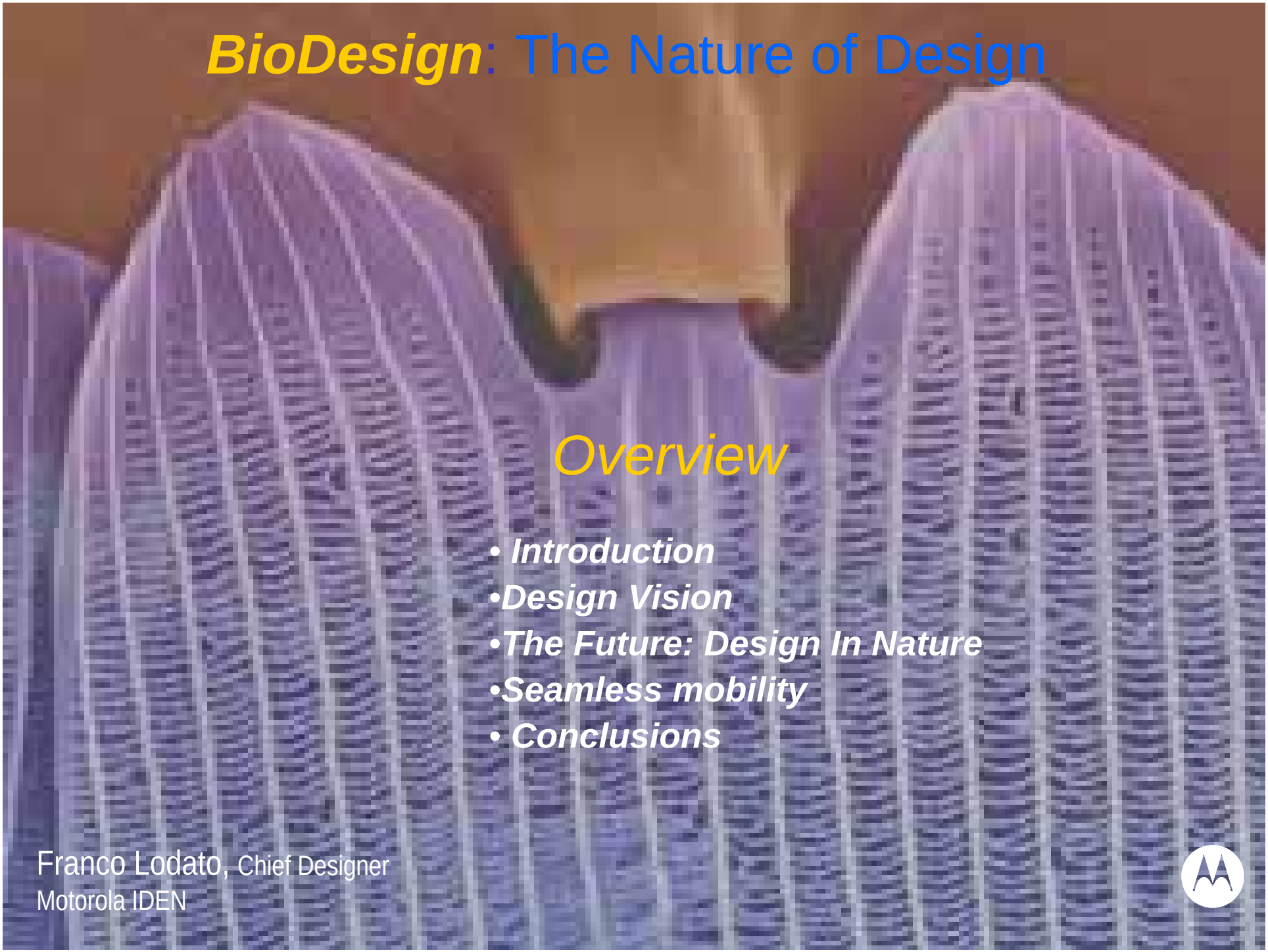
BioDesign: The Nature of Design



Overview

- ***Introduction***
- ***Design Vision***
- ***The Future: Design In Nature***
- ***Seamless mobility***
- ***Conclusions***

Franco Lodato, Chief Designer
Motorola IDEN

1: DESIGN VISION

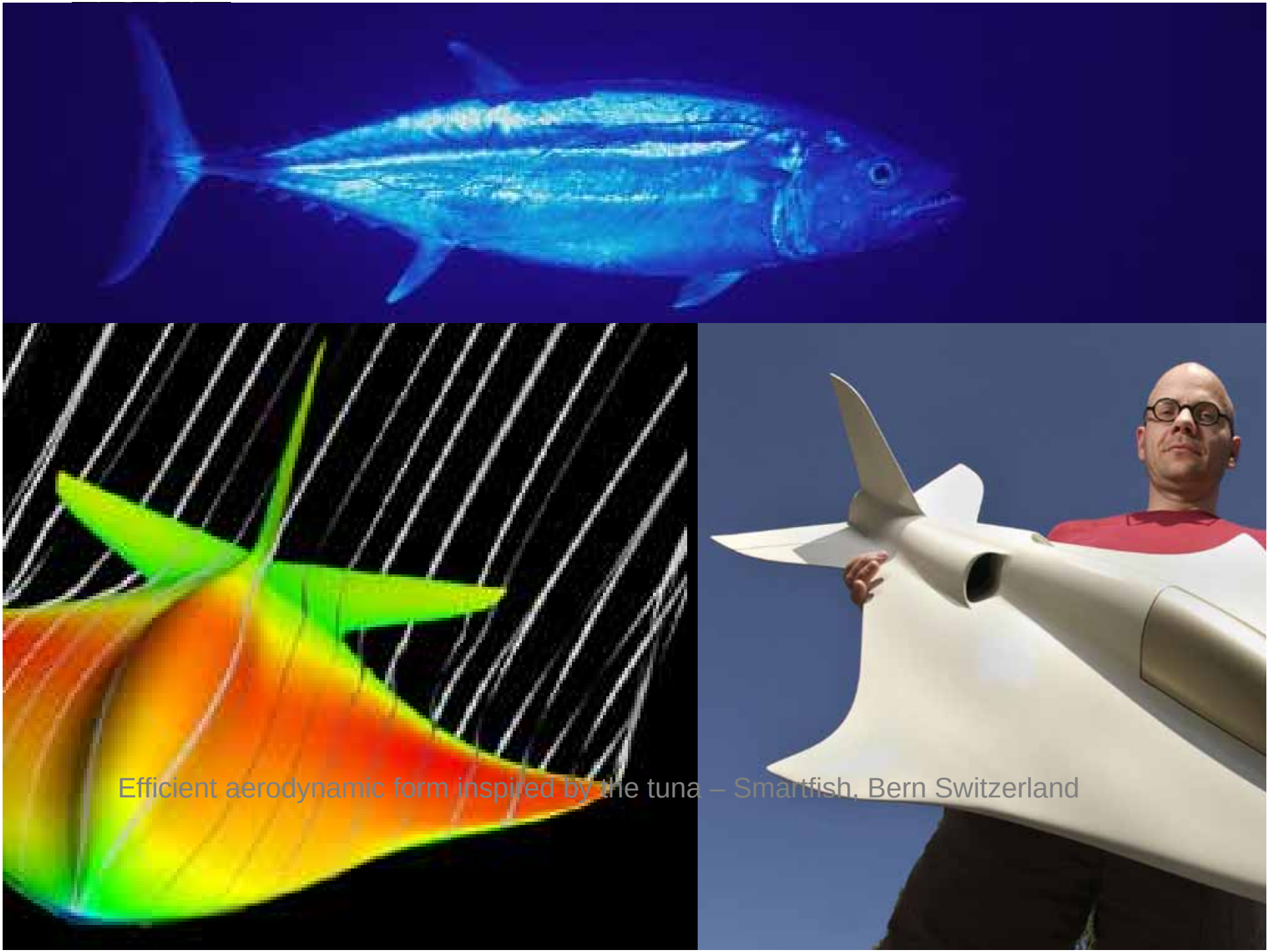
Our **Design** is the catalyst, connecting and converging Motorola's superior technology with our Human User's **Real Life**.

2: DESIGN IN NATURE

Bionics or Biodesign deals with the technical transformation and application of structures, procedures and developmental principles of biological systems.

An interdisciplinary research fields that combines biology with engineering, architecture and mathematics

Design *Analogies*

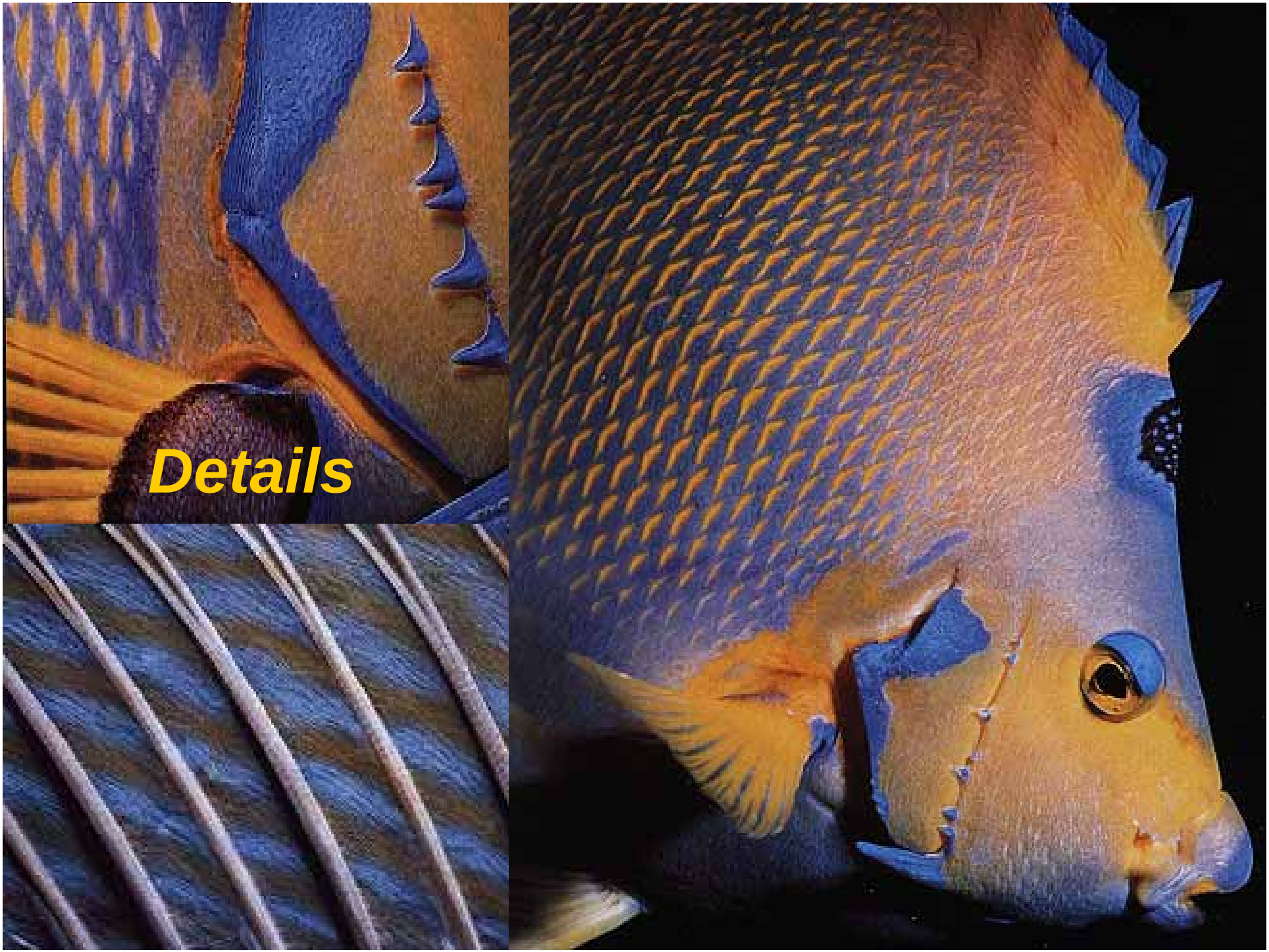


Efficient aerodynamic form inspired by the tuna – Smartfish, Bern Switzerland


Goosegrass
Velcro®

Beetle exoskeleton generates pigment-free structural colors

Paint with similar effect - BASF


Details


Re-discovering a “New Language”

