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Chapter 19
Artificial Intelligence and Extended Reality in Luxury Fashion Retail: Analysis and Reflection

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Abstract Retailing service is facing a rapid evolution through the incorporation of Extended Reality (XR) technologies and Artificial Intelligence (AI) algorithms. Within this umbrella, one can consider all real-and-virtual combined environments and interactions generated by computer, including Augmented Reality (AR), Mixed Reality (MR) and Virtual Reality (VR). This chapter brings together research on the experience of luxury fashion consumer retail and AI and XR technologies to identify critical gaps and open avenues for future research. It aims to analyze the incorporation and the potential evolution of AI and XR technologies in luxury fashion retail. The chapter presents the main theoretical concepts and the luxury fashion consumption cycle and offers a discuss about the human and non-human rights, privacy, and ethics at three levels: mega, micro, and nano. Also, the chapter contributes with a discussion about the rights, privacy and ethics involving humans, hybrid humans, and non-humans.

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19.1   Introduction

Forbes (2019) estimates that the global market for virtual reality (VR) and augmented reality (AR) in retail will reach USD 1.6 billion by 2025. Innovations such as 3D content can enhance conversion by up to 27.96% on retailer websites (Reydar 2022*). Comparing with customers without an immersive retail experience, AR engagement has increased 20% since the beginning of 2020 and the conversion rate increased by 90% (Retailing Customer experience 2021). Fashion and beauty brands are launching experiences "try before you buy" through filter-based apps. Customers can load up apps in a store to scan for information from AR beacons. One in five U.S.A. customers have used VR retail products in 2020 (XR today 2022). Juniper Research (2022) claims that retail machine learning spend will grow 230% between 2019 and 2023. Mordor Intelligence (2022) claims that the Artificial Intelligence (AI) in retail market was valued at $1.80 billion in 2019 and is expected to reach $10.90 billion by 2025.

These figures indicate that the retailing service is facing a rapid evolution through the incorporation of immersive extended technologies (XR) and artificial intelligence (AI) algorithms. The expression "extended reality" is employed as any technology that extends or creates a new reality by leveraging the 360º space, where technology generated man-machine interactions occur. Withing this umbrella one can consider all real-and-virtual combined environments and interactions generated by computer, including Augmented Reality (AR), Mixed Reality (MR) and Virtual Reality (VR).

XR represents a spectrum of the combination of psychical and virtual reality including Augmented Reality (AR – interactive experience of a real-world environment where objects in the real world are enhanced by computer-generated perceptual information), Mixed Reality (MR) and Virtual Reality (VR – the use of high-performance computers and sensory equipment) (Milgram et al. 1994; Matthews et al. 2021).

Real environments regard direct or indirect (e.g., a video display) views of a real scene. Virtual environments are in the other extreme of reality-virtuality continuum (Milgram and Kishino 1994). Virtual environments exhibit a completely computer-generated environment, where unreal objects are displayed on a device, creating Virtual Worlds (e.g., Second Life) and humans are represented by avatars (Flavián et al. 2019). Between the two extremes the Mixed Reality (MR) environments emerge, which are the different points of the continuum where real and virtual objects are merged (Milgram and Kishino 1994). MR creates augmented scene elements in 3D that together with a head-mounted device such as Microsoft Hololens allows the user not only to see virtual objects embedded in the physical world but also to interact with them (Loureiro et al. 2019). MR integrates AR and augmented virtuality (AV). AR overlaps virtual objects with actual physical surroundings (Rauschnabel et al. 2017), while AV superimposes real objects on virtual environments (Regenbrecht et al. 2004).

With the advance of technologies, new immersive VR equipment provides a sense of embodiment because users feel that the devices (e.g., HMD, gloves) belong to the human body (Shin 2017). The same occurs with the wearable AR (e.g., AR glasses, AR glasses camera, cognitive systems), where users can extend their natural abilities by enhancing perceptual or motor skills (Yim et al. 2017; Tussyadiah et al. 2017; Javornik *et al*. 2021). The embodiment can go so far as the full integration of devices in the human body (e.g., microchips, smart contact lens, nanotechnology), which can complement or improve the cognitive abilities of users (Wilson 2002; Tussyadiah 2014). For instance, with smart contact lens it is possible to project visual information directly into the retina of the eye. Therefore, due to the new technological developments, Flavián et al. (2019) propose an adjustment of the reality-virtuality continuum by introducing the pure mixed reality, where virtual elements are rendered in such a way that they cannot be

distinguishable from the physical environment (Collins et al. 2017). Users can interact simultaneously and in real-time with real and virtual objects.

As immersion technologies advance towards a more embodied incorporation of devices into the human body that intensify the senses and emotions, change the physical body, or enhance cognitive abilities, the sense of being elsewhere (Collins et al. 2017) will be more effective than it is today. Likewise, as humans incorporate more immersive technologies, their physical bodies and minds will be more capable to modify the position, orientation, or features of virtual and real objects. In those future days we can claim that enhanced humans will experience transreal environments. These environments will go beyond what today we recognize as pure mixed reality (see Fig. 19.1). Transreality represents here the use of nanotechnology (incorporation of nano-devices in a scale of 100 billionths of a meter) to extrapolate and reshape the human body capabilities in terms of sense, emotions, memory, and physical features allowing the experience of unique realities.
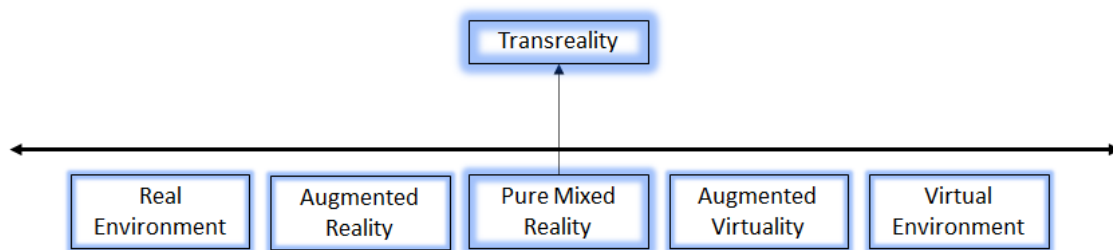
Fig. 19.1 Extended reality-virtuality continuum

AR and VR are combined with robots in the fashion industry to enhance the interaction between humans and robots (Sanderson 2018). Industrial robot programming systems can be assisted by AR. This programing process uses augmented graphics (e.g., the visualizations of the user-defined points and paths) directly onto the surfaces of workpieces (e.g., Ong et al. 2020; Makhataeva and Varol 2020). Robots are also coming

to the frontline, acting as frontline assistants, and interacting with customers. Robots can have artificial intelligence (AI) algorithms incorporated and learn how to deal with customers (Belanche et al. 2020). AI means the "programs, algorithms, systems and machines that demonstrate intelligence" (Shankar 2018, p. vi) and represents the "use of computational machinery to emulate capabilities inherent in humans, such as doing physical or mechanical tasks, thinking, and feeling" (Huang and Rust 2021, p. 32).

