Franco Lodato

Franco Lodato is an accomplished and global recognized creative leader, he has expansive success in integrating nature inspired design, human-centered innovation and technical insight into design-driven solutions that results in meaningful and dynamic products that improve the lives of users.

His comprehensive industry expertise includes corporate, startups, and design consulting agencies across industries including: personal and health care, lifestyle and luxury, education, consumer electronics, and wearable and mobile technologies.

Lodato has extensive experience in full concept to market product design in diverse contexts—from home environments (Herman Miller and Gillette) to consumer-high tech (Motorola- Google) to high-end consulting (Pininfarina, Continuum). He was recognized as “Master Innovator” at Motorola-Google and holds 71 U.S., and International invention patents, including the first wireless ECG, a multi-blade conformable razor (precursor to Gillette's Mach3), and the Motorola i833.

His academic assignments include: Associate Professor at the University of Montreal School of Design, Designer in Residence at the University of South Florida, Visiting Lecturer at the MIT Media Laboratory, and Vice President of the Industrial Designers Society of America (IDSA), Florida Chapter. He is executive member of the U.S. National Academy of Inventors.

As of 2019 he is SVP Design & Innovation for Kids2, one of the fastest growing baby product companies in the world and was appointed as research associate at the Florida Institute of Human Machine Cognition Lodato is also a published author and a Tedx Talk speaker “What Woodpeckers, Sharks and Snakes Teach Us About Design”

Bionics in Action

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> *"The waves of the sea, the little ripples on the shore, the sweeping curve of the sandy bay between the headlands, the outline of the hills, the shape of the clouds, all these are somany riddles of form, so many problems of morphology, and all of them the physicist can more or less easily read and adequately solve. Nor is it otherwise with the material forms of living things. Cell and tissue, shell and bone, leaf and flower, are so many portions of matter, and it is in obedience to the laws of physics that their particles have been moved, moulded and conformed."*
>
> D'Arcy Wentworth Thompson,
> On Growth and Form, 1917

[DESIGN]

Design has been with us as long as man has been creating his own tools. Design is about tools; tools for work or tools for pleasure, and, at best, tools for both. And design is about purpose and creation. In effect, design means translating a purpose into a tool. This confers a double meaning on the word design: It stands for the result – the tool – as well as for the process that created it. Man's first designs – the knife, the axe, the bow and arrow – and later, the ship that took him along the river or across the sea – have a sense of inevitability about them. In their simple form, they were tools making the best use of the materials available, and tools in a natural way matching the body and mind of the user.

Yet, these tools did find their form thanks to the act of a single designer. They were created over many generations via a series of minor adjustments in a long trial-and-error process that ultimately gave a design classic like the Viking ship its archetypal form. It was this vessel that took the first Europeans to North America more than a thousand years ago, now cooperating with, now struggling against, the forces of nature – the kind of demanding environment that inevitably leads to the best designs. Or as Jørn Utzon, the architect, puts it: 'Everything on a good ship has the right form and is made from the right material'.

Industrialization and the emergence of a multitude of new processes, new materials and new purposes changed the nature of design. From being a long and largely unconscious process, industrial design became a here-and-now activity, featuring the new ways of making things and new purposes. Design – industrial design – became a conscious process. Yet, the basic meaning of the word remains: Good design is the craft and the art of translating a purpose into the best possible tool.

[DESIGN DIMENSIONS]

Creating the best possible tool is a multidimentional task. By its very nature, design is not about maximising any one of these properties but of achieving the best possible, or optimum, mix of them all. Good industrial design is always achieved as a balance between six different design dimensions:

- Purpose
- Construction
- Manufacturing
- Function
- Relationship to the user
- Relationship to the environment

Each of these design dimensions may, in its turn, be subdivided in order to create a subtler description of what design is all about. Yet, the basic structure remains the same.

PURPOSE is where it all starts. A good design only reaches its full potential when it is a solution to a problem worth solving. It loses its real meaning if the purpose it fulfils is not really worth pursuing.

CONSTRUCTION is about the right form and the right materials, and about how the different

components of a product work together, both under normal and critical conditions.