Technical ***Approach***

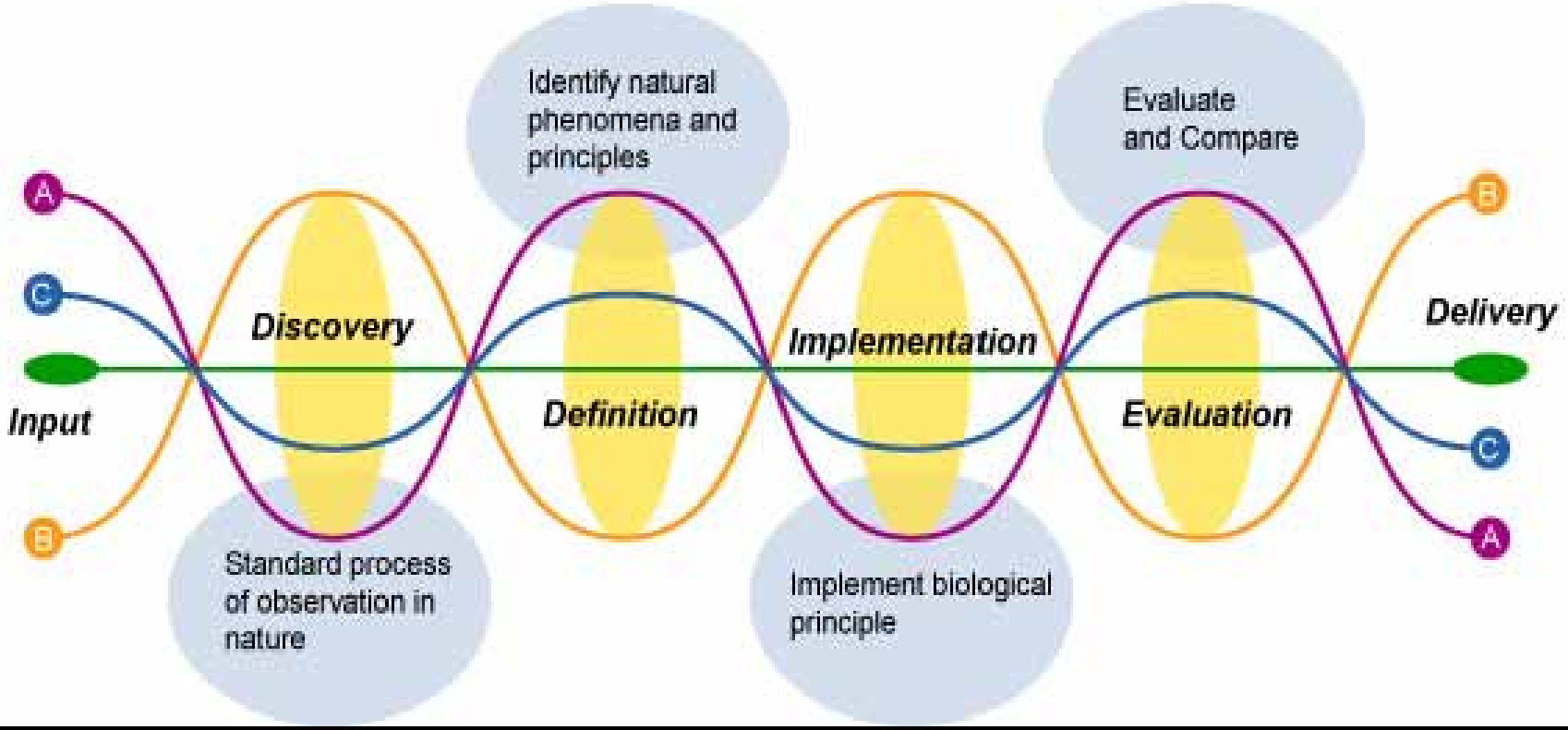
1)Identify suitable opportunities target areas.

2)Select relevant biological models and undertake or commission research to understand them.

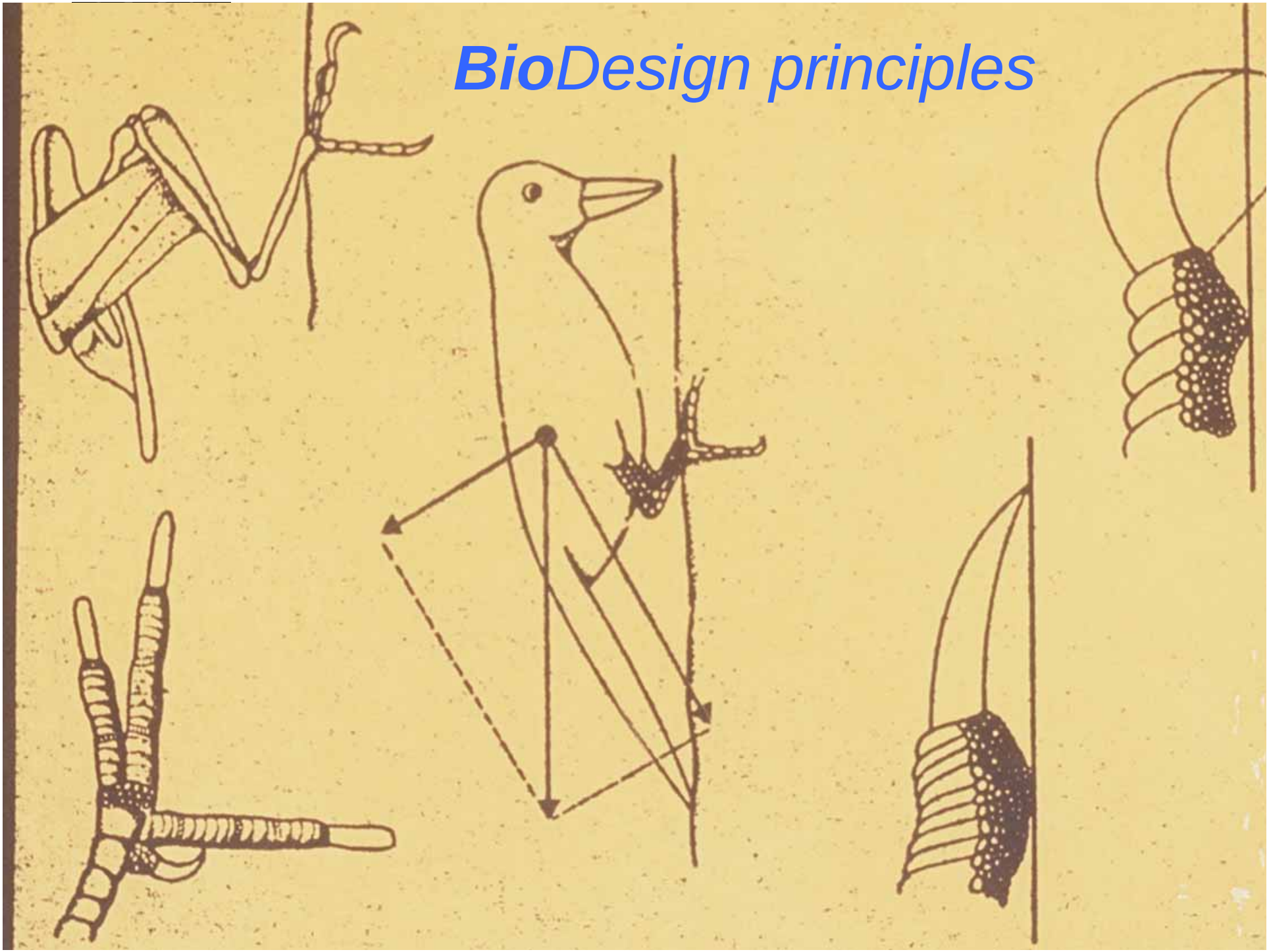
3)Abstract this understanding into Engineering analogues.

4)Assess the feasibility of incorporating this technology into useful product prototypes.

Integrating biodesign



Bio*Design principles*



inclinazione variabile

Ricerca Bionica (analisi)