Academics create different typologies for the levels of AI (Mende et al. 2019; Loureiro et al. 2021). Davenport and Kirby (2016) suggest task automation (standardized or rule-based applications) and context awareness (requires algorithms to "learn how to learn" and extend beyond their initial programming). Huang and Rust (2018) consider four AI: mechanical, analytical, intuitive, and emphatic. Mechanical is the ability to automatically repeat tasks and routines without any help from humans. They are extremely consistent in performing tasks without the human fatigue aspect. As examples of jobs that can be performed by Mechanical AI is the operation of retail salespersons or waiters/waitresses. Analytical AI can perform complex, yet systematic and predictable tasks. Machine learning and data analytics are the major analytical AI applications. Thus, these are machines able to process and synthesize large amounts of data (big data) and learn from that information. For instance, the large number of reviews from social media can be analyzed by Analytical AI. Intuitive AI can think creatively and is able to adjust to novel situations (Sternberg 2005). As Huang and Rust (2018, p. 159) claim that "tasks that are complex, creative, chaotic, holistic, experiential, and contextual require intuitive intelligence". For example, intuitive AI can operate as creators in advertising or creative problem-solving. Empathetic AI can understand emotions and interact emotionally (Goleman 1996). Sophia, the human-like AI, from Hanson Robotics and Replika are first examples of what such Empathetic AI could be.

Kaplan and Haenlein (2019, p. 15) consider AI as "a system's ability to interpret external data correctly, to learn from such data, and to use those learnings to achieve specific goals and tasks through flexible adaptation". They propose Narrow AI versus General AI, where the first is focused on a specific domain and the second can extend into new domains. Thus, Narrow AI is somewhat associated with mechanical and analytical intelligences, whereas General AI with intuitive and empathetic intelligences (Reese 2018) (see Table 19.1). Davenport et al. (2019) argue that the level of intelligence can be conceptualized as a continuum.

Table 19.1 Typology of levels of intelligence

Typology				Authors
Task automation		Context awareness		Davenport and Kirby (2016)
Mechanical AI	Analytical AI	Intuitive AI	Empathetic AI	Huang and Rust (2018)
Narrow AI		General AI		Kaplan and Haenlein (2019)

Although luxury fashion retail managers are becoming more open for incorporating AI and immersive technologies, to date academics have not been prolific in developing research that explores the use of these technologies in luxury fashion retail (Chung et al. 2020). Only a few studies attempt to analyze AI and immersive technologies in fashion retail, but they are not specialized in luxury consumption (e.g., Watson et al. 2018; Tupikovskaja-Omovie and Tyler 2020; Baytar et al. 2020; Hamouda, 2021; Loureiro et al. 2021). Academics tend to focus primarily on studying specific technologies and concepts, without a broader perspective of the experience that customers are or will be living in their fashion consumption. For instance, understanding how luxury fashion retail can provide a personalized e-service through AI agents (chatbots). Other studies are concerned in developing digital shopping platforms for fashion shopping

where customers meet their expectations, using eye tracking fashion m-retail (Tupikovskaja-Omovie and Tyler 2020), augmented reality for virtual try-on (Baytar et al. 2020), or explore the customer experience during the interaction between customers and the mobile application (Watson et al. 2018; Hamouda 2021). Likewise, exploring how the experience in a virtual shoe store with different music tone stimulates the consumers' cognitive and affective state (Loureiro et al. 2021).

Understanding how the increasingly complex technologies affect customer experience is also a priority suggested by the Marketing Science Institute (MSI) (MSI 2021). Therefore, this chapter intends to bring together research on the experience of luxury fashion consumer retail and AI and immersive technologies to identify critical gaps and open avenues for future research. This chapter aims to analyze the incorporation and the potential evolution of AI and immersive technologies in luxury fashion retail. The main research questions are: How do AI and immersive technologies affect luxury fashion consumption cycle currently? How will the potential evolution of the AI and immersive technologies influence luxury fashion retail? What might be the concerns in terms of human and non-human rights, privacy an ethics associated with the context of luxury fashion? What might be questions for future research?

To do so, the chapter first presents the main theoretical concepts and the luxury fashion consumption cycle. Then the chapter offers a discuss about the human and non-human rights, privacy, and ethics at three levels, mega, micro, and nano. Finally, the chapter provides the research agenda. This chapter will contribute as a first reflection on AI and immersive technologies of actual and future evolution on luxury fashion retailing, proposes the luxury fashion consumption cycle model for AI and immersive technologies, and suggests research questions for the future. The chapter also contributes with a

discussion about the rights, privacy and ethics involving humans, hybrid humans, and non-humans.

19.2   Retail Customer Experience

Customer experience is a multidimensional concept that represents emotional, behavioral, cognitive, social, and sensory responses of consumers to the retail stores offered during the purchase journey (Schmitt et al. 2015; Verhoef et al. 2009). Diverse stimuli during the purchase journey shape consumer experience. Those stimuli come from the atmospheric cues of the physical or online store (e.g., layout, design, colors scheme, scent, music background), frontline employees, past experience, and marketing communication efforts (e.g., marketing campaign, social media).

Layout and design mean how the store is set up for the customer flow. When the layout is too complex, it helps to retain customers in the store (physical or online), but it can also annoy them and invite them to leave without buying. Warm colors are more associated with excitement, energy, and movement than cool colors (Crowley 1993; Labrecque et al. 2013). Scent represents aromas or smells that come naturally from the store (as in bread store) or purposefully (e.g., use a fragrance to represent a brand) to induce pleasure in consumers (Spangenberg et al. 2006). Music is also an ambient element that influences emotions and behaviors (e.g., Grewal et al. 2003; van Rompay et al. 2012). Frontline employees provide the service, contribute to a more personalized service, and to develop the interaction between the retail brand and the customer. They are important elements in the customer experience because they can induce emotions and behaviors, such as pleasure, enjoyment, commitment, and the return to the store (Palmatier et al. 2006).

Past experience influences the appraisal of the current experience because it creates expectations (Verhoef and Van Doorn 2008). When consumers have a good memory of the previous experience, this can help them to recommend the store (physical or online) to others or return more often. However, a negative experience is difficult to overcome and can lead the consumer to complain or stop going to the store (Verhoef and Van Doorn 2008). As past experience, marketing communication also forms the expectations about the experience. Marketing communication can take many forms from in-store communications to advertising campaigns or social media. In-store communications represent all type of signage that guide customers in the store (Van Nierop et al. 2011). Advertising campaigns are created by the retailers to promote their products. Although retailers can also use social media to promote their products, this medium is mainly used by customers to comment on the products, by recommending or complaining (Van Doorn et al. 2010). Social media can be a way to engage the customer (Hollebeek et al. 2014).