MANUFACTURING concerns the way a product is made. It is based upon the technology available, and changes with the technology in a never-ending game, where new technology and new materials inevitably foster new designs.

FUNCTION is about how well the tool works. Its efficiency, its safety and reliability. In short, how well it fulfils its practical purpose.

The relationship to the USER is a short designation for the harmonious interplay with the body, the mind and the spirit of the user – and, at its best – the factor that links work, play and meaning. In some lucky instances, it all boils down to a single principle: Observe life, and then the design will take care of itself. Finally, the relationship to the ENVIRONMENT marks the link to the people, other products and processes the new product will have to relate to, and to the nature and quality of this relationship. Sometimes, this interplay, and not the product, is the real design. In their turn, the concept of purpose and all the other design dimensions are linked by two common denominators: Economy and ecology.

[DESIGN IS A LANGUAGE]

Design is a language. It is a statement of our purpose and goals and of the values we hold, which is understood across the boundaries of the different languages of the world, and sometimes across the barriers of culture. Design is not only a visual language. Design caters for all of the senses: Vision, sound, smell, touch, taste. And when working at its best, all of these design dimensions help define the product and distinguish its nature and create a coherent product personality. The door slam of a new motorcar is part of its personality – and a detail revealing the quality of its engineering and manufacturing.

The smell of the cabin could be that of cheap plastics or of well-tanned leather. The texture and touch of the steering wheel could be just right for the hands and the action, with all handles and switches within easy reach. And the look of the car, of course, give an image of the guiding principles, if any, behind it. A design statement can be as revealing as any spoken statement.

Pininfarina have designed Ferrari cars for five decades – effectively inventing the archetypal form where the shape of the car mirrors the passion for action and speed. In some cases, the product is mainly a vehicle for advertising or a fashion statement: Look at me, I am 'in', this is what I would like to be. Design may have many purposes, one of which is to steal the show. At other times, the message is the low-key statement that this is just an excellent tool. A tool the user feels confident with to such a degree that he may forget about the tool and just concentrate on the job at hand.

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[SIMPLICITY, COMPLEXITY AND THE TIMELESS WAY]

Any design inevitably carries an imprint of the age and the culture and civilisation in which it was created. Yet, there may also be a timeless way, a guiding principle that connects all good designs, irrespective of the time of their creation. That guiding principle is simplicity.Good design was always about achieving more by means of less – without cutting corners or compromising function. Sometimes, the best-designed component is the one which is not there because intelligent design has made it superfluous. The art is to achieve the simplest possible
solution to the problem without violating the inherent complexity of the task.

That is: The demands stemming from the sum of interests relating to purpose, engineering, manufacturing, function, interplay, environment and economy. This makes 'design the timeless way' a delicate balancing act between complexity and simplicity. The art is to bridge the gap between the complexity of the task and the simplicity and elegance of the solution. And that, in turn, according to Kenji Ekuan, the Japanese designer, 'is a game that can be played again and again, with new purposes and new technology without the good designer ever getting tired of it'.

[DESIGN FOR COMPETITIVE ADVANTAGE]

Industrial design, finally, is about competitive advantage. Any industrial product is sold in competition with other products. The basic rule is the survival of the fittest. The winner, ultimately, is the product and service that – in the eyes of the user or buyer – provide most value for the money.

This process takes place in an atmosphere of never-ending gambling, the core principle of which is creating and communicating value. Including branding, in today's lingo. Both technology and design – and the combination of the two in innovation – play crucial roles here. Technology is an essential incentive of development, yet it rarely does it alone. We have much more new technology at our disposal than can be put to good use, and in addition we suffer from an urge to do things, whether they are useful or not, just because they have become possible.

In a sense, new technology is a solution looking for a suitable problem. This is a matter of intelligent innovation, not just in the products and services of a company, but also in the processes and life of the entire enterprise. Designing the enterprise is ultimately what industrial design is about.

[NATURE'S WAYS]

Why do living organisms and physical phenomena in nature take the form they do? That is the subject of one of the most famous, and most poetic, books ever written about the natural sciences, D'Arcy Wentworth Thompson's 'On Growth and Form', first published in 1917.