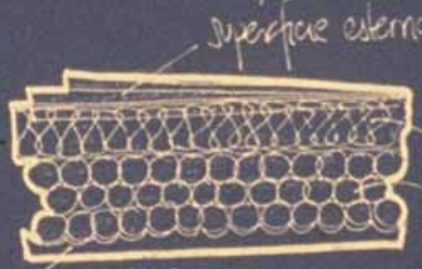
INDUSTRIAL DESIGN

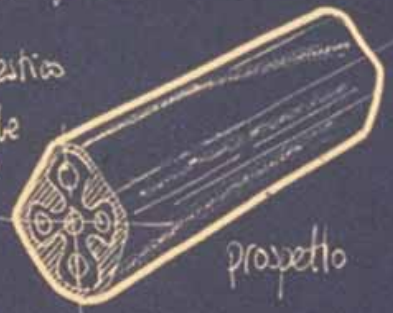
Prospetto generale

Caratteristiche delle impronte Umane

Proposta generale
struttura o materia
per il manico

Analisi della pelle
animali





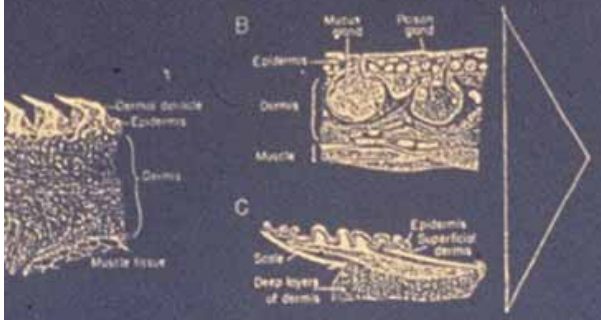
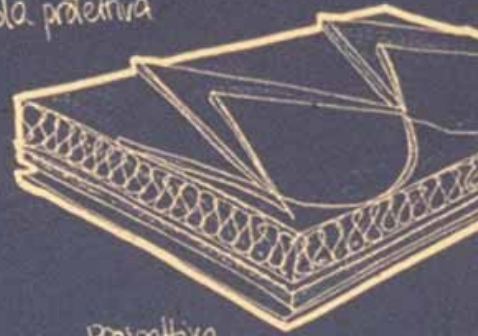
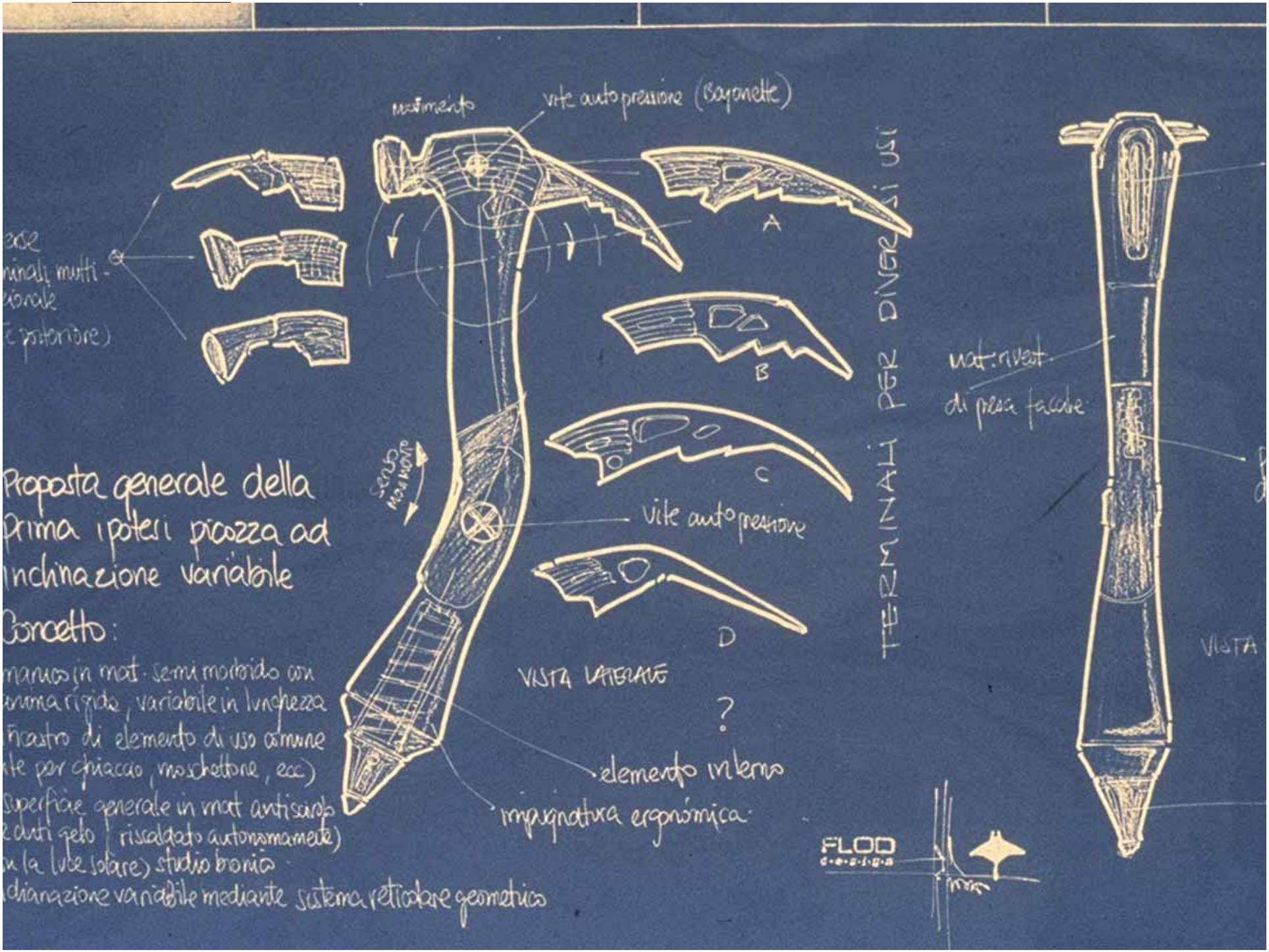


Fig. 75. Sections of the skin of A, a shark; B, a salamander; C, a teleost. (After Held.)



Prospettiva

Possibile caratteristica simulare alla pelle dell


vite auto pressione (baionette)
A
B
C
D
Vite auto pressione
TERMINALI PER DIVERSI USI
Proposta generale della
Prima ipotesi piccozza ad
inclinazione variabile
Concetto:
VISTA LATERALE
?
elemento interno
impugnatura ergonomica
FLOD
design

inclinazione variabile

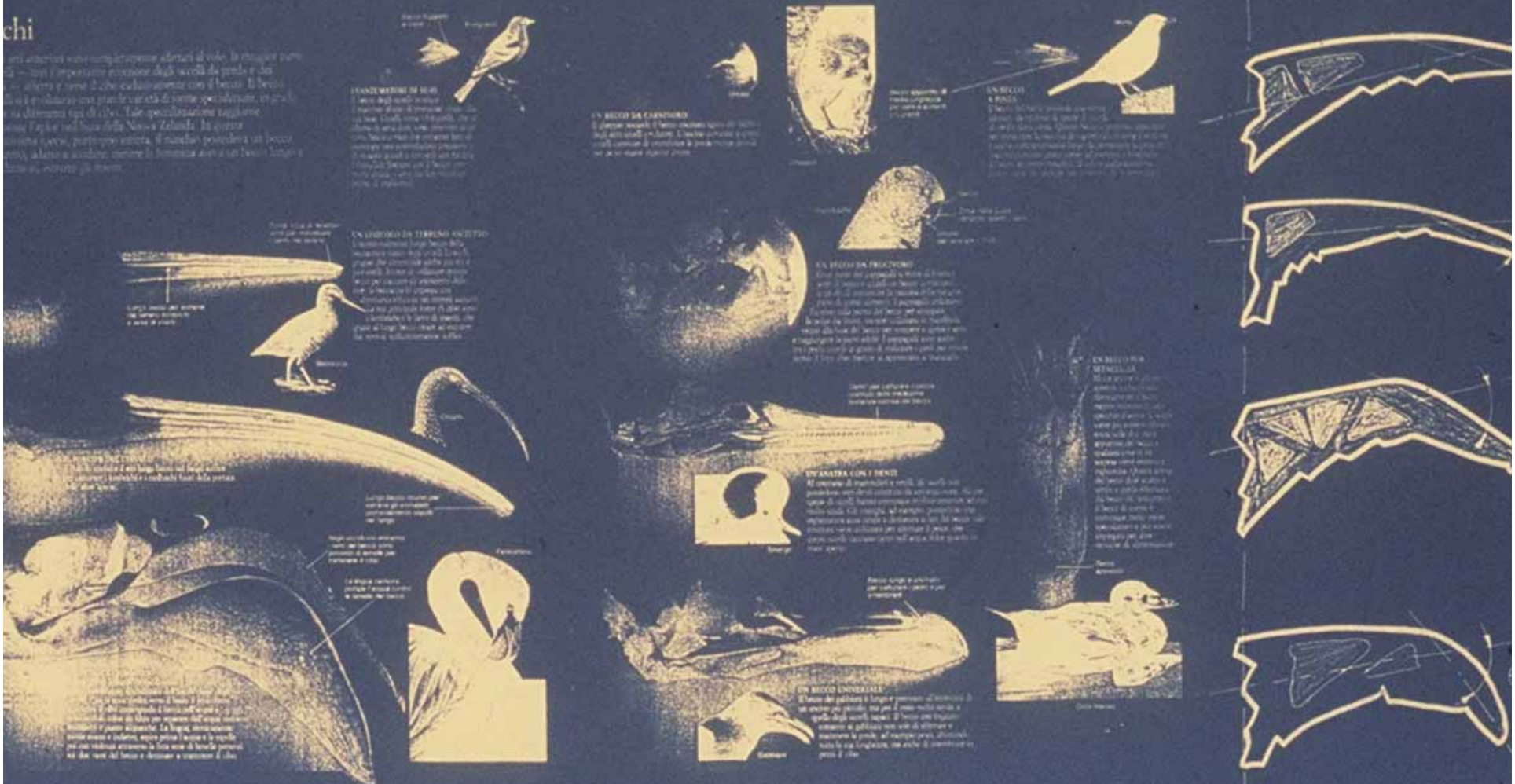
Ricerca Bionica (analisi)