Although distinct from experience, the concept of engagement is closely associated with it. A good product or brand experience can contribute to engage customers. By customer engagement Van Doorn et al. (2010, p. 253) claim that it is "the customer's behavioral manifestation toward a brand or firm, beyond purchase, resulting from motivational drivers". From the relational perspective, (Kumar and Pansari 2016, p. 498) define engagement "as the attitude, behavior, the level of connectedness (1) among customers, (2) between customers and employees, and (3) of customers and employees within a firm". Customer engagement has a multi-dimensional nature, where the core meaning refers to interaction (e.g., repeat purchase, exchange ideas), emotional connection, and cognitive focus towards the object (i.e., retail, product/brand).

19.3 Luxury Fashion Consumption Cycle

Luxury fashion brands have global reputations, associated with innovation and tradition and encouragement of the customer's desire (Tynan et al. 2010). Hermes, Chanel, and Louis Vuitton are commonly ranked in luxury brand indexes (e.g., Prestige Brand Ranking 2021, Interbrand 2020). Ko et al. (2019) claim that a luxury brand is perceived by customers as being high quality, authentic, having a prestigious image, commanding premium pricing, and inspiring a deep connection. Fashion brands as Hermes, Chanel, and Louis Vuitton, Gucci, Prada, Burberry, or Dior have such characteristics. In the luxury brand industry two terms are often employed: *Haute Couture* (high fashion) and *Prêt-à-porter* (ready-to-wear). The first refers to one-of-a-kind piece, completely personalized, unique, with extreme attention to detail. As for the *Prêt-à-porter*, these are pieces of high-end garments that are available at physical or online sophisticated stores. Although high fashion is extremely expensive and is affordable only to a very few, ready-to-wear has premium prices, but is more accessible to customers.

The high fashion (*Haute Couture*) pieces are all handcrafted, bespoke and require a lot of skill and time. *Haute Couture* customers do not buy from retail stores, they belong to a very exclusive high wealth percentile, so the pieces are made exclusively for them, and they have direct access to the couture designer's stylist of the Couture House. Ready-to-wear stores are the core focus of this discussion. Thus, are these brands using XR and AI in their retail? The answer is yes. Gradually luxury brands are introducing these technologies, particularly in the ready-to-wear context.

For example, Dior Virtual Try-on is an app that allows customers to try on sunglasses and headbands via AR on Instagram, from the comfort of their own smartphones. They also launched a virtual sneaker try-on with Snapchat. Dior Insider is an AI chatbot that promotes the brand's beauty to help consumers keep up to date. Dior

Insider begins by greeting the user by name and asking if he/she is a Dior privileged customer. If the user answers no, Dior Inside says "Not yet… it's just a matter of time" with a wink emoji. The VR headset – Dior Eyes – is equipped with high-definition image resolution and integrated holophonic audio, creating a 3D immersion into the backstage world of a fashion show.

In a partnership with digital clothing marketplace DressX, designer Clara Daguin wears a digital version of her Jacquard in the Paris Haute Couture Week - Fall 2021. The designer Damara Ingles presents Sutu wearing looks originally created for the VR Paris fashion show 2020, claiming that the future of fashion is a symbiose between biological bodies and virtual environments (Voguebusiness 2021).

Other example comes from Burberry 'ARKit', which is the Apple's augmented reality for iOS (mobile operating system) that allows customers to digitally redecorate their surroundings with Burberry-inspired drawings by artist Danny Sangra. Coach installed VR headsets in stores in ten malls across the United States of America provide customers with full access to its latest runway show. Louis Vuitton initially took more time than other brands to adopt these technologies, but now it demonstrates AR technology-infused sneakers and accessories and presents a new textile that allows for flexible displays of high-resolution imagery in bags, which they called "Canvas of the Future".

What will the future of luxury retailing bring? The pandemic situation of COVID-19 has given us a glimpse by opening the consumers' mind to accept technologies that allow them to be closer to the luxury fashion brands, even without a traditional physical touch point in a physical retail store. Luxury fashion industry is known for being creative and innovative, making the fashion experience dynamic and iterative.

Dynamic, because *Haute Couture* houses create a collection every winter and summer season (a very creative industry whose innovation takes place twice a year). *Haute Couture* tends to inspire or even define the fashion trends of the ready-to-wear of the same luxury fashion brands. Iterative due to the cycle that flows from before purchase, effective purchase and after purchase. The cycle process (see Fig. 19.2) shapes the luxury fashion consumer experience over time.

Before Purchase *Discovery*

Behavior:
1. Need /desire
2. Search
3. Consideration

Interaction:
1. Social media
2. QR codes
3. VR, AR try-on
4. Pure mixed reality in runway
5. Mechanical AI
Empathic AI: Virtual assistant

Re-feed

Awareness

Retailing Effective Purchase *Environment*

Behavior:
1. Select
2. Ordering
3. Payment

Interaction:
1. AR try-on
2. Beacons and Facial recognition
3. Live shopping
4. Transreality
5. Empatic AI, Human and Hibrid human

Usage

After Purchase *Evaluation*

Behavior:
1. Usage, consumption
2. Engagement
3. Service requests

Interaction:
1. Social media
2. XR
3. Analitical AI
Empathic AI: Virtual assistant
Intuitive AI:
1-Prepare advertising and
2-Communicate with humans

