IVH Yes. Before I began working with 3-D printing, I made everything by hand—I didn't even use a sewing machine. So, from the outset, I adjusted my process to the 3-D printer. Working with 3-D printing forces you to make decisions at a very early stage in your process. Normally, when I make a piece by hand, the process of making is actually the design process. As you stitch, you change things and make them better. But with 3-D printing, you have to decide the final look before it's made. The piece comes out of the machine completely finished. It's like giving birth. It was scary in the beginning, but I like it when something is not comfortable.

AB Can you describe your process with regard to 3-D printing?

IVH I start with sketches, which I draw by hand, to figure out the silhouette and proportions. The actual process of modeling and designing is all done on the computer. I work with an architect. It's a strange process. We skype for hours and hours. It's a collaboration. The result is like a two-way drawing. For me, the most difficult part is deciding—down to the very last millimeter—how you want the piece to look without seeing it in three dimensions because the computer screen is two-dimensional.

AB You seem to relish collaboration. As well as architects, you've worked with artists, scientists, engineers, and computer designers. I think this type of collaboration, and the sharing of expertise among specialists in diverse disciplines, is the future of fashion. They'll advance fashion in ways previously unimaginable.

IVH My collaborations are extensions of my atelier. For example, I've worked with the architect Philip Beesley, who has an atelier in Toronto. It's a dreamlike place with every type of machine you can imagine. When I discover a new process in my atelier, I share it with him, and he explores it in his atelier. He does the same with me. Our ateliers are separated by geography, but it's like working in one atelier.

AB Your collaborations with architects are akin to the collaborations with the artisans of the couture, such as Lesage, Lemarié, and Lognon. They're like a twenty-first century version.

IVH I also work those ateliers. For me, it's less exciting because there's an equality of knowledge. They rarely come up with something that triggers my imagination. Scientists and architects challenge me. They make me look at my work differently. They take me out of my comfort zone.

AB As an artist, it's important to be challenged.

IVH It's part of my process. I need to step outside of my routine. It gives me a different perspective.

AB How did you feel when you became a guest member of the Chambre Syndicale de la Haute Couture?

IVH I was totally surprised. My work falls outside of the traditional boundaries of couture. I thought it was very open-minded of the Chambre Syndicale.

AB Yes, that is very reassuring.

IVH Like many designers, I thought you had to make everything by hand in Paris to meet the regulations of the Chambre Syndicale. It made me realize that the haute couture is about craftsmanship, regardless of the types of crafts you employ. Of course it's also about the time that goes into a piece and the amount you produce. If you make two hundred dresses, it is not couture.

AB Do you approach your haute couture and prêt-à-porter collections differently?

IVH There is a whole system behind ready-to-wear, especially in terms of production. Everything is thought out differently. You can't work for two months—by hand—on ready-to-wear, but you can with couture.

AB And the fit?

IVH The fit is the biggest problem I have with ready-to-wear. I began with couture, and I love to make a piece that fits the body perfectly.

AB Do you think that the categories of the haute couture and prêt-à-porter are still relevant?

IVH They shouldn't be relevant. But the gap between the haute couture and ready-to-wear is too big nowadays. The space in between is what I find interesting. That's where I want to be involved.

AB I love "in between" space. To me, it's where creativity has freedom and autonomy. Do you think technology has a role to play in this in-between, interstitial space?

IVH I definitely think technology could fill the gap between the haute couture and ready-to-wear. In general, people in fashion are very interested in technology. But most companies see it as a marketing strategy. There is not one company in fashion that really embeds new technology, such as 3-D printing, as part of its creative endeavor. The use of 3-D printing is more advanced in design and architecture.

AB Is that because the material lends itself better to design and architecture?

IVH Yes, but in fashion there are some flexible materials within 3-D printing. However, most of them don't look very nice and the quality is not very good. It could be a lot further along if companies were more willing to invest real money. It is most advanced in the medical world because it's the biggest market and it has the biggest investment. In fashion, 3-D printing has to start finding its way into the creative minds of designers as well as into the business minds of company executives.