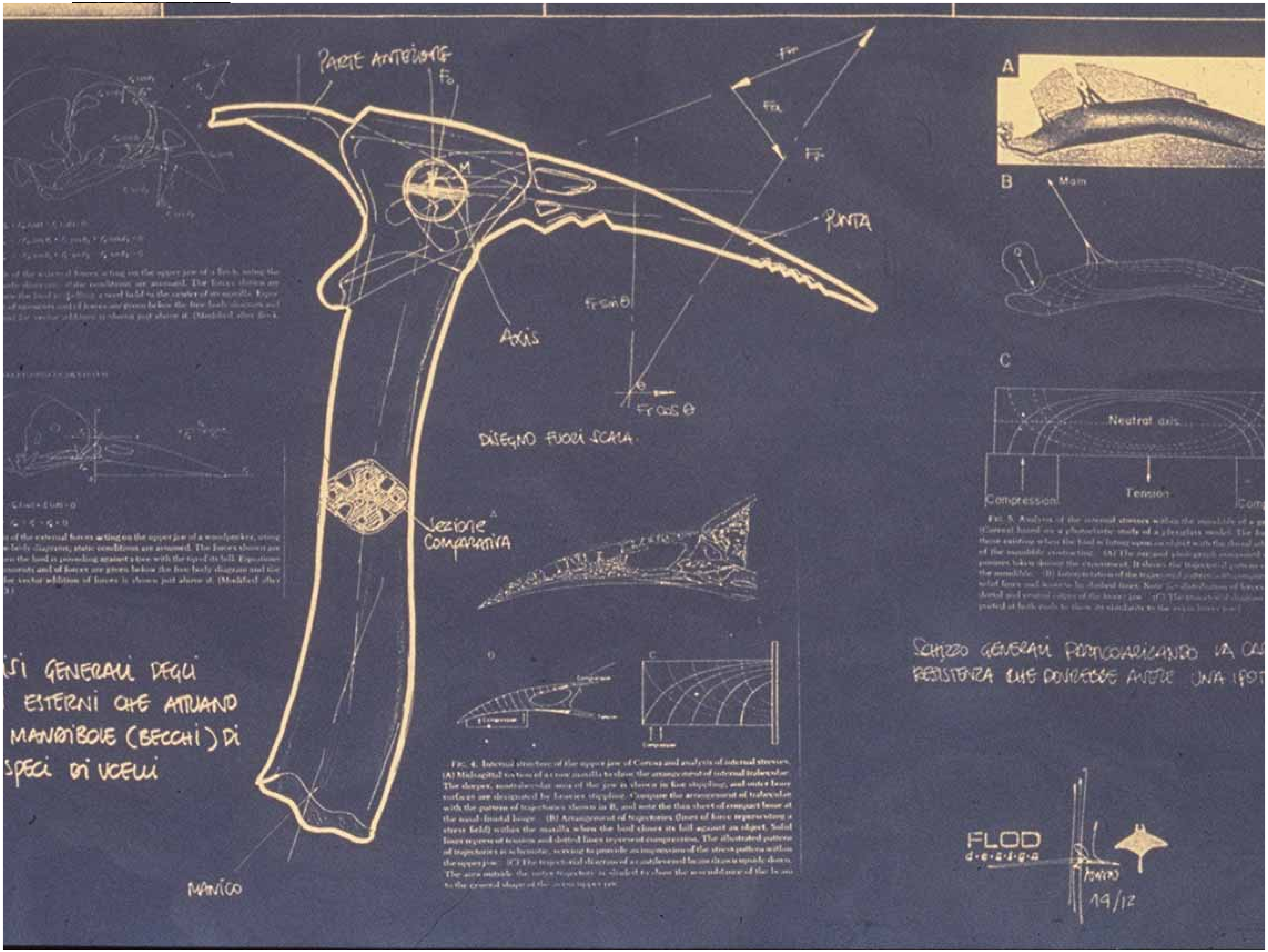
INDUSTRIAL DESIGN

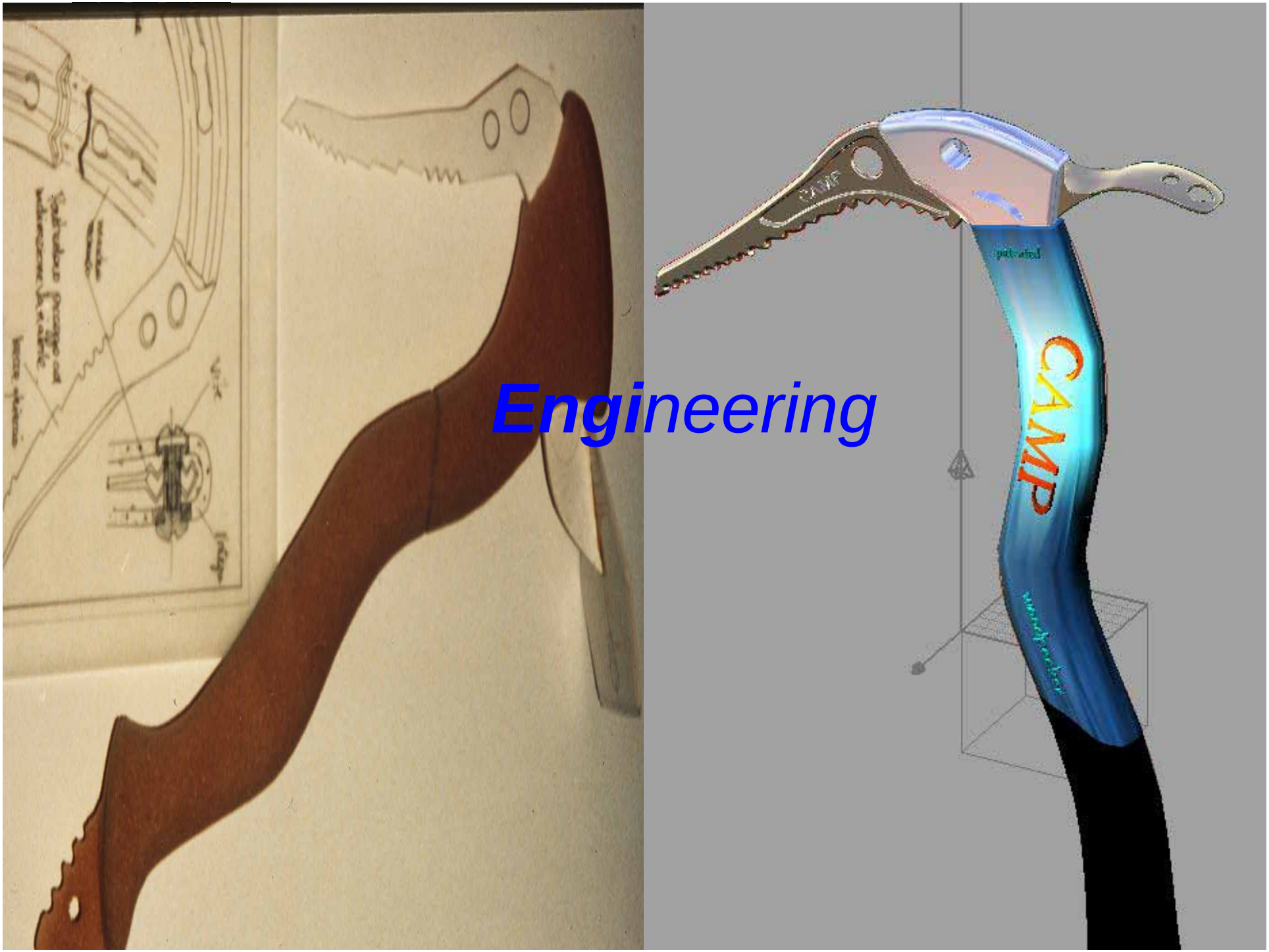
UDIO GENERALE DEI BECCHI DEGLI UCELLI : ANALISI COMPARATIVO

Caratteristiche piu importante e funzionalita della estremita'

- Proposte generali dei di
terminali basati su dis
- angoli α, β, γ, δ




PARTE ANTERIORE
PUNTA
AXIS
M
DISEGNO FUORI SCALA
Sezione Comparativa
MANICO
SI GENERALI DEGLI
ESTERNI CHE ATTUANO
MANDIBOLE (BECCHI) DI
SPECI DI UCELLI
A
B
C
Neutral axis
Compression
Tension
SCHIZZO GENERALI PARTICOLARICANDO LA CA
RESISTENZA CHE DOVREBBE AVERE UNA IPOT
FLOD
d·e·s·i·g·n
14/12


Engineering
CAMP

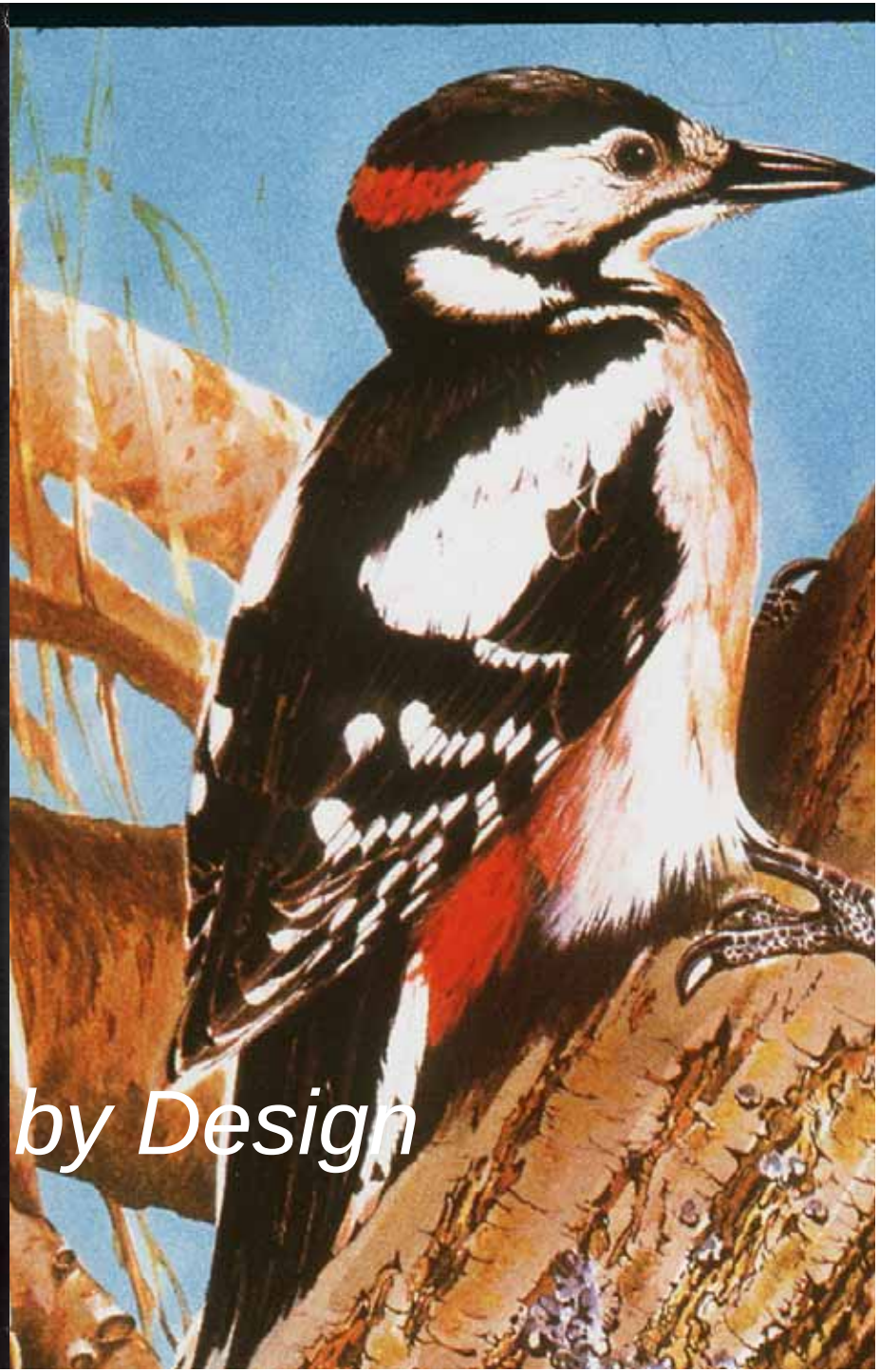

CAMP

PICCOZZA WOODPECKER

PICCOZZA
BIONICA
WOODPECKER.

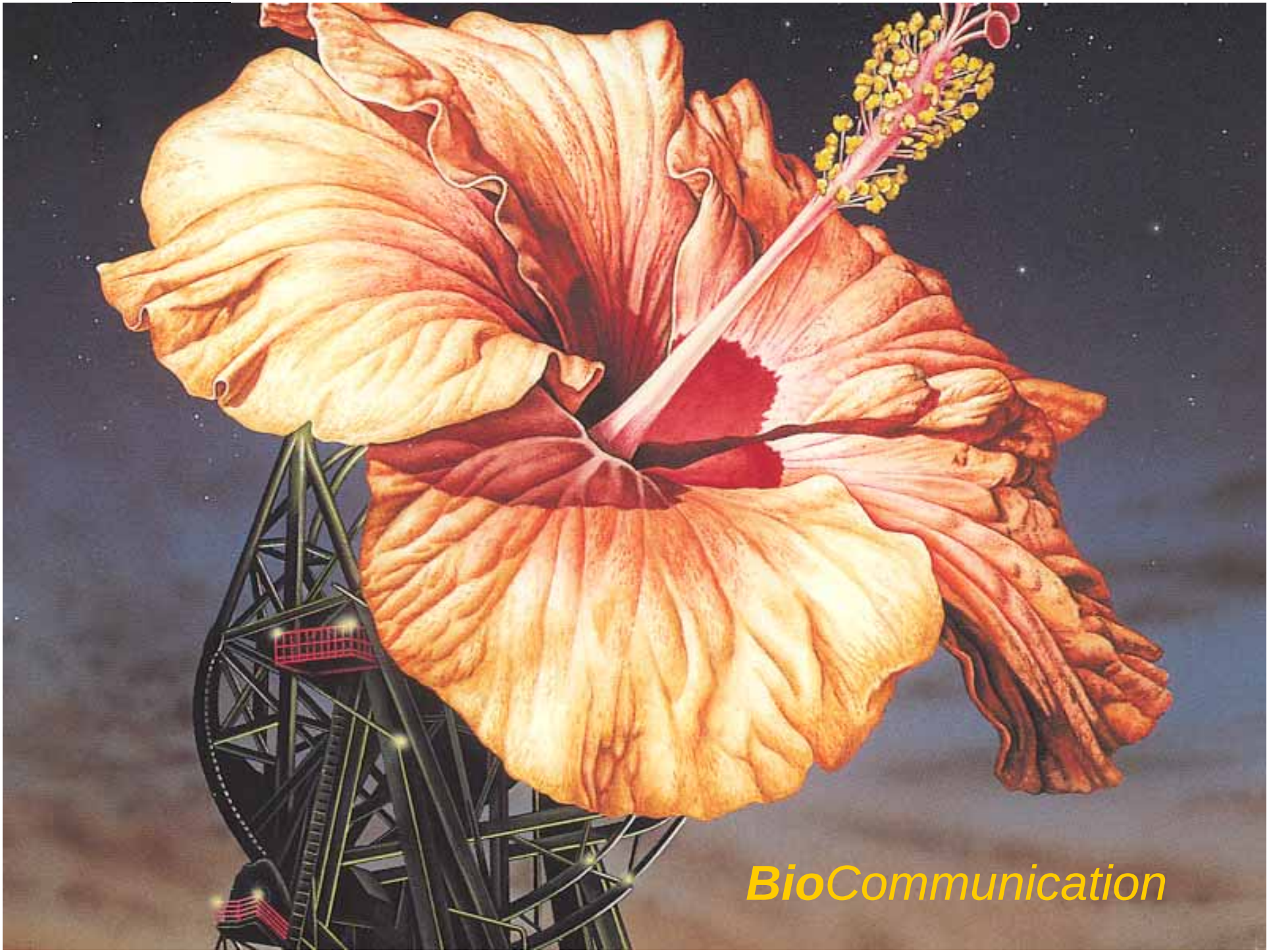
IDEATA SEGUENDO
LE LEGGI DELLA
NATURA.