D'Arcy Wentworth Thompson (1860-1948) was Professor of Zoology at the Scottish University of St Andrews. According to legend, he was offered a choice of professorships in three disciplines as different as classics/philosophy, mathematics, and zoology. He excelled in all three, both as a scientist and a writer. 'On Growth and Form' hardly uses the word design anywhere. Yet, it is not only about the natural sciences, it is also about design. To the design students at the legendary Hochschule für Gestaltung in Ulm, Germany, the book was mandatory reading.

In the title of his book, Wentworth Thompson brings together the two fundamental aspects of nature's designs, growth and form. He goes on to state that any portion of matter, whether living or dead, and the changes of form which are apparent in its movements and in its growth, may in all cases be described as due to the action of force. In short, the form of an object is a 'diagram of forces' at play. This is the basic principle, which Wentworth Thompson explores in the analysis of living cells and cell structures, the wings of insects and birds, the shell of insects and the skeleton of larger animals, raindrops, bees' cells and the spider's web, and in many other of nature's designs.



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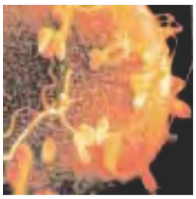
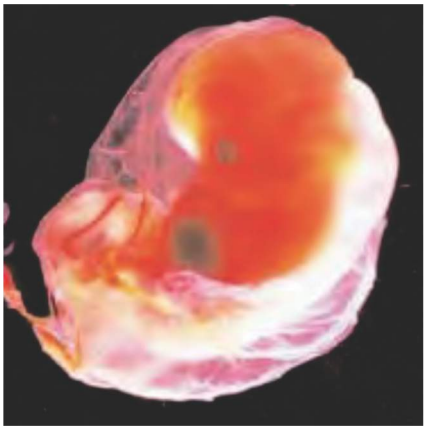
[THE LONG SEARCH]

Life on Earth is a long search. It was initiated by the emergence of the first living cells maybe three billion years ago, and continues as a never-ending story. In the process, one single cell in the warm sea became an organism consisting of several cells, later to form the nuclei of a flora and fauna of immense richness of form and variety, finally inhabiting the entire 'Spaceship Earth'.

And in each individual case, it happened – and is happening – in a striving for the form and organization best suited for life in the relevant environment.


[DESIGN FOR COMPETITIVE ADVANTAGE]

In his book, 'The Long Journey', the writer and Nobel laureate Johannes V Jensen describes a decisive phase in the development of the forests that covered the Danish landscape after the last Ice Age. The land, at the time of Johannes V Jensen's story, was covered with oak forests from coast to coast.

Yet, a new competitor was arriving from the South, in the shape of the beech tree. At first as a couple of beechnuts, carried by man or animals. The oak at first welcomed the new entrant that took root on the forest floor under the open crowns of the oaks. The next year, the young beech started to grow, producing leaves two weeks before the oak, and casting a shadow due to the mosaic of the leaves. That was a further setback to the young oaks, which were already handicapped by being late. And so the story goes on. In the end, what was once a landscape covered with huge oak forests became a landscape covered with beech forests.

Life in nature is a matter of survival. And survival, in turn, is a matter of competitive advantage. That is the guiding principle in The Origin of Species: 'Survival of the fittest' in Charles Darwin's famous words, (a principle which almost amounts to a circular definition). Survival among the plants is a matter of competition. That also applies to the cohabitation of plants and animals that feed on plants (herbivores). And the same thing is true about the cohabitation of these animals and the animals that feed on other animals.



[SIMPLICITY, COMPLEXITY AND THE TIMELESS WAY]

In the philosophy of the natural sciences, one principle emerges again and again, viz the principle of simplicity. The basic idea is that if two theories are both able to explain the same phenomenon, the simpler one is the true one. Yet, simplicity is always opposed to complexity in the sense that a valid theory cannot be simpler – have fewer dimensions – than the phenomenon it sets out to explain.

Nature prefers simplicity. Yet, it achieves simplicity in a demanding way by always acknowledging the complexity of the purpose at hand, whether in one single organism or in the interplay between a multitude of living species in a habitat. That is the guiding principle of the designs of nature. That is nature's timeless way.

