the Composition of Electroacoustic Computer Music." Proceedings of the International Computer Music Conference, the Hague, Holland.

Issued Patents

2014, US8671007	Work packet enabled active project management schedule.
2014, US20140096105	Determining competence levels of teams working within a software.
2014, US20140025411	Automatic configuration of process definition metrics.
2013, US8527329	Configuring design centers, assembly lines and job shops of a global delivery network into "on demand" factories
2013, US8452629	Work packet enabled active project schedule maintenance.
2013, US8448129	Work packet delegation in a software factory.
2013, US8396869	Method and system for analyzing capabilities of an entity.
2013, US8370188	Management of work packets in a software factory.
2012, US8140367	Open marketplace for distributed service arbitrage with integrated risk management
2012, US20120291007	Management of template versions.
2012, US20120245896	Analyzing factory processes in a software factory.
2011, US20110078204	System and method to customize metadata for different users running on the same infrastructure.
2010, US20100058197	Supporting role-based access control in component-based software systems.
2010, US20100057514	Effective task distribution in collaborative software development.
2010, US20100031090	Self-healing factory processes in a software factory.
2010, US20100023919	Application/service event root cause traceability causal and impact analyzer.
2009, US20090300586	Staged automated validation of work packets inputs and deliverables in a software factory.
2008, US8452629	Work packet enabled active project schedule maintenance.
2003, US6658309B1	System for producing sound through blocks and modifiers.
2001, US6285367	Method and apparatus for displaying and navigating a graph.
2001, US 6192378	Method and Apparatus for Combining Undo and Redo Contexts in a Distributed Access Environment.

2000, US6015949	System and Method for Applying a Harmonic Change to a Representation of Musical Pitches. While Maintaining Conformity to a Harmonic Rule Base.
2000, US6011211	System and Method for Approximate Shifting of Musical While Maintaining Harmonic Function
1999, US5936181	System and Method for Applying a Role and Register-Preserving Harmonic Transformation to Musical Pitches
1998, US5734905	User Interface in Objet Oriented Computer System for Performing Intuitive Object
1997, US5663517	Interactive System for Compositional Morphing of Music in Real Time.

Select Compositions

- 2016 **This is (not) Max Haus.** An interactive composition composed using Ableton Live using its Session View. Sound materials included recordings of my own voice.
- 1992 **Lamentations for Jerusalem.** An interactive composition for solo saxophones (tenor, baritone) and the DMIX environment. The performer's musical gestures are captured in real-time by DMIX and used as expressive controls over compositional algorithms, synthesis, and sound processing. The performer is thus not only a virtuosi soloist but also the conductor of his accompaniment and at times interacts and affects the actual composition of his accompaniment.
- 1991 **Concerto in 'D' for Solo Violin and DMIX.** An interactive composition for solo violin and the DMIX environment. The performer's musical gestures are captured in real-time by DMIX and used as expressive controls over compositional algorithms, synthesis, and sound processing. The performer is thus not only a virtuosi soloist but also the conductor of his accompaniment and at times interacts and affects the actual composition of his accompaniment.
- 1989 **Psookim** (psalms). Two versions: for full chorus and for female chorus.
- 1988 **Baroque** piano suite for children.
- 1987 Round the Corners of Purgatory Electroacoustic music for magnetic tape (duration 26').
- 1984 **Harmonies** a symphonic Prelude.
- 1983 Cycles of Time piano solo.
- 1982 Kayitz (sextet, a prelude to Zar Vekotsani).
- 1981 **4 Percussion** (percussion quartet, second version).
- 1980 Zar Vekotsani (sextet). Hebrew text by Leah Goldberg.

Music Commissioned for Theater

- 1984 (a play based on the novel by George Orwell, Director: Howard Ripp); Electroacoustic music. Performed at the Akko Festival for Modern Theater, Israel.
- 1983 **Yizkor** (a play by Shimon Zimmer, director: M. Greenberg); Music for Cello, Piano and Singers. Performed by the Tzavta Theater Company at the Akko Festival for Modern Theater, Israel.
- 1981 **The Day That Martin Buber Died** (a voice oratory by Yehuda Amichai, director: M. Greenberg); Piece for harp, actors and six car horns. Performed by the Tzavta Theater Company at the Akko Festival for Modern Theater, Israel.
- 1981 **Purgatory** (a play by W. B. Yates). Collaboration with director Mordechai Greenberg, Tzavta Theater Company, Jerusalem. Musical instruments were specially designed and built by the composer. Performances in Jerusalem and Tel-Aviv, Israel.

International Performances of Music, 1988-2000

2000 Cloud Gate Dance Theater of Taiwan, in their program "Green". Premiered in June 2000 at an outdoor amphitheater in Nantou, Taiwan, to an audience of at least 10,000 people. (http://www.asianweek.com/2000_06_22/ae1_cloudgatedance.html).

- 1998 In celebration of the 50th anniversary of the founding of the State of Israel, under the auspices of the Society for Jewish Music, at the Hochschule Der Kuenste in Berlin, May 20. *"Round the Corners of Purgatory."*
- 1997 International Computer Music Conference, Thessaloniki, Greece. "*Lamentations for Jerusalem*" for solo saxophone and DMIX. Stephen Horenstein, solo
- 1996 MediaMix 96 International Conference, York University, United Kingdom. "*Lamentations for Jerusalem*" for solo saxophone and DMIX.
- 1993 World Music Days (ISCM), representative of Israel, Mexico City. "Concerto in D."
- 1993 Summer Concert, Frost amphitheater, Stanford University. "*Lamentations for Jerusalem*" for solo saxophone and DMIX.
- 1993 International Computer Music Conference, Tokyo, Japan. *"Concerto in D"*, Cello version with Chris Chaffe
- 1993 Society for Electroacoustic Music of America (SEAMUS) Conference on Music, Media and Movement. Austin, Texas (April). *"Concerto in D."*
- 1993 Fourth Biennial Arts & Technology Symposium. New London, Connecticut (March). "Round the Corners of Purgatory."
- 1992 Featured composer at the 'Winter Sounds' Festival held by the Jerusalem Contemporary Music Institute, Israel (March). *"Lamentations for Jerusalem."*
- 1992 Computers and Music, Mexico City, Mexico (April). "Concerto in D."
- 1991 Small Computers in the Arts (SCAN-91), Philadelphia, USA. "Concerto in D."
- 1990 International Computer Music Weekend, Keele, England . "Round the Corners of Purgatory."
- 1989 International Music Days, ISCM, Hong Kong. "Round the Corners of Purgatory"
- 1989 International Computer Music Conference, Ohio. "Round the Corners of Purgatory."
- 1988 SEAMUS (Society for Electroacoustic Music in the US) conference, at Olympia, Washington (November). *"Round the Corners of Purgatory."*