CAMP



Nature *by Design*

Outstanding results


BioCommunication

Development of Personal Communication Network into Bio-communication:

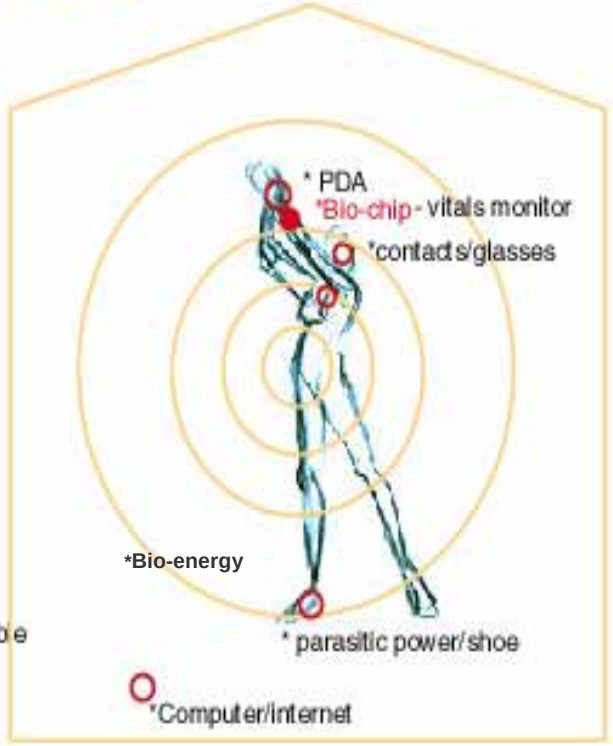
Technology: ***Best at time, network, hardware, software.***

Industrial design: ***Developing wearability, style, functionality.***

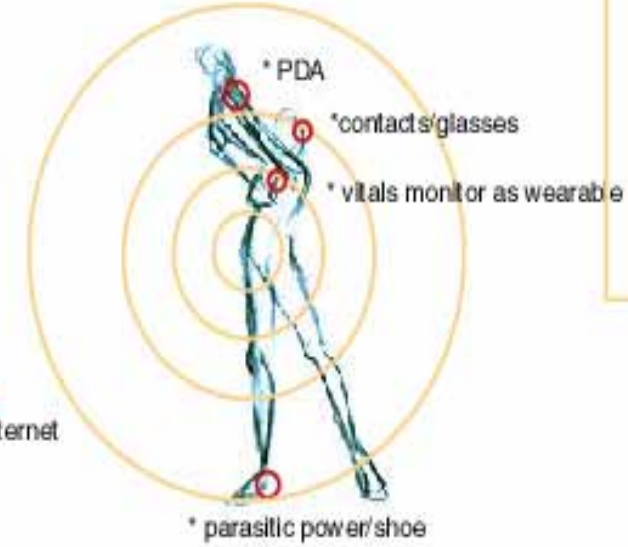
Fashion: ***Beyond clothing and gizmos, aimed at simplifying and improving quality of life.***

2010:

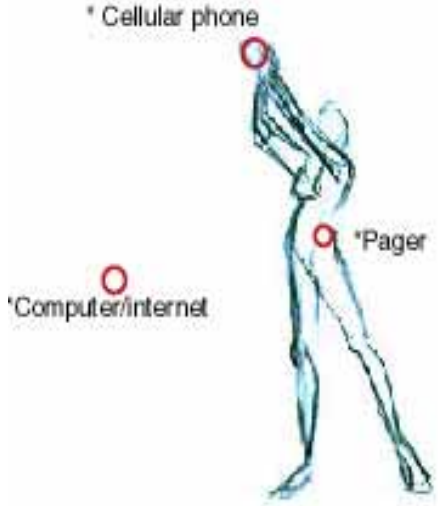
*Fully connected to environment.



2005:



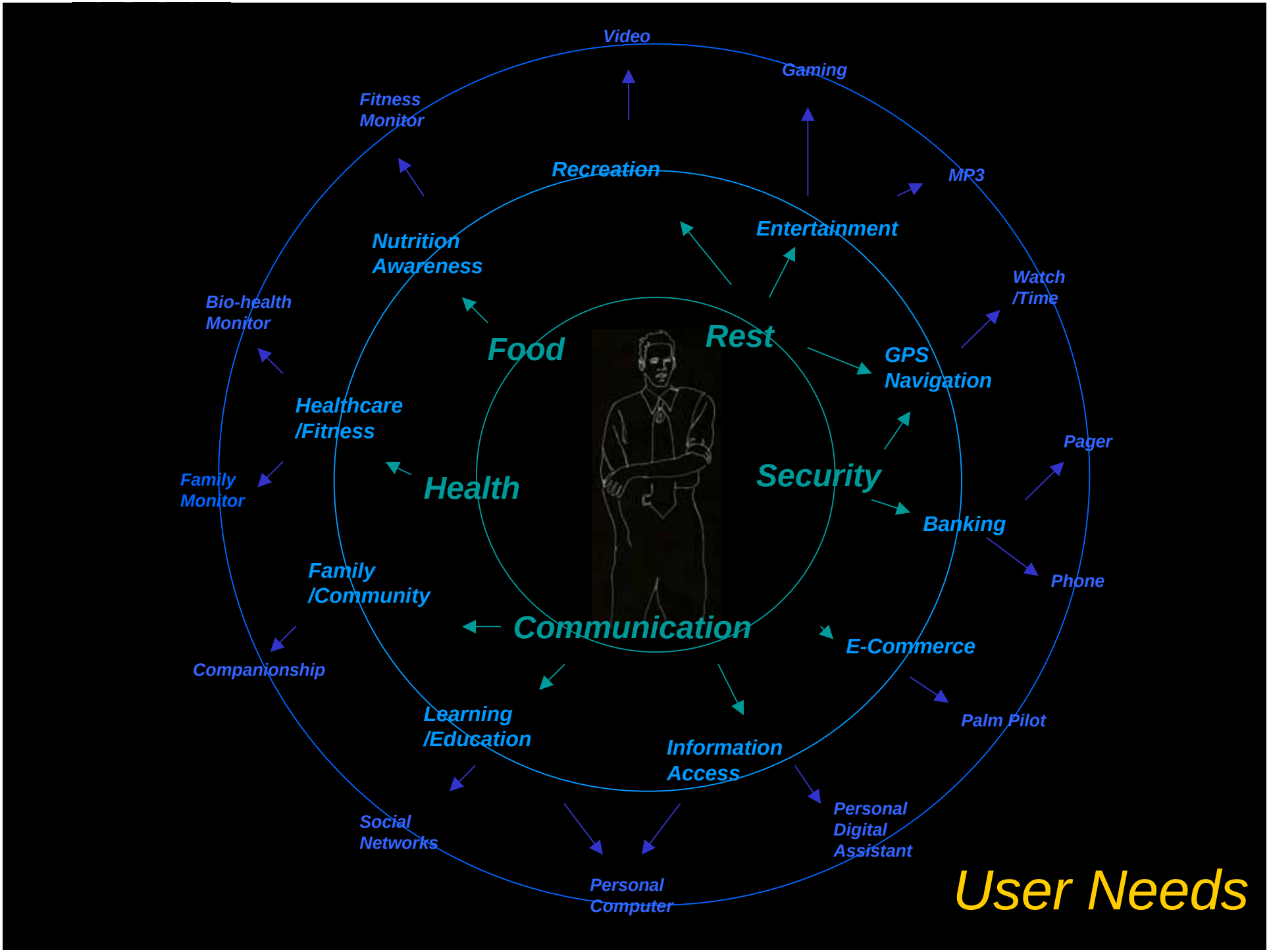
2000:

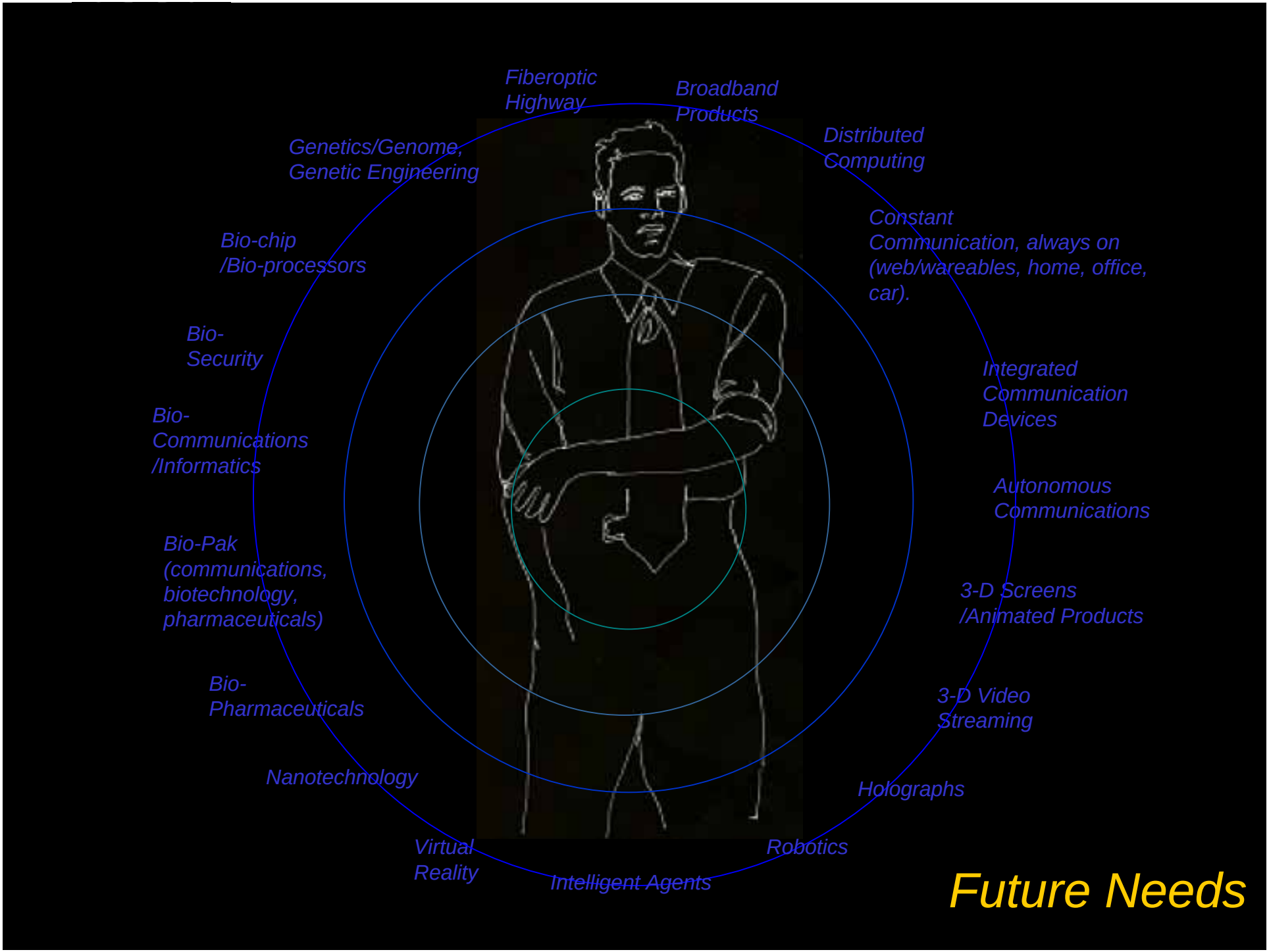


* Bio-chip technology is added to interrelated existing communication products.