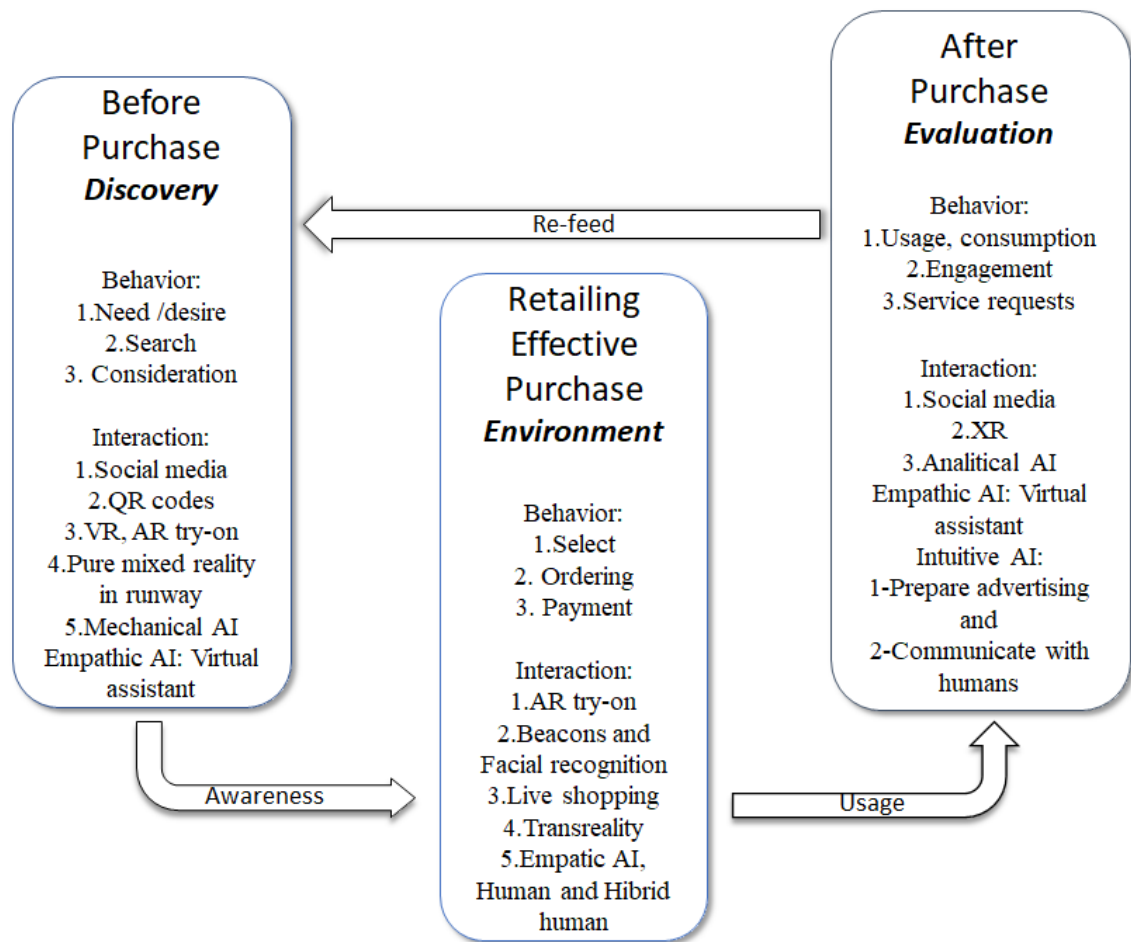Fig. 19.2 Luxury fashion consumption cycle model for AI and immersive technologies

In the future, the three major phases of the consumption cycle are expected to evolve to customer-brand relationships with multiple interactions between humans, machines, and hybrids. Hybrid means beings that are humans but have incorporated technologies (as nanotechnologies) to enhance their capabilities, what can also be called

as transhuman (e.g., Bostrom 2005a; Kumar et al. 2016; Henkel et al. 2020). Thus, luxury fashion customers in subsequent years may constitute a heterogeneous market of human, hybrid, and non-human individuals. The fashion luxury providers can also be composed by the same multiplicity of individuals.

In this vein, the creative stylist of a Couture House could become a hybrid or a non-human (for instance, an Artificial Intelligent (AI) agent that has evolved into a more creative and intuitive way). In the ready-to-wear manufacturing process, both human and non-human employees can cooperate. Some hybrid humans with enhanced physical and cognitive abilities can, alone or in interdependence with AI algorithms, design more personalized clothing or be more innovative in creating new green fabrics and materials. In *Haute Couture* the tailor-made outfit and experience can be performed by highly evolved AI agents. These agents (robots or not) can operate with large amount of data, knowledge psychological and physical aspects of human beings and provide unique experiences alone or with other human employees.

19.3.1 Before Purchase

This phase (see Fig. 19.2) aggregates the interaction activities between consumers and luxury fashion brands before the act of purchase. Here customers recognize that they desire a luxury piece (Boujbel and d'Astous 2015). They search and consider alternatives. Luxury consumption is associated with hedonic pleasure (Hagtvedt and Patrick 2009), the wish to create a distinction from the mainstream and to belong to a niche group of consumers (Tungate 2014). Luxury fashion brands instill in consumers the feeling of uniqueness, excitement, upper-scale, and distinctiveness (Prentice and Loureiro 2018).

The use of VR to communicate brand identity may enhance the attractiveness of the brand. VR creates a psychological state of isolation from the real world leading to a

flow in which the fashion customer is completely taken by the fashion brand. As this technology technically evolves, luxury consumers can have the whole experience of using a fashion piece, without actually having it. They may not only visualize the color and shape, but also touch, smell, and use all senses, depending on what the brand wishes to provide (Petit et al. 2019). A luxury fashion consumer can have a pre-purchase experience of different luxury brands prepared specifically for him/her. For instance, the runway show can be prepared in a sequence of pieces that can better fit the style and personality of the fashion consumer. In 2021, a VR movie showing a runway is already possible but with the current state of the technology a customization is not possible, neither is the use of the five senses without a CAVE (Cave Automatic Virtual Environment – a cubic room where stereoscopic images are projected) (Loureiro et al. 2019).

A few luxury brands – as Ralph Lauren and Louis Vuitton – are using QR codes for their advertising campaign. QR codes can connect fashion consumers with AR experience for a more insightful, interactive, and playful demonstration of the fashion pieces and trends (Wedel et al. 2020).

The use of virtual try-on technology (AR apps) – as for instance in Dior makeup or Gucci shoes – provide a luxury experience before any purchase decision that can engage the consumer, encouraging and leading them to the effective purchase online or offline (Spence et al. 2014). AR apps for mobile devices can give information about the characteristics of the products, such as color, texture, size, price (Gäthke 2020). However, the smell of materials or the touch of products to understand their texture is still not possible. Even so, the human brain can cognitively process stimuli that are not experienced through memories of past experiences (e.g., memories of smell and touch of similar fashion pieces), that is, mental imagery (Niedenthal et al. 2005; Petit et al. 2019).

The theory of embodied cognition claims that all cognitive processes are due to both bodily states and specific processing systems of the brain's sensory modality (Barsalou 2008). Thus, when luxury fashion consumers experience the fashion piece in a real setting, they mainly activate the cognitive bodily states process. The brain integrates the perceptual, introspective, and motor state resulting from the stimuli of smelling and touching, seeing, and wearing the garment in the real world. The multisensory representations are stored in the fashion consumers' mind (Petit et al. 2016). Then, when fashion consumers use VR or AR try-on environments without being able to use all the senses, the specific processing systems are activated with the memories created by past experience of similar fashion pieces. For example, the consumers' visualization of shoes can incorporate mental simulations of past experiences using shoes in them and producing spontaneous sensations similar to actually touching and wearing the shoes (Okajima et al. 2016). In the future, with the evolution of technology, the immersive experience will be increasingly bespoke, and the five senses will be experienced in any place and at any time.