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The seashell applies a minimum of material to achieve a maximum of volume and stability. It is, at the same time, a picture of its own growth pattern by always adding the next cells at the same angle to its centre. The curve formed by this pattern of growth is mathematically well defined: It is a logarithmic spiral.

[THE LANGUAGE OF NATURE]

Nature's designs are also communication designs. To describe two basic phenomena in nature, zoologists and botanists use the terms 'camouflage design' and 'advertising design', both of which refer directly to communication.

The flatfish, whose skin structure and pattern blend with the colours and texture of the seabed, is protected from predators by melting into the background. This is camouflage design. And the brightly coloured flower with the alluring fragrance that attracts the attention of insects is actually engaged in a bargaining process: Here I am, come and drink my nectar – and in return take pollen to the next flower. That is advertising design. The twitter of a songbird is there to attract the interest of a mate, or to mark off its territory (if you can hear my song, you are invading my preserves). Or simply, maybe, to say 'I am happy'.

Sometimes, a design in nature may serve both camouflage and advertising purposes. The stripes of a flock of zebras in movement confuse the attacking lion. Yet, with each pattern being unique in the eyes of a zebra female, it is also a way for her foel to identify its mother. Communication in nature may even convey misinformation, like the harmless serpent whose colour pattern mimics the pattern of a poisonous snake and thus scares away enemies. The design language of nature appeals to all of the senses, vision, sound, smell, touch and taste. And what is camouflage and what is advertising design, be it true or false, is always a question of context.

Now-you-see-me, now-you-don't. These horses are protected by the pattern of their skin that helps them melt into the background. In contrast to this camouflage design, flowers apply an advertising design to attract the business of bees and other insects. pattern of growth is mathematically well defined: It is a logarithmic spiral.

[ECONOMY AND ECOLOGY]

In its designs, nature again and again achieves a stunning elegance and beauty – designs that go far beyond what man has ever been able to achieve. Yet, the source of this beauty is not aesthetics but economy. Natural economy is about achieving more by means of less. In the case of the sea urchin, the shell achieves maximum strength by a minimum use of materials, in this case chalk. That is achieved by means of the overall shape and the variations of the thickness of the walls – in the formulation of Hans J Wegner – by 'taking away material where it is not needed'.

Yet, the economy of the designs of nature goes far beyond the best use of materials. A related theme is the choice of the most suitable materials. Like the water-resistant coating of a beetle's shell or the extremely strong and flexible strands of a spider's web. Another related theme is the combination of different materials in a single construction, inevitably 'the right materials and in the right shape'.

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And further, the intelligence and economy with which the different parts of a living organism interact mechanically, chemically and electronically via signal and feedback.

In his groundbreaking book on signal and feedback, 'Cybernetics' (1948), Norbert Wiener tellingly added a subtitle: 'On the Control and Communication in the Animal and in the Machine'. He thus linked the phenomenon of control in the man-made world to that in nature. In nature, the principle of control and communication goes far beyond the single organism. It is also a basic feature in the interaction between different organisms – plants and animals – in a given habitat. Here, economy and ecology, time and again, emerge as two aspects of the same principle.

The underlying principle of beauty in nature is economy and its sister concept, ecology. pattern of growth is mathematically well defined: It is a logarithmic spiral.

[NATURE'S DESIGN DIMENSIONS]

Finally, the theme of design in nature is weighing different interests against each other. Power versus speed, strength versus weight, specialisation versus generalisation and many other aspects where nature's aim is to achieve an optimal combination of properties rather than a maximum value for any one property.

The designs of nature invariably balance
such different interests as:
- Purpose
- Materials and construction
- Birth and growth
- Function
- Interplay
- Environment

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All contained within the framework of:

- Economy
- Ecology

Such is nature's way, the common denominator behind all of its variety. And described under the very same headings as its sister concept industrial design.

[BIONICS]

[ISTITUTO EUROPEO DI DESIGN]

Design inspired by nature is nothing new in Italy. The 69 km of Roman aqueducts that, like a river, brought life to remote settlements, are an early example of mimicking an ecosystem. In modern times, the architecture of the engineer/designer Pier Luigi Nervi directly mentions the bony trabeculae as first described by the 19th century natural scientist Karl Culmann as an inspiration for his patent on the construction of reinforced concrete floors.