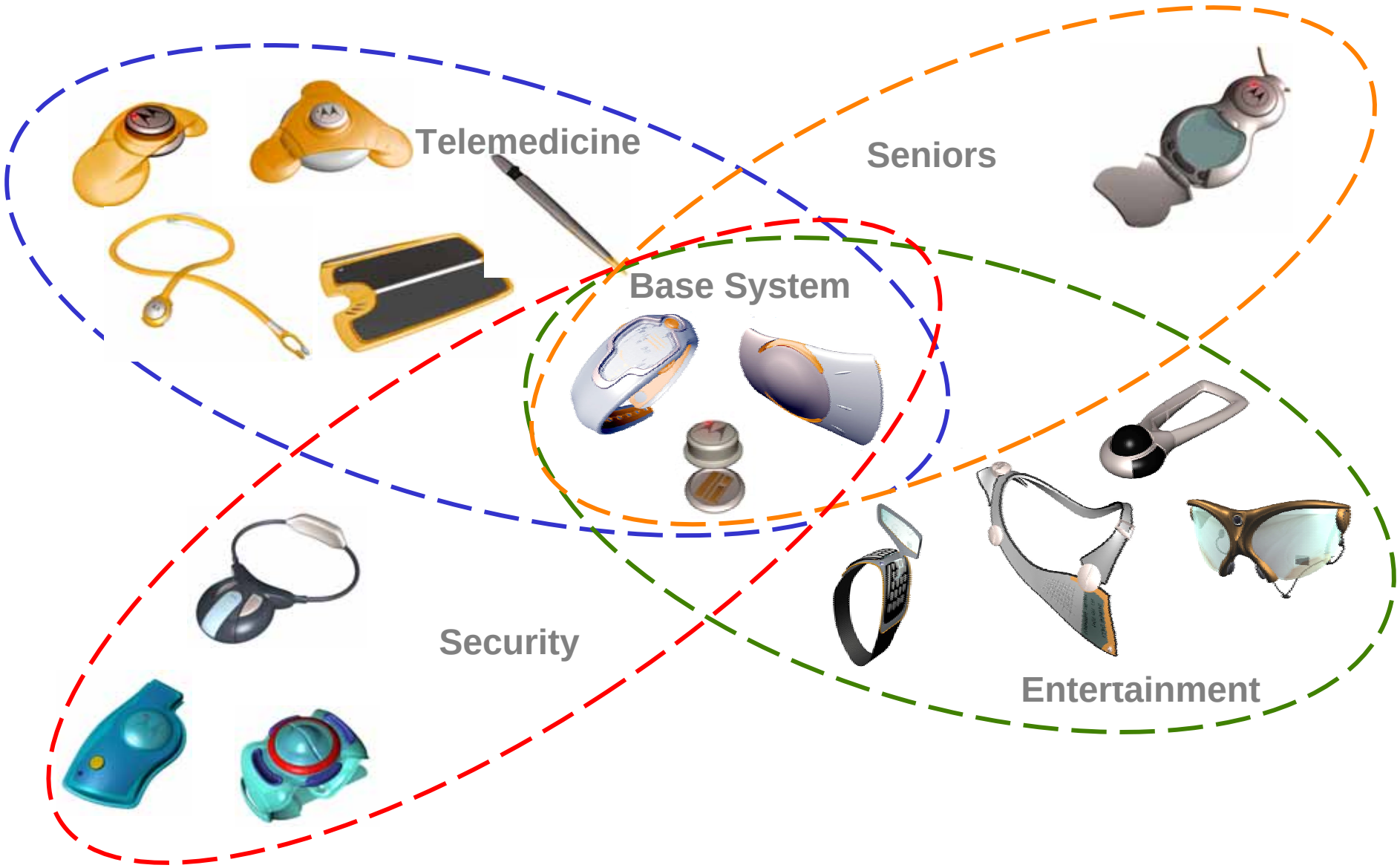
*Priority should be on creating a distributed computing network of wearable products.

PAN Development

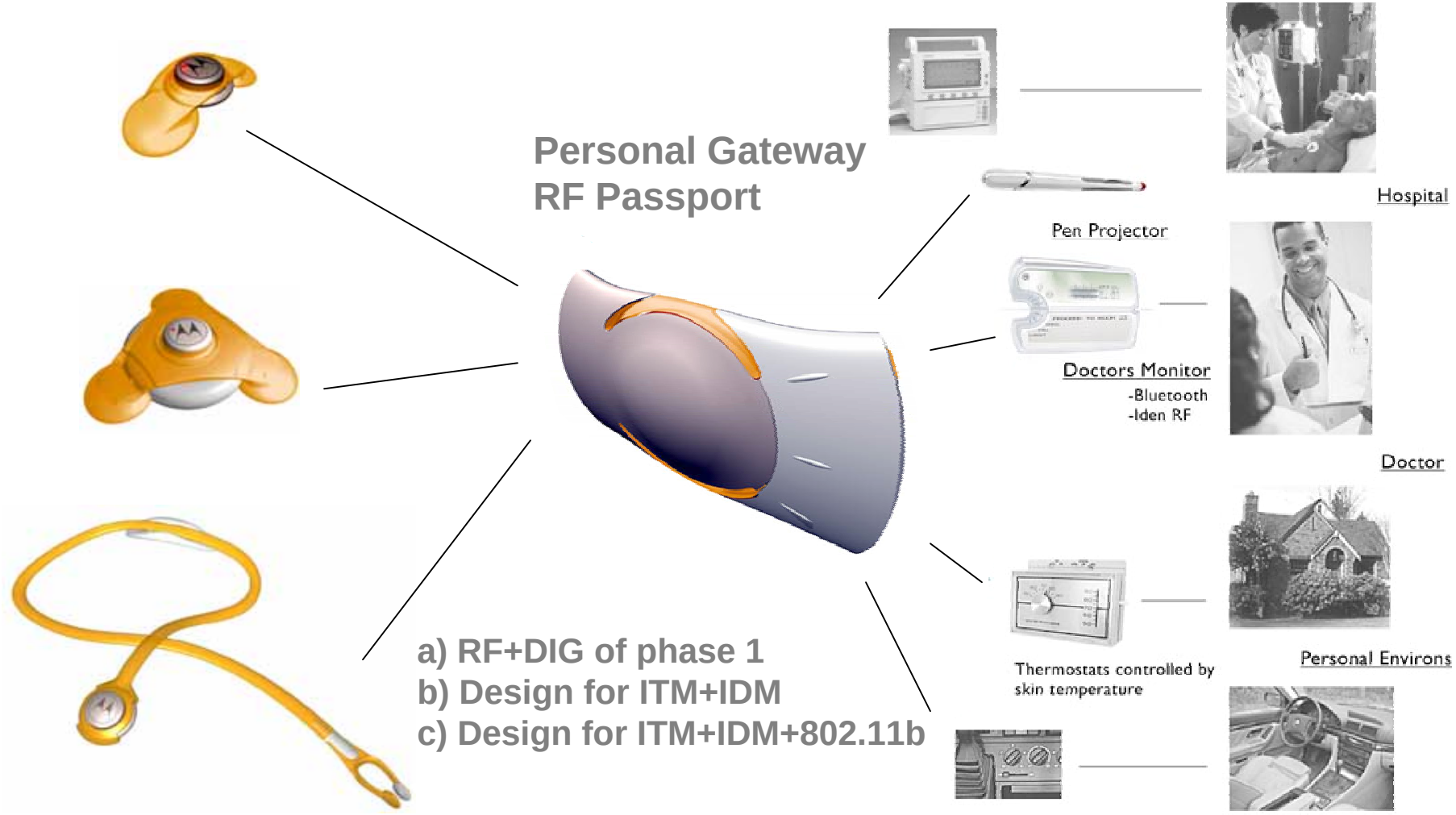

Video
Gaming
Fitness Monitor
Recreation
MP3
Entertainment
Nutrition Awareness
Watch /Time
Bio-health Monitor
Food
Rest
GPS Navigation
Healthcare /Fitness
Pager
Family Monitor
Health
Security
Banking
Family /Community
Phone
Communication
E-Commerce
Companionship
Palm Pilot
Learning /Education
Information Access
Social Networks
Personal Digital Assistant
Personal Computer
User Needs


Fiberoptic Highway
Broadband Products
Distributed Computing
Genetics/Genome, Genetic Engineering
Constant Communication, always on (web/wareables, home, office, car).
Bio-chip /Bio-processors
Bio-Security
Integrated Communication Devices
Bio-Communications /Informatics
Autonomous Communications
Bio-Pak (communications, biotechnology, pharmaceuticals)
3-D Screens /Animated Products
Bio-Pharmaceuticals
3-D Video Streaming
Nanotechnology
Holographs
Virtual Reality
Robotics
Intelligent Agents
Future Needs