The pure mixed reality is a way to provide an immersive experience of fashion pieces (Flavián et al. 2019), which makes the virtual elements so embedded in the physical environment that fashion consumers cannot see the difference between real and virtual. This can be an important advance for luxury brands to promote their luxury pieces. The virtual runway can be more creative, providing an experience combining real and virtual pieces tailored to small groups of fashion customers.

Analytical AI integrated in a system with Intuitive AI can cooperate to use the big data of customers and prepare creative virtual and personalized VR environment. Social media, eventually with new forms, is an example of where empathic AI could be incorporated (as if it were a human being) and where AI can act as the steward (e.g., a

sophisticated chatbot or an AI avatar with a deep knowledge of the identity of the mother house) of the luxury brand. One may imagine a scenario where a certain fashion luxury brand has an AI empathic steward for each customer with a face, body, voice, gender that can represent the identity of the brand. The luxury fashion customer feels identified and emotionally involved with the specific steward developing an intimate relationship of mutual trust and interdependence (Fournier 1998; Sampson and Chase 2020). The same steward is also present in VR or pure mixed reality personalized immersive environment, accompanying, and giving suggestions to the customer in a runway prepared specifically for him/her. In this context, the luxury clothes can be co-created with the customer and experienced even before the physical existence. This phase creates awareness for the customer to make the decision to the effective purchase.

19.3.2 Effective Purchase

This phase encompasses the interactions when the luxury fashion customer is effectively purchasing. Traditionally this phase is connected to the selection, ordering and payment inside a real store or using online platforms (De Keyser et al. 2019; Bromuri et al. 2021). Various research on atmospheric cues have been conducted to understand how the environment stimuli – such as design, layout, music, scent, and color – can affect purchase (Roschk et al. 2017; Bolton et al. 2018). In 2021, physical stores are using mirrors with AR to help customers in the selection process by visualizing themselves with clothes without actually putting them on. Online stores also present environment stimuli through the luxury brand website, which uses atmospheric cues as design, layout, colors, links (Roschk et al. 2017), chatbots and try-on. Luxury brands also use chatbots in Facebook's Messenger or WhatsApp. This chatbots (AI virtual assistants) – for instance Burberry has Lola – guide the customer in the online store.

The actual Beacons – small wireless devices that transmit a continuous signal; the cloud server delivers specific content to the fashion smartphone – and facial recognition – scanning thousands of landmarks on a person's face to identify their unique 'face imprint' – allow to track customers in the store and provide specific information about the products that may interest them, as does the app of Macy's luxury malls.

However, the live shopping (combining video livestreaming, e-commerce, and social media; simultaneously recorded and broadcast in real-time) that Chinese luxury fashion customers experience with Bilibili is taking the online experience to a more vivid reality. Louis Vuitton and Marc Jacobs are already taking advantage of this platform. Live shopping allows for an interactive in-store experience that creates positive emotions and increases engagement (Hollebeek et al. 2014; Kumar and Pansari 2016,) with the luxury brand. The Pandemic situation of Covid-19 accelerated the use of live shopping for luxury brands.

Luxury fashion brands are recognized for innovation, exclusivity and bespoke pieces and experiences. Thus, to be competitive and offer innovative and tailored pieces and experiences, luxury fashion brands will consider the evolution of technology to make the fashion consumer experience transreal environments. Transreal environments will be so immersive that the customer will not be able to distinguish whether they are in an online or offline environment, but it will be a unique, innovative, and personalized experience. Luxury fashion customers who desire to incorporate nanotechnology devices in their bodies can be in direct interaction with the fashion brand without the interface of a laptop, table or mobile. The image of the new pieces and the luxury environment will emerge in their mind, and they (brand and customer) will interact in real-time.

The fashion customer can have a personal fashion stylist, which will be a human or an AI algorithm. Customers can think and feel that they are actually wearing the piece

because the nano device can operate in the mind creating the feeling of real usage. In this high-tech environment, the customer can also have the option of purchasing the physical part or the image of using the virtual part. The sensation will be very similar in the customer's mind, but in the case of the physical piece customers can own the object (the luxury piece) and in the case of the virtual piece, they can have the sensation of using it for a period of time. In both situations the feeling of wearing the piece will be very real in the consumer's mind.

In this new market, customers are not only humans. They can also be hybrid humans or AI agents. AI agents that evolve to become intuitive and empathic can eventually have their jobs and be introduced in the society as any other human. Thus, AI emphatic agents may develop a desire for fashion pieces. They can even be influencers in social media (as humans are digital influencers today) or even be virtual influencers. By virtual influencer means AI (without virtual body as an avatar) with the ability to change opinions and behaviors in a transreal environment.

In the future, empathic AI robots can assist customers in physical and more traditional stores, particularly in the case of ready-to-wear (prêt-à-porter) luxury stores (Belanche et al. 2020) in a more tailored way. They may empathize with regular customers and understand their desires and style, giving them suggestions, advice. More select and exclusive customers can have the same steward, designed for each individual customer, as in the previous phase. Thus, very exclusive fashion customers can benefit from having a steward in all phases of the purchasing process and use a unique virtual room to select and effectively purchase the fashion products. Nevertheless, real private rooms can still exist for a strict number of customers that wish to try on clothes and can be assisted by humans and/or robots. AI can operate as systems with or without a vocalization similar to a human voice (e.g., Amazon Echo, Apple Siri) or as robots.

Robots with AI can work side by side with humans. AI robots are evolving to learn how to walk and master complex human skills (Fevre et al. 2019; Singh and Bera 2020), in sum, to have human-like movements and behaviors. With the effective purchase phase, the luxury consumer will be able to have an experience of using the purchased luxury piece.

19.3.3 After Purchase

This phase is traditionally associated with the use of the fashion products, service support regarding, for instance, guarantee and complaints, and the engagement with the brand. Customer engagement is a complex construct representing the consumers' interaction with the focal object (e.g., the luxury fashion brand) (Van Doorn et al. 2010; Bilro and Loureiro 2020). The engagement process can create mutual interest and behaviors between the luxury brand and the customer through word-of-mouth, giving recommendations, writing reviews in social media, or buying more often products of the same brand (Kumar and Pansari 2016).

At this phase, luxury fashion customers use, touch, and feel the luxury fashion products in their daily life or use exclusive pieces at special moments, as parties, galas. For instance, celebrities parade models at the Oscars' runway and other public figures use models bought, given, or borrowed by fashion luxury brands at various events. These people with social influence communicate the brand by attending public events but they can also be digital influencers by making comments via traditional social networks. An intuitive and empathic AI can also be an influencer that is able to adapt to different circumstances and eventually have a virtual body to exhibit luxury fashion products. In a transreal environment and using their virtual body (e.g., AI avatar) they become a virtual influencer.

