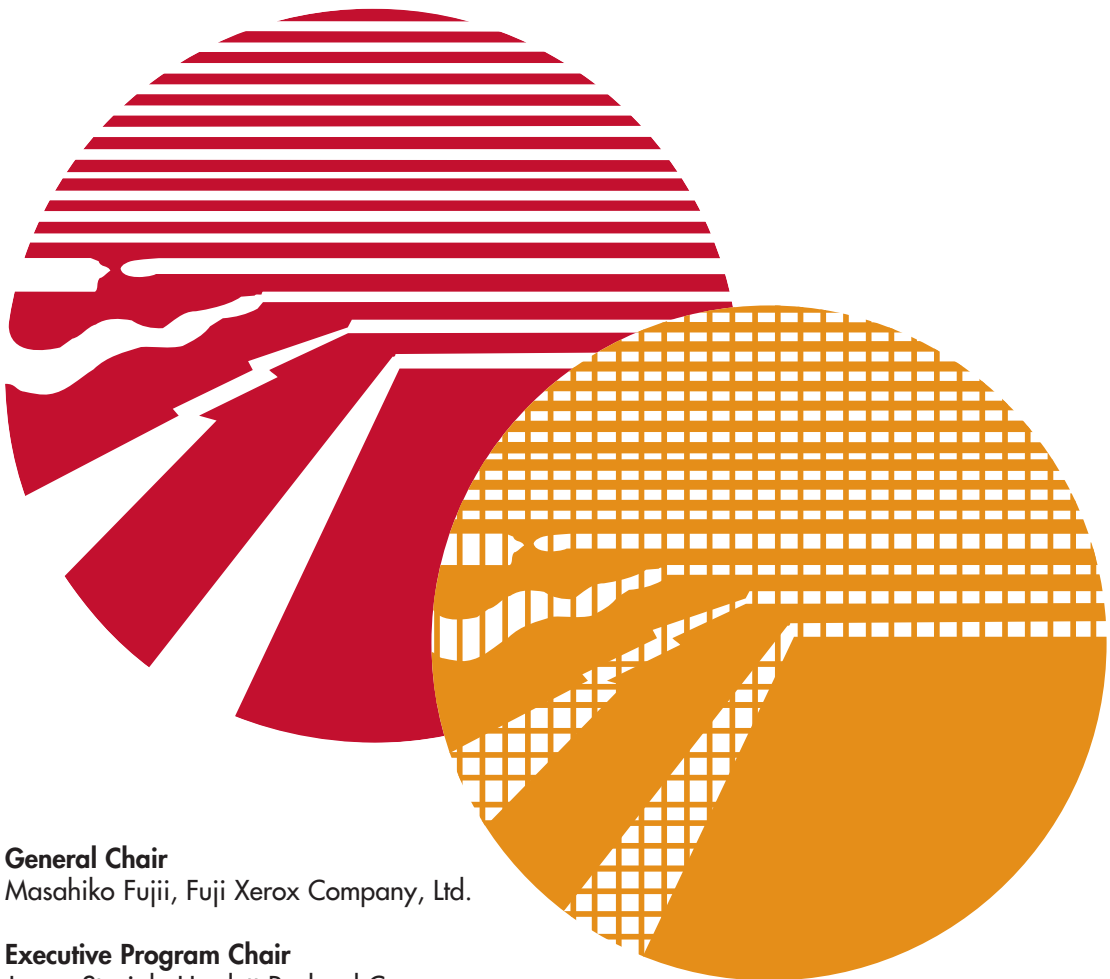
September 27 – October 1, 2015 • Portland, Oregon

# NIP31

31st International Conference on Digital Printing Technologies

*more than printing*

# Digital Fabrication
# Digital Printing



**General Chair**
Masahiko Fujii, Fuji Xerox Company, Ltd.

**Executive Program Chair**
James Stasiak, Hewlett-Packard Company

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TECHNICAL PROGRAM, ABSTRACTS, AND USB PROCEEDINGS

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# *Welcome to Portland and NIP31*

I am delighted to welcome you to Portland, Oregon—The City of Roses—and host to the NIP31/Digital Printing and Fabrication 2015 Conference, where the highest level of imaging technologies and applications are featured. Through vigilance—and the incorporation of topics related to digital fabrication and bio-printing beginning eleven years ago—this conference has maintained a unique position where engineers and researchers engaging in both of the basic areas of imaging technologies and their applications gather and grow by their interactions through overlapping session structures and free discussion events.

To help us reflect on our growth during the past eleven years, and to aid us in looking toward the future, we have invited Dr. Neil Gershenfeld to give our opening keynote address. Dr. Gershenfeld presented a keynote talk and introduced the general ideas of digital fabrication at the first Digital Fabrication Conference in 2005. During his talk on Monday, he reviews the past 11 years and provides a view of the future.

Additive manufacturing, and specifically—more broadly—3D printing has been featured as one of digital fabrication area mainstays of the conference because of its roots in and strong connections with fundamental 2D printing technologies—including document security, materials and processes used for printing, and data workflow. This recognition of the overlap between the 2D and 3D printing communities has allowed us to create a central event for presenting and discussing research progresses on the latter. To further this connection, we have invited Richard Hague to provide the Tuesday keynote: 3D Deposition of Functional Materials for the Additive Manufacturing of Smart Devices.

As his title illustrates, as 3D printing technologies progress, they can realize not only the accurate shape of an object, but also some functions creating a completed model. Essential to this process, is the data format and workflow of the 3D system, which allows it to transmit various information from input to output. Tuesday afternoon features a complementary invited talk by Hiroya Tanaka on a New File Format for 3D Printing, its Extensions, and Applications. During this session, we discuss the association between 3D data formats and printing technologies. This topic is further complemented by an offsite tour to 3D Systems on Thursday, a company that has established a strong presence in the 3D printing market.

Rounding out our keynotes and our focus on 3D printing technologies is our Wednesday talk by Michael McAlpine on 3D Printed Bionic Nanomaterials. Since integrating 3D topics into NIP, bio-printing has been watched with keen interest as it has moved from concept to functional realization.

2D printing and associated technologies have been at the heart of NIP since its inception. Over the years, the talks presented have evolved and steadily promoted the digitization of analog commercial printing market and the delivery of additional value. drupa® is one of great exhibitions where you can see the latest technologies that make up the current printing revolution. On Tuesday, we are pleased to offer a preview of drupa®2016 by the conference organizers.

In addition to an outstanding technical papers program, this year's event is rounded out by a technical exhibition, 17 short courses, roundtable discussions on Surface Manufacturing and Security Printing, the annual Late Breaking News/Success Stories final session—complemented this year by a Conference Highlights Forum—and a reception at the Portland Art Museum.

Outstanding technical breakthroughs are made not only by the continuous efforts of individuals and companies to master specialized technical areas, but also through contacts with different technical areas and colleagues. It is exposure to what we don't know, that allows us to dream about new technologies and applications. The NIP Digital Fabrication and Printing Conference offers a unique venue where basic imaging technologies and their applications coexist in an open and supportive environment. I do hope all of you will Meet, React, and Create as a result of your participation in NIP31—and that you will present innovations based on what you've learned here in the coming years.

Finally, I would like to express my gratitude to Executive Program Chair Jim Stasiak who provided his knowledge and experience unstintingly in the preparation of this conference, and to the conference committee members and IS&T staff, who support all our efforts. I also express my appreciation to the sponsors and exhibitors who always support the conference and make it a better event.

*—General Chair, Masahiko Fujii, Fuji Xerox Co., Ltd.*