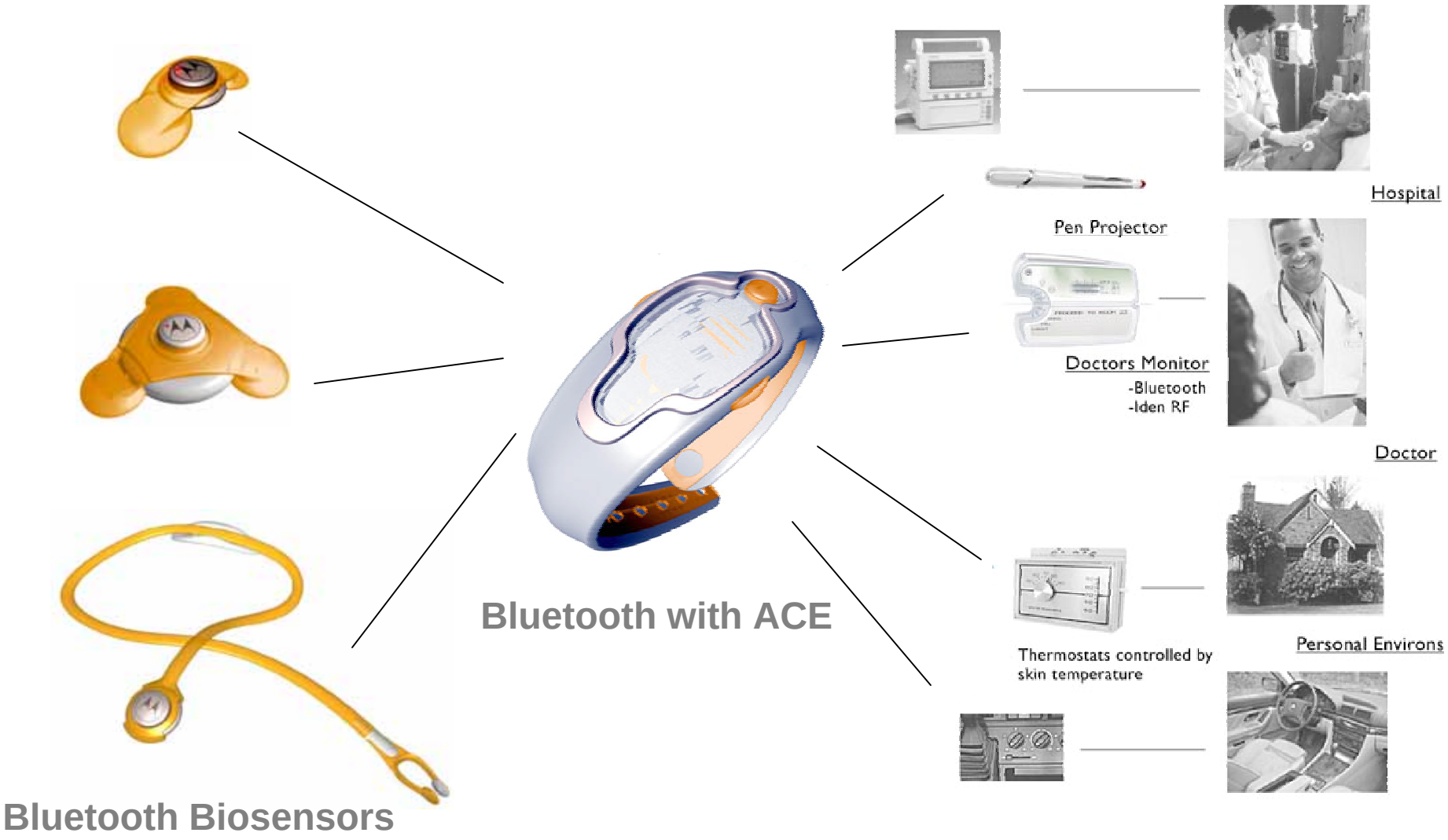
iDEN Wireless BodyNET Applications



iDEN Wireless BodyNET Technology



Phase 4: iDEN Wireless BodyNET Technology Plan



iDEN Wireless BodyNET concepts

PET

ELDERLY

Secure Zone Product Concepts with GPS ,iDEN Radio and Bluetooth

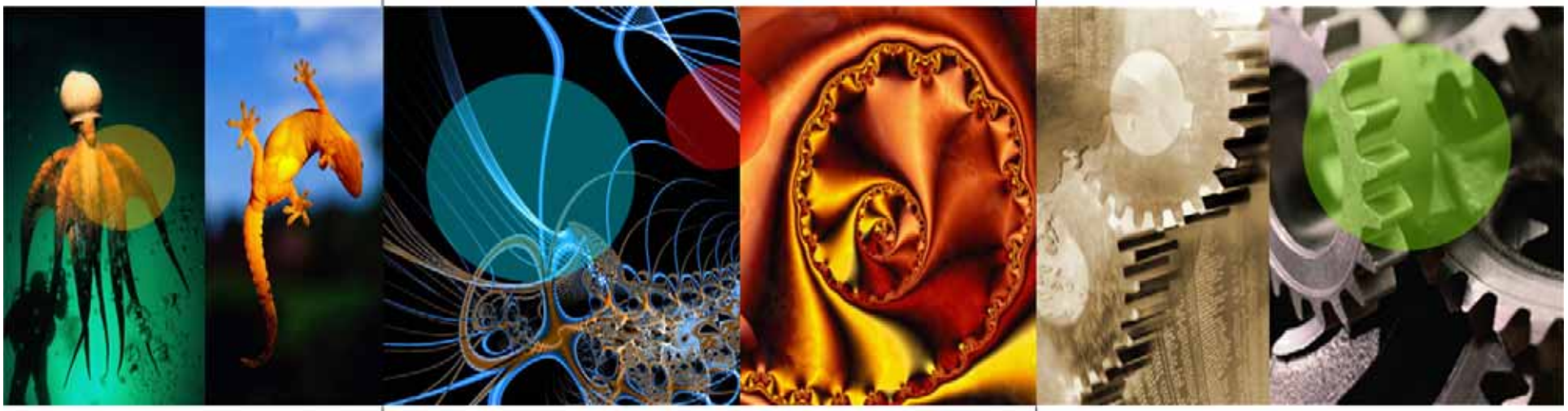
INFANT

CHILD

MOTOROLA OFFSPRING ('WEARABLES') CONCEPTUAL DESIGN

Motorola Offspring ('Wearables') is a design exploration of a family of connected, modular wireless communication devices. The concepts utilize Motorola's iDEN technology, as well as the latest advances in miniaturization and Bluetooth technology, to enable entertainment, business, and security-related communications and broadband applications. The devices, individually designed to be worn as fashionable accessories, each have an independent power source and memory. Each device communicates and shares information with the other devices and the user, operating as a seamless personal network.

Design Themes -



bionic

concepts and shapes
that are rooted in Nature

1. organic
2. no straight lines
3. textured
4. color
5. relates to nature

fractals

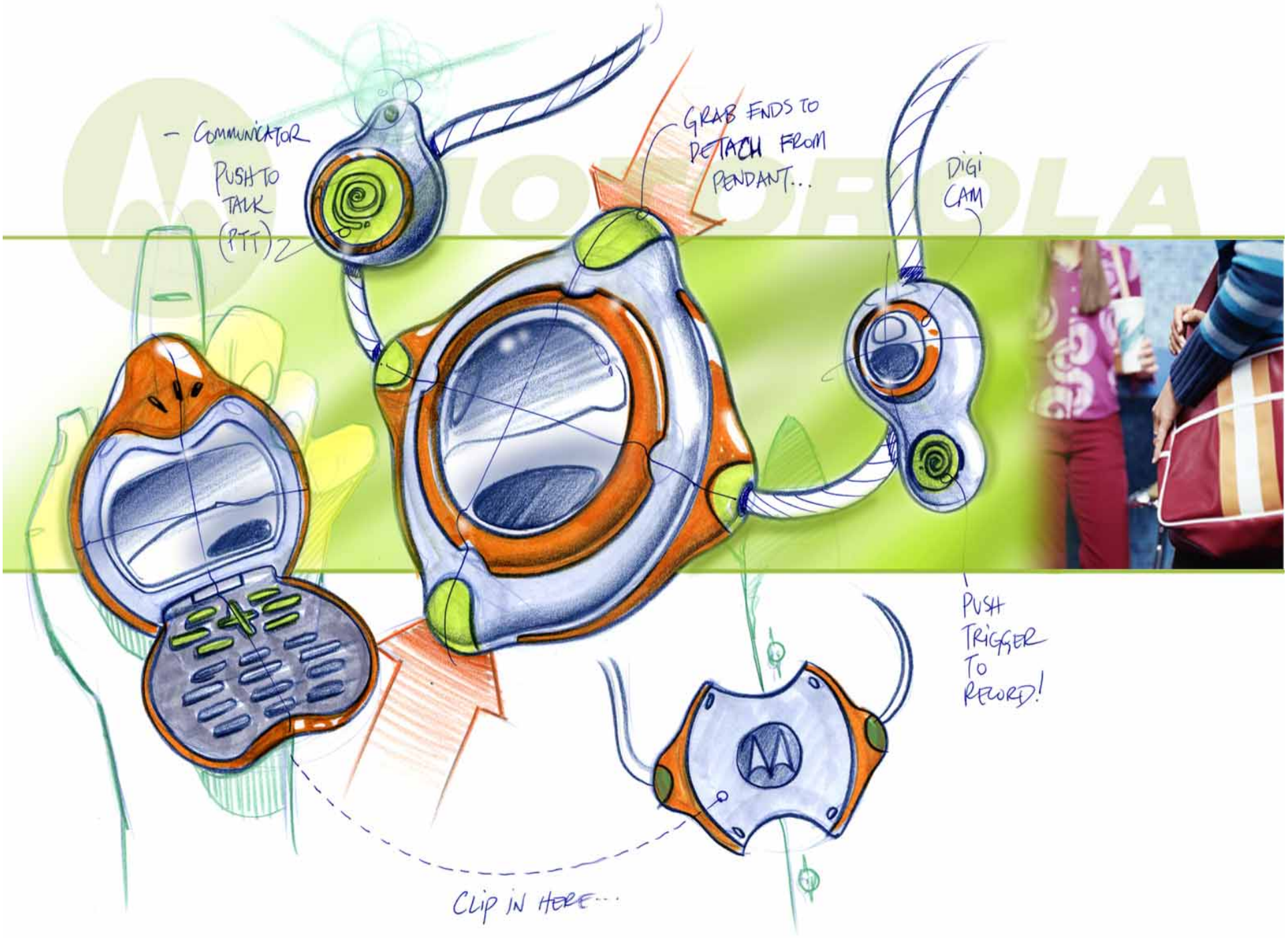
visually translating AI
and algorithmic technology

1. repeating elements
2. systemic
3. scaled patterns
4. movement
5. micro to macro