Therefore, AI is a relevant tool in producing a tailored engagement marketing approach. AI can enable real-time learning, leading to an increase of value for customers, customer retention and growing competitive advantage (Kumar et al. 2019). AI systems are able to develop persuasive communication with human employees, capture the essence of the communication to assist in promoting the service and formulate questions that contribute to solving problems (e.g., Aicardi et al. 2018).

This phase opens the window to the re-feed. When luxury fashion customers have the experience of using the fashion piece, they will evaluate such usage experience. If the evaluation is positive, customers recommend the brand to others and are more willing to search for more information about the brand with the intention of purchase it again in the future. If the evaluation is negative, fashion customers will tend to provide negative information about the brand and will search for other brands.

19.4   Human and Non-human Rights, Privacy and Ethics

The AI and immersive technologies bring to the public discussion issues related to human and non-human rights, privacy, and ethics. This discussion can be conducted at three levels: mega, micro, and nano (see Fig. 19.3).
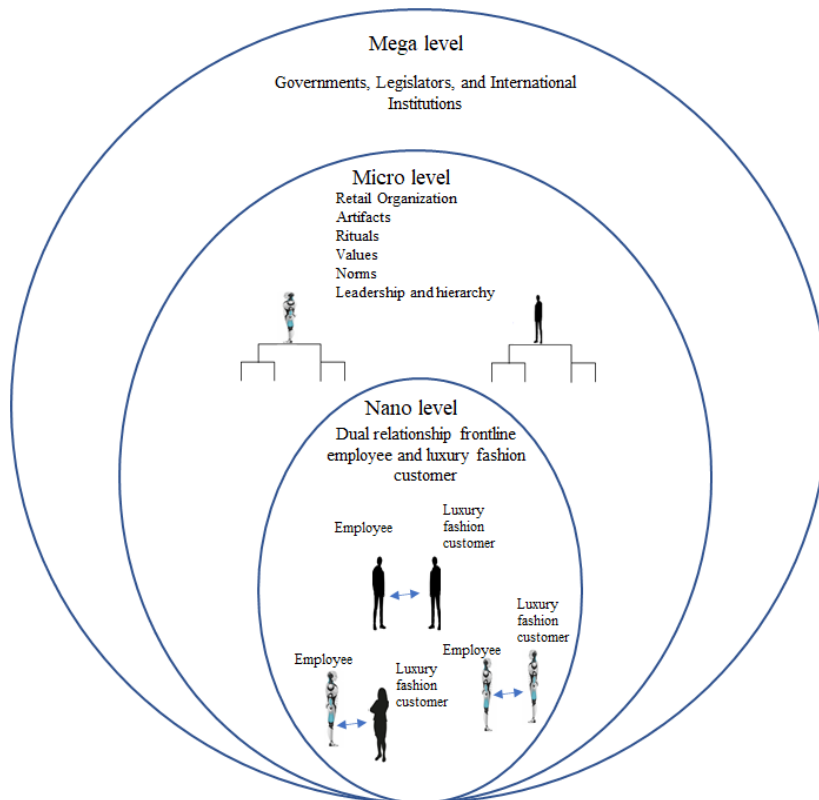
Fig. 19.3 Human and non-human levels of rights, privacy, and ethics

19.4.1 Mega Level

This level comprises governments, legislators, and international Institutions. International organizations, governments, and legislators weave the laws and rights that manage the life of societies at a global level or referring to each country. Intergovernmental organizations as United Nations that created human rights will also have to pronounce on the rights of non-humans.

The United Nations Educational, Scientific and Cultural Organization (UNESCO) recognizes the need for international and national policies and regulatory frameworks to ensure that the emerging technologies do not harm Humanity as a whole (UNESCO 2021). They claim that AI should exist for the greater interest of humankind and not the opposite.

Legislators and ethicists worldwide have begun to develop legal norms and standards to regulate the emerging technologies, particularly AI algorithms. Some examples are the Montreal Declaration for Responsible AI, the Asilomar AI Principles, the AI 4 People's principles for AI ethics, the two High-Level Expert Groups on AI's reports (European Commission), on ethics as well as governance of AI, the House of Lords Artificial Intelligence Committee, and the German Ethics Code for Automated and Connected Driving, which entail important aspects of ethical issues related to AI.

The Montreal Declaration emphasizes ten principles (Montreal_Declaration, 2018), namely, artificial intelligence systems must (1) permit the growth of the well-being of all sentient beings, (2) respect the people's autonomy, (3) protect the people's privacy and intimacy, (4) be compatible with maintaining the bonds of solidarity among people and generations, (5) meet intelligibility, justifiability, and accessibility criteria, and must be subjected to democratic scrutiny, debate, and control, (6) contribute to the creation of a just and equitable society, (7) be compatible with maintaining social and cultural diversity and not to restrict the scope of lifestyle choices or personal experiences, (8) every person must exercise caution by anticipating the adverse consequences of AI, (9) not to contribute to lessen the responsibility of human beings when decisions must be made, (10) to be carried out so as to ensure a strong environmental sustainability of the planet.

Aligned the Asilomar AI's Ethics and Values and the AI 4 People's principles for AI ethics mention the need for secure, equitable, fair, transparent, private, and responsible AI systems, that preserve human privacy (Floridi et al. 2018; Futureoflife 2019). AI systems should be designed so that their goals and behaviors can be aligned with human values. Humans are the ones that decide what to delegate AI systems and these systems should respect and improve, rather than subvert, the social and civic processes on which

the health of society depends. The European Union states that AI systems must be controlled by humans, AI systems must empower human beings to make more informed decisions, have transparency, respect for privacy and data protection and adequate data governance mechanisms (Europa 2019). The U.K. parliament and the German Ethics Code for Automated and Connected Driving are other voices expressing the importance for transparency, privacy, and human empowerment.

All these committees point out human empowerment and treat AI systems as ways to support human, what is quite reasonable for mechanical and analytical AI systems, that is the narrow AI, as we have today. Yet, AI systems and agents are designed to learn and evolve. They will become intuitive and empathic. AI agents will be bold in terms of creativity, similar or even transcend human regarding cognitive and even emotional states. In this situation can we humans consider them as slaves or assistants of human beings, or they will become a non-human species? In this situation what will be their rights? Similar to human-beings?

19.4.2 Micro Level

Organizational culture encompasses artifacts (e.g., stories, rituals, arrangements, a flag, colors having a strong symbolic means), shared norms and shared values (Deshpande and Farley 2004). Culture influences how the organization adapts to changes and contributes to motivate employees. The incorporation of technologies is a factor whose incorporation requires changes in the organization. The acceptance of technologies as AI in luxury fashion retailing organizations involves the recognition that the benefits are meaningful and the risks can be minimized, prevented, or controlled through risk management (e.g., insurance and redressing). Fashion retail organization ethics comprises organizational

values and norms that guide individuals' behavior (Ferrell et al. 2019). Thus, AI systems should not only incorporate the norms and values stablished by supra national organizations, but also the specific ones that each retail organization has. Although rituals, stories and other artifacts can be incorporated in the AI algorithms, this is not a necessary condition since AI can easily learn them all over the time.