Yet, more than any, Leonardo da Vinci's studies and drawings of phenomena in nature and his inventions from early Renaissance times are, in a sense, two sides of the same idea. And for many years, a large number of Leonardo's inventions have been on show, not just as drawings but also as 3D models at the Leonardo da Vinci Museum in Milan. So it does not come as a surprise that the world's leading design school, taking inspiration from nature as its basic idea, was located in Italy, in Milan.

The European Institute of Design, under the leadership of Professor Carmelo di Bartolo, made bionics – the technical transformation and application of structures, procedures and development of biological organisms and systems – its core subject in the training of young designers. Another guiding principle for Carmelo di Bartolo was creating close links between the bionics and design theory and industry – an idea he has since brought further in his new venture, Design Innovation Italia.



[A TASTE OF BIONICS]

At a lecture at a conference in Milan in 1984, Professor Carmelo di Bartolo had a young designer in the audience, Franco Lodato, a graduate from the Venezuelan Institute of Technology, and a design researcher at the Venezuelan Research Institute, IVIC. Lodato had just moved to Milan, helped by a UN scholarship, and on the lookout for a next step in his studies. Carmelo di Bartolo's keynote speech

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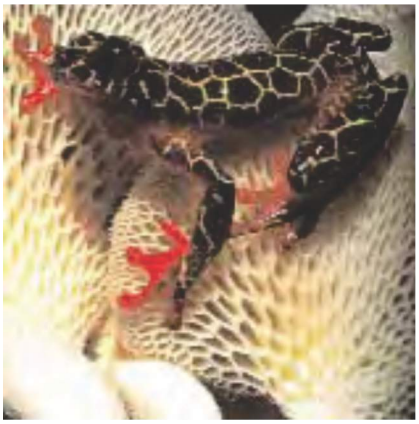
on bionics struck him like a revelation, the missing link in his own education. In 1987, he signed up for the 2-year graduate bionics course at Istituto Europeo di Design.

This course opened a new world to Franco Lodato, to the designs of nature and how they could inspire the designs of man. It gave him an introduction to identifying basic features and order within the chaos, with eg the shark, the ichthyosaurus and the dolphin presenting a classic example: They are swimming animals, surprisingly similar in form, yet, one is a fish, one a reptile and one a mammal. Another lesson was an indirect one, on how Carmelo di Bartolo had the skill of orchestrating the creation of big ideas by using ideas from all of his students.

Finally, briefing was essential, based on a careful analysis of the problem at hand, next, talking to a highly qualified scientist – when you talk about nature, you need to have specialist knowledge – and then creating meaning, objectives and a process path that includes both the engineering and design of the product and the communication to go with it. And best of all, the studies were intermingled with work for leading industries and designers: Studies of the movement of the skin and muscles of living animals that inspired the way in which Mario Bellini completely covered his unupholstered LIRA chair in hide. Communication with the blind at the Milan underground via a textured floor covering made by Pirelli, and also working for the Italian branch of the American chemicals firm DuPont de Nemour.



[GETTING TO GRIPS]

The handle is a crucial part of a frying pan: It has to provide a good and safe grip, also when the pan is hot, and it has to fulfil the demands set by technical standards, which require the application, at 230°C, of a 5 kg load at the middle of a handle 16-18 cm long. This has caused conventional handles typically to be made from reverse C og U-shapes, obtained by pressing thermosetting resins, making them thick, heavy, expensive and often difficult to clean.

How does nature solve the task of providing a light and strong construction that would last for a lifetime? Lodato chose the femur's biophysics which, although it is hollow, is structured to resist up to a hundred years of considerable stress.
The design solution featured a hollow body of an elliptical cross section, which gives a safe grip. The manufacturing process uses a gas-injection technique that leaves the contact surface unchanged, ensures mechanical strength, and improves thermal insulation.