AB In fashion, I also think that 3-D printing has to become more user-friendly.

IVH I agree. It has incredible possibilities but it needs to evolve further to make it more human-friendly. For instance, it takes a lot of time to create a file for a complex dress, although for a simple dress the process can be pretty quick and you can print it on demand. That's why the 3-D-printing process was originally called rapid prototyping. Once you have the file, it's easy to adjust details. It's much simpler than traditional pattern making. And it's more environmentally friendly than the sewing machine.

AB How so?

IVH With 3-D printing, you don't start with a flat piece of material. Instead, you build the material directly from powder, so you create your shape without any waste. In fashion today there is so much waste in materials.

AB And 3-D printing also creates a lot of possibilities for customization.

IVH Exactly. Today, there is a big market for customization. A 3-D-printed dress can be made to measure for you on demand, and it can be achieved much less expensively than couture.

AB Yes, the 3-D printer could be as revolutionary as the sewing machine, and the jacquard machine beforehand.

IVH Customization is going to become increasingly more important. New technologies will help to evolve niches of mass customization on a quicker timeframe. Today, people want more individuality. They also want more control, and they want products—clothes especially—faster and faster. Technology can help reach that direct level of connection with your customer.

AB Apart from 3-D printing, are there any other technologies that might have an impact on mass customization?

IVH The technology of 3-D knitting is very interesting. But it's still mechanical, which makes it less flexible for customization.

AB Are there any technologies that might have an impact on the future of fashion in general, such as 4-D printing?

IVH I'm very interested in 4-D printing—the idea of engineering a material. So not simply building it but, over time, giving it a behavior. A material, for instance, that is soft and warm in the winter and thin and airy in the summer.

AB What about robotic printing?

IVH I think robotic printing will become more relevant over time. 3-D printing is an over-controlled environment, so part of the process of experimentation is lost. Robotic printing falls in between the impulsiveness of handwork and the deliberateness of 3-D printing. For example, elements such as gravity and velocity can become part of your process. In terms of creativity, it's more flexible and

AB Nanorobotics and nanomaterials seem as if they could have a significant influence on fashion.

IVH There is a whole area of research into engineering on a microscopic level in all directions. But many of the technologies, like nanorobotics, are not yet embedded in fashion. I've been working on a project using very small drones, like nanodrones, to make a dress—in a lightweight material—that is not one entity. A dress is often seen from a purely aesthetic perspective, so I'm always trying to generate more freedom within my creative space of what makes a dress interesting. I'm not quite there yet because the technology isn't advanced enough. The control of these little drones will take a year or two to develop into a system that will produce a dress I can control completely in its movement. I've also been working on a nanomaterial, which involves engineering on a very small scale.

AB Nanoengineering seems especially apposite in fabric development.

IVH Yes. One company has made a fabric that bends the light, so you can see through it. At the moment, it's used only by the U.S. Army. There is also a company in the U.K. that has made a material, also used by the U.S. Army, that is so intensely black it absorbs all light. There is no black that even comes close to that amount of blackness. It's like a black hole. Any three-dimensional object coated in the material would become completely flat because there would be no depth.

AB What about metamaterials?

IVH They go one step further. Like nanomaterials, they behave in a completely different way than any material we know today. But we're not there yet—they're maybe ten or twenty years into the future.

AB With nanoengineering and metamaterials, can you foresee a future within fashion whereby clothes as we know them will not only look different but will also function differently? That is, a future in which both the pragmatics and components of dressing are brought into question?

IVH I think nanoengineering and metamaterials will probably create completely new behaviors. As designers, we don't realize how much of our designs are dictated by materials and their behavior. Instinctively, a designer knows how a seam will work, that there will be gravity, that there will be a certain amount of transparency. So, imagine a material that makes you completely invisible. As a designer, it's almost unthinkable how metamaterials will change the design process. In fashion, those changes are going to be even more radical than the techniques of making clothing.

AB What is your position on biotechnology—the fusion of biology and technology?

IVH It's starting to get very serious, and it's something I'm very interested in exploring. If you look at biology, it's a hundred times more complex than technology. So where biology and technology come