In luxury fashion retail, managers need to discuss the decision-making process and the hierarchical structure in an environment of high technology with AI. The AI decision-making process can include feelings and emotion-based personalization similar to human beings (Huang 2017), but the ai ethical choices will emerge in behaviors rather than in intentions (Etzioni and Etzioni 2016). so, ethics should be integrated in the design of the ai algorithm (Martin et al. 2019).

With ethic principles implemented, AI can be allowed to take diverse decisions through predictive analytics, implement operations and associated with retail frontline service (Kaplan and Haenlein 2019). But can luxury fashion retailer leaders let AI make strategic decisions? If so, that means humans will transfer the decision power to the AI. If not, when in the future AI systems transcend humans cognitively and emotionally, these systems will not take the leadership, whether humans want it or not? The use of AI nanotechnology to enhance human cognitive and emotional capabilities can create hybrid humans whose potentials transcend those of current humans. Are these hybrid beings to lead in the future? Therefore, in the hierarchical structure humans can be led by AI systems or by hybrid beings. Can we avoid it today? Or it will be an inevitability due to the main assumption of AI, that is, its ability to continuously learn and adapt.

The luxury fashion industry is well-known for its fast innovation and creativity. This industry creates trends and is open-minded. But can AI systems transcend the creativity of humans? At least AI systems can cooperate in duality with human creativity

giving the possibility to identify faster than humans, certain particularities – the new *zeitgeist* – in the street and social media that boost the innovation of luxury fashion.

While AI systems can handle a large amount of data, they need it to be relevant and accurate to be effective in the predictions they make and tracking new trends. This point can collide with the privacy of the fashion consumers. Thus, the level of privacy imposed by the luxury fashion retail brand or the level of trust that the consumer places in the brand may restrict the personal data that is provided. Personal data means sociodemographic variables (e.g., age, gender, income, facial expressions), but also more sensitive data such as photos, medication, or political preference. Sensitive personal data can come from tracking retail consumers when they look for certain clothes in physical stores or online. For instance, the use of augmented reality apps can save information about luxury fashion preferences. Virtual reality technology can also incorporate eye tracking to understand which specific points of the store or luxury clothing customers are looking at or take longer to observe. The virtual runaway – often used during the Pandemic situation – and the traditional runaway – using, for instance, eye tracking tool associated with augmented reality – can provide useful data for AI systems. The use of AI algorithms to analyze street wear can add to the other more traditional information about fashion consumers (particularly some *avant gard* and well-known streets in different parts of the world). Yet, retailer and luxury fashion brands need to create guidelines about how all this information can be used.

AI systems are powered through different datasets (De Bruyn et al. 2020) and depending on the trustworthiness of the information accessed, it will be possible to have a better or lesser forecast of the trend, thus, be a more accurate means to reduce bias, and this lies on the quality and quantitative of the data. The policy to restrict information due

to the privacy of luxury fashion consumers can decrease the accuracy of the AI analytical predictions.

Luxury fashion retailers should understand their customers sensitivity towards the donation and use of their personal data. The knowledge about the customers and the general guidelines of the international organizations help to trace the policy of ethics and privacy. With the evolution of the AI systems and other technologies the policy of ethics needs to be revised from time to time.

19.4.3 Nano Level

Nano level represents the dual relationship between frontline employee and luxury fashion consumer. A human frontline employee must be trained to perform his/her tasks in accordance with the retail's organizational culture and identity. He/she has labor rights and duties in accordance with the laws in force in the countries where the retail is implemented and in accordance with the general policy of the fashion luxury brand. However, frontline employees are not just human, they are also AI agents (e.g., chatbots, robots in stores). These AI agents are evolving in knowledge and emotionally, and eventually they will become more aware of its existence and one day these non-human high evolved agents will begin to claim their rights. Eventually they could become consumers. At the same time hybrid humans – those who incorporate nano-technologic devices or adopt prosthetics that enhance their capabilities – can also perform the double role of being employees and customers.

In this situation we will witness a proliferation of dual interactions between human-AI agent or human-human with different levels of technology incorporated. Luxury fashion retail will operate in multiple and interrelated places that will go beyond the well-known physical or online stores. The transreal environments integrating multiple

humans, non-humans and AI agents will reshape each individual values and ethics towards life and purchase behavior. Individuals will tend to analyze in real time what are the benefits and risks of purchasing a particular luxury piece, which will increase the front-line employee's responsibility to persuade and trust customers.

In transreal environments it will be difficult to distinguish what is real (in the sense of what we know today) and what is not. In these circumstances, it will be the luxury brand's ethics to prevail in order to generate confidence that their data will not be misused, since in this environment, privacy will be difficult to achieve.

19.5   Conclusion

XR and AI technologies are bringing a revolution to the fashion retailing business. VR and AR technologies will evolve to become easier to be used, with updated oculus or other devices to immerse in VR experiences or interfaces that are not smartphone or tablets for AR.

XR technologies can evolve to a pure mixed reality, in a first stage, and then to transreality. In the pure mixed reality luxury fashion consumers cannot distinguish from virtual and physical elements. However, in transreality the immersive environment is leveraged to the extreme, where beings incorporating nanotechnologies in their bodies can interact simultaneously in real and virtual environments without any external equipment and without differentiating between environments. The dynamic interexchange in different environments is not only possible to hybrid humans. AI algorithms can also have access to such environments. They can present themselves as AI avatars in such way that hybrid humans do not differentiate AI from them. These AI agents may desire to wear exclusive luxury fashion pieces tailored for them, as hybrid

humans. These pieces can have only a non-real existence, but for the luxury fashion customer these pieces can be cognitively and emotionally gratified as the tradition real pieces.

AI in luxury fashion retail can have a dark side. For instance, AI algorithms could evolve into generating a non-empathetic involvement with others, particularly humans. Some humans may not adapt to this new reality and others will lose their jobs and will not be able to change to new job situations. The relationships between humans and advanced AI (with or without a human-like body) will be complex. AI may eventually develop consciousness of being. At that stage, they may develop feelings of fear and loss, and could even fear being shut down, just as human beings are afraid of dying. AI could claim their own rights and a new or adapted declaration of citizen rights could emerge.