The practical realisation of the design was made possible by a DuPont polyester resin. Rynite® is highly heat-resistant and also resists the products, including the detergents, that are used in the kitchen. And it gives a high-quality appearance to the finished product. At the same time, the material

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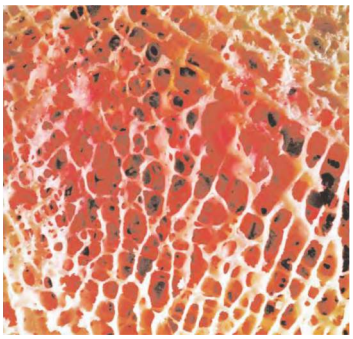
has several advantages for manufacturing: It can easily be pigmented in bulk, the handle is easy and economical to make, and it allows for a more pleasing design.



Panhandle, designed for La Termoplastica, Italy. The handle is hollow like the human femur and elliptical in cross section. The femur, like other parts of the bone structure, is designed to carry heavy loads by means of a material of minimum weight – and last for a lifetime.This is, as in nature, achieved by using the right material in the right form.

[FLYING THE SCOOTER]

The scooter – immortalised in the 1953 film 'Roman Holiday', starring Audrey Hepburn and Gregory Peck – has become an Italian national icon. After WW II it literally put a whole generation on wheels as an economical, swift, feminine and lightweight version of the motorbike. And even after millions and millions of Fiats, it still maintains its status as a vehicle suited for the narrow streets and crowded street scenes. Accordingly, in today's leaner and greener times, it has ecological advantages such as minimal fuel consumption and low CO2 exhausts.

Yet, aerodynamics leaves something to be desired. And so does the comfort of this open-air vehicle in rainy weather. So why not add one of the little extras, the transparent screen and roof all scooters need when it rains, in the right material and in the right shape? That was the problem statement. In tackling this joint design and technology task, the innovation team sought inspiration from the world of insects, from the flight of beetles, which would change their geometry when taking off in order to use their protective shell to create good aerodynamics when flying.

The client was Piaggio, the Italian scooter manufacturer, with DuPont sponsoring the model-making and the first experiments, under the design guidance of Luciano Marabese, the designer and Franco Lodato for the bionics input. The Piaggio Spazio was launched as a prototype at the 1994 Bologna Motor show. It combines a sleek and rounded aerodynamic body and a transparent screen protecting the driver from the front and over the head. In the rear, the PC/ABS roof was supported by a slender pylon that added to the safety of the vehicle. Altogether, the supporting structure applied a principle always used in nature: Take away the material where you don't need it.

[CLIMBING ICE MOUNTAINS]

Whereas many products have undergone little change over the last generation, nothing is as it was within the field of tools for sports. As in the case with military equipment, the crucial factor is winning, often in the fundamental sense of surviving. And that means going to extremes in the choice of materials, construction and shape in order to achieve the all-important competitive advantage.

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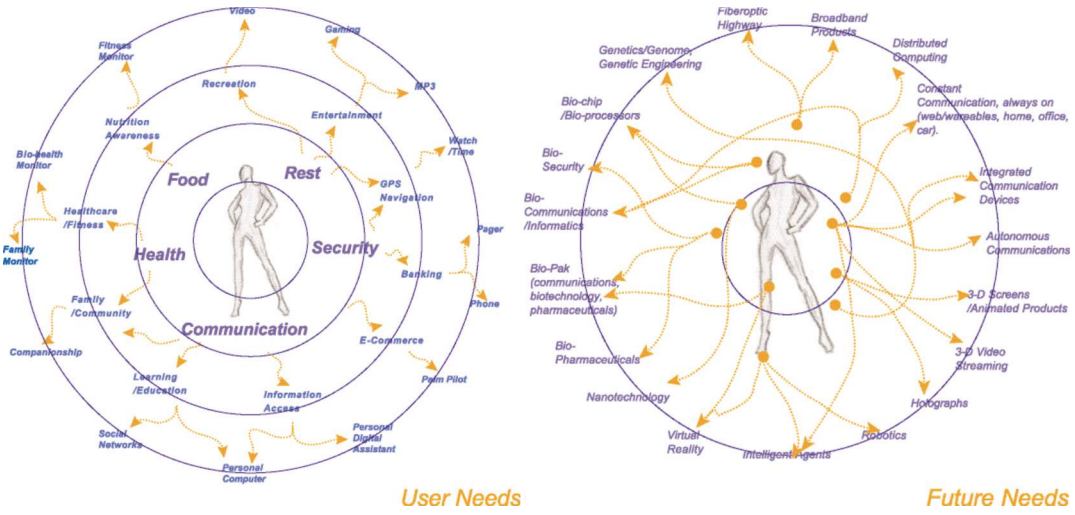
The Italian firm of CAMP had been in the business of manufacturing tools for mountain climbing for 100 years when Franco Lodato met the owners in Como, Italy, in 1989. During all of these years, CAMP had been manufacturing axes with handles of metal.