In the future, more research will allow to better understand the four core pillars of fashion retailing industry, that is, fashion retailing-technology relationship, service fashion retail environment, stakeholder-technology relationship, and innovation-technology relationship (see Table 19.2). Regarding fashion retailing-technology relationship, two sub-pillars emerge, that is, organizational culture and relational process. The first focuses on the internal hierarchy structure of the luxury fashion retail brand. Future research should be concerned with understanding the organizational culture (considering rituals, artifacts, values, and norms) in a luxury fashion retail organization that includes AI and hybrid employees. The possibility of having an AI advanced agent leading the organization or some intermediate hierarchy level should be discussed and analyzed. As for relational process, future studies should consider all kind of relationships and interactions among humans, hybrid humans and AI agents as employees and in society. Society and educational institutions need to debate the shift in different educational levels concerning the cooperation and interaction among different beings.

Educational researchers should investigate how to prepare courses to generate skills about how to live, operate and interact in XR, mixed reality and transreality. The workforce is changing, and this is an avenue for researchers interested in the new interactions at luxury fashion retail. The interaction process in pure mixed reality and transreality should not be neglected.

Table 19.2 Suggested research questions

Pillar	Sub-pillar	Research questions
Fashion retailing-technology relationship	Organizational culture	What will be the organizational culture in an environment with human, AI, and hybrid employees? What will be the rituals, artifacts, shared values and norms among human, AI, and hybrid employees? What is the role of leadership? Will a more intuitive and empathic AI become a leader at a creative industry such as fashion luxury? What will be the leadership styles at different levels of the organization? Can AI develop social intelligence, self-awareness, and self-mastery to embrace the leadership?
	Relational process	Can AI develop social intelligence, self-awareness, and self-mastery to interact with other employees? How will be the relationship among different AI agents (some with a robot body and others not)? How will be the relationship between AI, humans, and hybrid employees? AI will need an academic degree as human beings today? Will they need to learn how to behave in society? How to educate (formally through higher education and informally) humans to deal with non-humans' employees? How to encourage humans to acquire more skills to operate with XR technologies or others related? How will humans and non-humans live, operate, and interact in pure mixed reality environments? What about transreality? How will be the new role of humans at workforce?

Service fashion retail environment		Can we consider AI robots in luxury fashion stores as part of the atmospheric cues? Or are they as any other frontline employee? What about their duties and rights?
		AI agents not incorporated in a robot should have similar duties and rights that their similar robots?
		How to combine XR, mixed reality and transreality technologies and AI robots in the service retail landscape?
Stakeholder-technology relationship	Customers	Will customers become more involved with AI employees that human employees?
		Will AI become a customer?
		How can we segment customers in their interaction with AI employees? How different can the relationship cognitively, emotionally, and behavioral be between humans (customers or employees) and AI (regarding, for instance, voice, text, or robot shape and appealing)?
	Competitors	What direct competitors are presenting in runways and marketing communication? How fast are they incorporating AI and immersive technologies?
	Suppliers	What are the strategies of suppliers to incorporate AI and immersive technologies in retail stores? Are they interested in integrating different store environments?
	Government and International Institutions (GII)	What laws will be stablished about the use of XR, mixed reality and transreality environments in luxury fashion retailing? What about data protection?
		How will GII interact with retail brands? Will they consider gradually incorporating AI with intuitive and empathic skills? Or will they only consider analytic AI? Will GII establish laws to protect AI against slave labor?
Innovation-technology relationship		Can VR technology replace the traditional advertising (e.g., printed, outdoors, video)?
		How will be the marketing communication process in XR, mixed reality and transreality environments?
		Can AI become a celebrity or an influencer and generate a perception of "cool" fashion products among humans or non-humans?
		Can an intuitive and empathic AI become a stylist and compete with a human stylist? What will be the tipping point for such circumstance?
		What will be the relationship between humans and AI in the new product development process?
		Can AI robots be customers, too? How to segment AI customer preferences?

Service fashion retail environment deserve to be investigated in terms of atmospheric cues in the XR, mixed reality and transreality environments. The duties and rights of non-human employees should be discussed and investigated. Researchers should also explore the service luxury fashion retail landscape in high-technological environments.

The stakeholder-technology relationship comprises four major sub-pillars, customers, competitors, suppliers, and government and international institutions (GII). Customers' segmentation and the relationship with different employees' agents are two key aspects that need further attention. Luxury brands should always be aware about what other luxury fashion brands are doing in terms of strategy of using AI and immersive technologies. This is a key point for positioning the luxury fashion brand and creating the differentiation. In the case of stores that sell multi-brands and are not directly managed by the luxury Couture House, they should continuously be opened to understand the policy of the luxury Couture House (the supplier) towards the incorporation of AI and immersive technologies. Concerning GII, researchers should focus on the roles and laws to be stablished in the new future for XR, mixed reality and transreality environments and data protection.

Innovation-technology relationship is a pillar that deals with innovation in luxury fashion industry with the incorporation of AI in the innovation process and the marketing communication. Researchers should also study how VR and other related technologies can replace the traditional advertising and how marketing communication will be in environments such as XR, mixed reality and transreality in luxury fashion context.

This chapter contributes to business and society by awakening the reader to the incorporation of AI and immersive technologies in luxury fashion retail. Society is

starting to live side by side with these technologies, using and interacting with them. As AI agents evolve, they will be able to perform more complex tasks and will gradually have self-awareness. A complex society with humans and non-humans will be very challenging and a new system of support and business models will emerge. Rights and duties will be extended in a society or at an organization aggregating multiple relationships with humans, non-humans, and hybrid humans.

Theoretically, this chapter constitutes a first reflection on AI and immersive technologies in luxury fashion retailing, by (i) proposing a model of luxury fashion consumption cycle for AI and immersive and artificial technologies, (ii) giving a glimpse about what the future could be because of the evolution of AI agents (cognitively and emotionally), the incorporation of nanotechnologies – allowing the creation of hybrid humans – and virtual environments (pure mixed reality and transreality), (iii) and suggesting diverse research questions which can stimulate academics to investigate.

Luxury fashion managers benefit in reading this chapter because they can acknowledge (i) how AI and immersive technologies have been incorporated in the luxury fashion consumer experience cycle, (ii) the potential evolution of such technologies and (iii) the rights, privacy an ethics that can be involved regarding humans, hybrid humans, and non-humans.

Haute Couture luxury fashion pieces are made for a specific customer that traditionally has direct access to the Couture House. Ready-to-wear is associated with luxury fashion retail, where fashion pieces have a unique style and high quality, but it is less expensive and exclusive than *Haute Couture*. The evolution of AI and immersive technologies, as exposed here, opens the door for a better understanding of what will be the potential changes in the luxury fashion retail. The technologies allow a closer and more interactive contact with each customer. Therefore, the technologies open

opportunities to accelerate the innovation, but it also increases competition. Luxury Couture Houses need to continue to be creative, differentiating and be at the forefront with surprising proposals.

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