With his DuPont background, Lodato's obvious question was: Why not celebrate the first century in business by looking for a material that could replace the metal and create advantages to the user. And in the process, look for the optimal shape of your ice axe. The design brief said: Create a multifunctional ice axe that can work in various positions, is light, possessing high structural strength, with a good grip, also under difficult conditions for mountain climbers and materials. The ice axe was to be used even en altitudes of 5 km, and in temperatures as low as –20°C.

When initiating his bionics research, Lodato contacted the director of the Natural Science Museum in Milan with an obvious question: What is the best example of a hammer in nature? Dr Moja was not in doubt, there were two candidates: A rock lobster, which, when hammering mussels on rocks, produces sound waves of over 120 dB. The woodpecker was the other intriguing example. The woodpecker can make up to 25 hits per second with an impact of 25 g/mm2, without damaging its spine or brain. This is achievedowing to the shape of its spine and the fact that it uses its tail as a spring.

The handle of the woodpecker CAMP ice axe is shaped like the woodpecker's spine, and injection-molded in dual-density neoprene. The head is made from a titanium alloy and stainless steel, and more or less shape like its beak, but with a tooth-like profile added.

CAMP (l) ice axe Woodpecker, design Franco Lodato, with the handle shaped similar to a woodpecker's spine.When interviewed on TV, the world famous French extremist skier Pierre Tardivel said: 'The secret of my success is being really careful.This axe is the best in the world'. The Danish Crown Prince opened the Danish Design Centre in January 2000 just days before embarking on an expedition to Greenland. As a 'good journey' greeting from the DDC, he received a CAMP ice axe.



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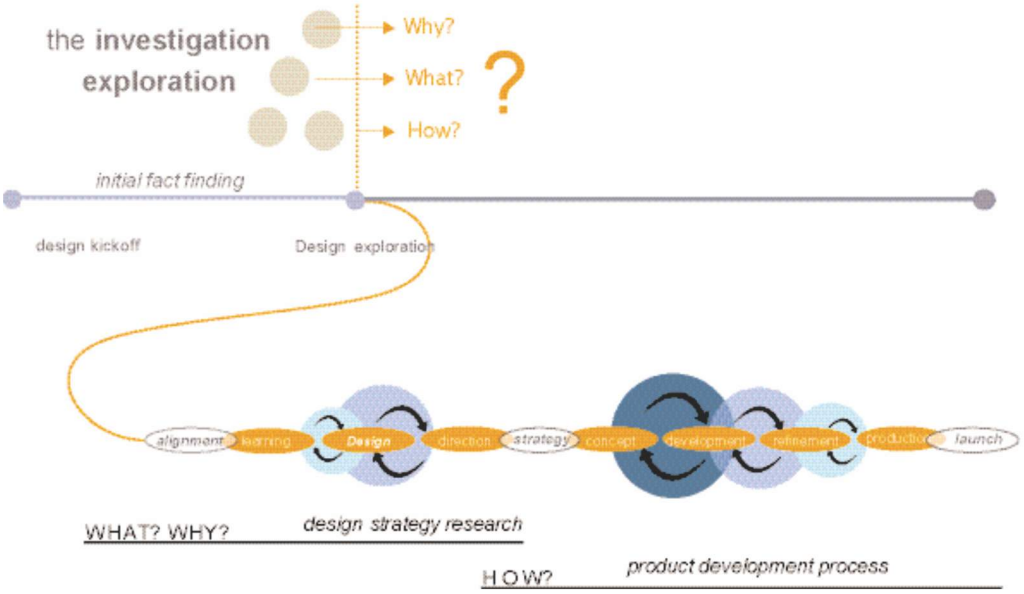
Design process



Biodesign process

By Franco Lodato

Integrating biodesign