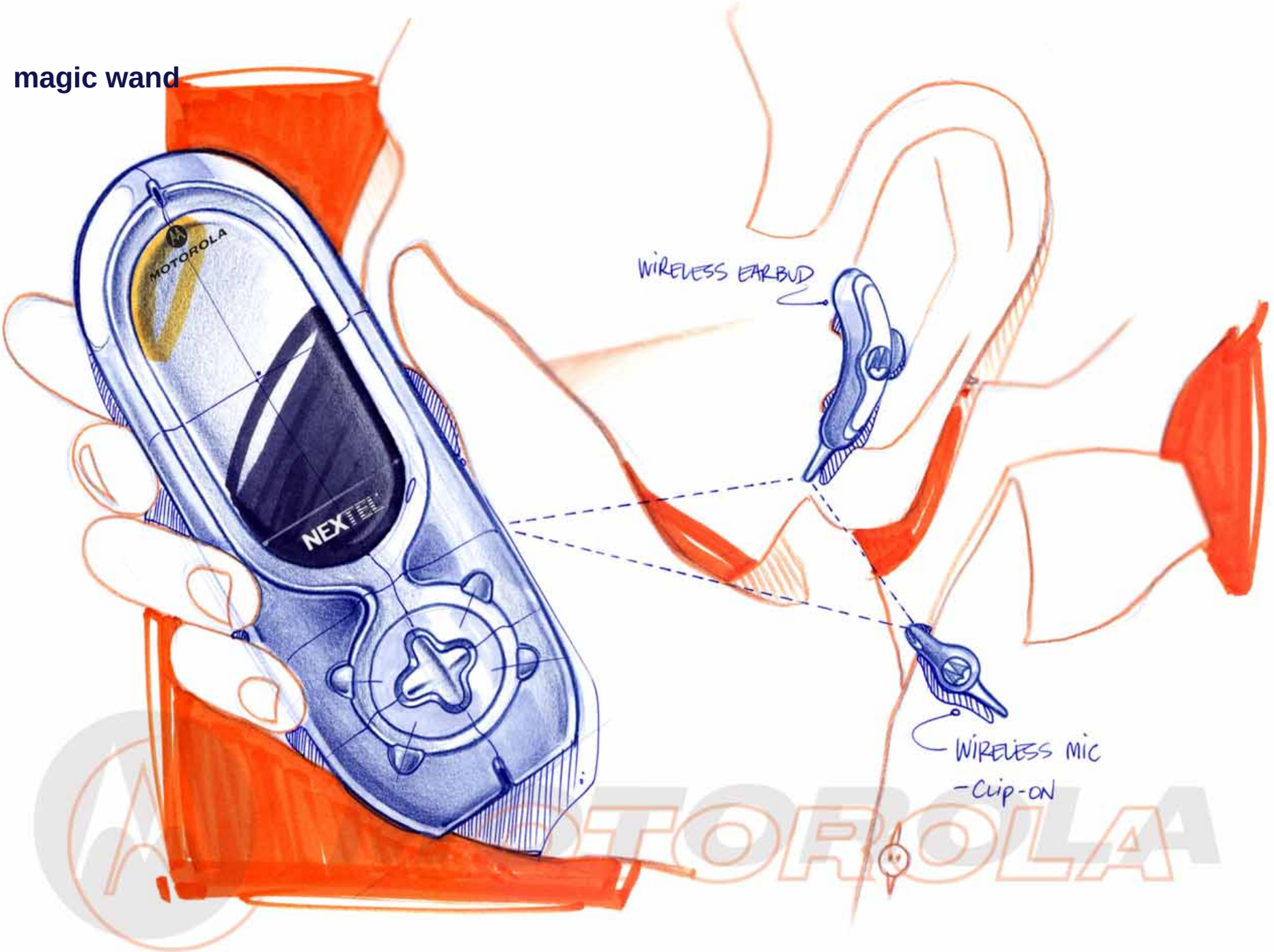
tech romance

connect to the
pioneering spirit of Motorola

1. machine aesthetic
2. industrial
3. homage to metals
4. machined parts
5. linear

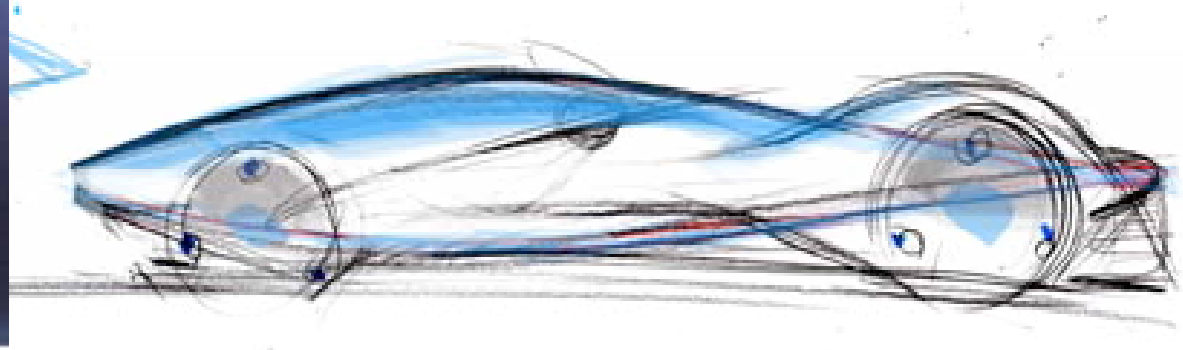

– COMMUNICATOR
PUSH TO TALK (PTT) 2
GRAB ENDS TO DETACH FROM PENDANT...
DIGI CAM
PUSH TRIGGER TO RECORD!
CLIP IN HERE...

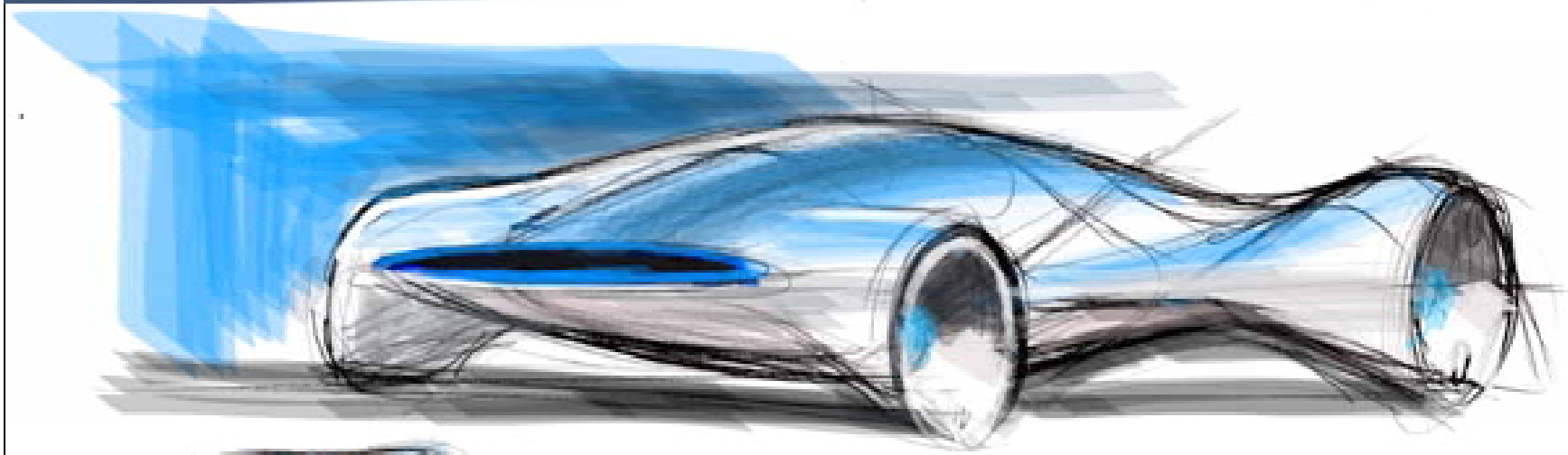
magic wand

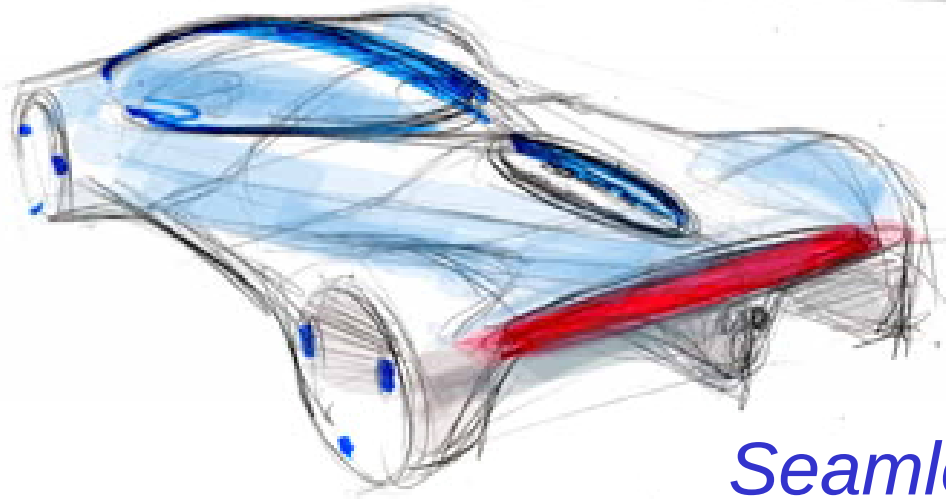



Contacts
Calendar
Internet Explorer
ActiveSync
Call History
MSN Messenger
Settings
More...
Home
Menu
MOTOROLA

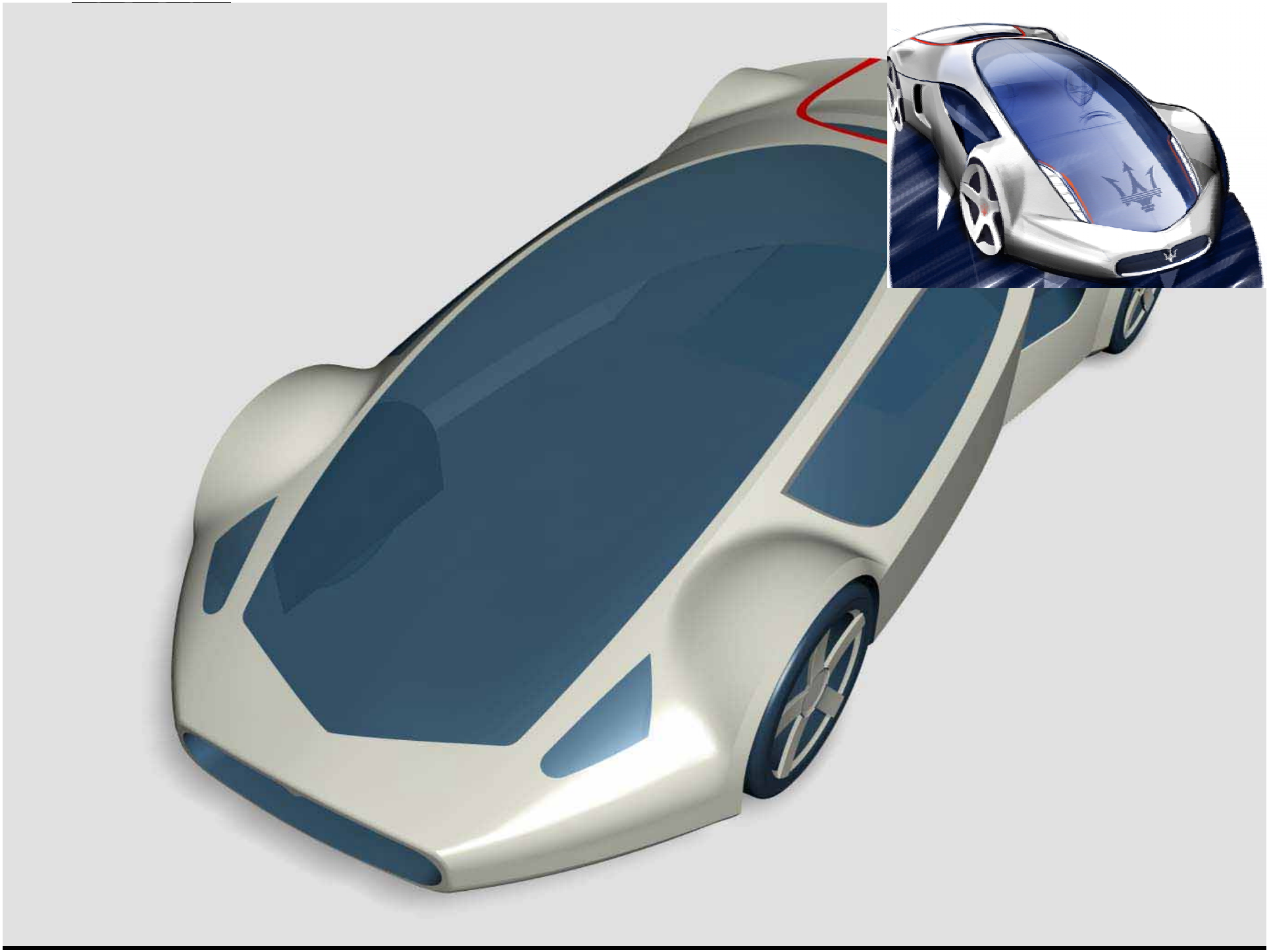

The entire family of modular devices is wirelessly connected, allowing each device to share information with other devices and the user, operating as a seamless personal network.
in use







Seamless mobility: Car /Person

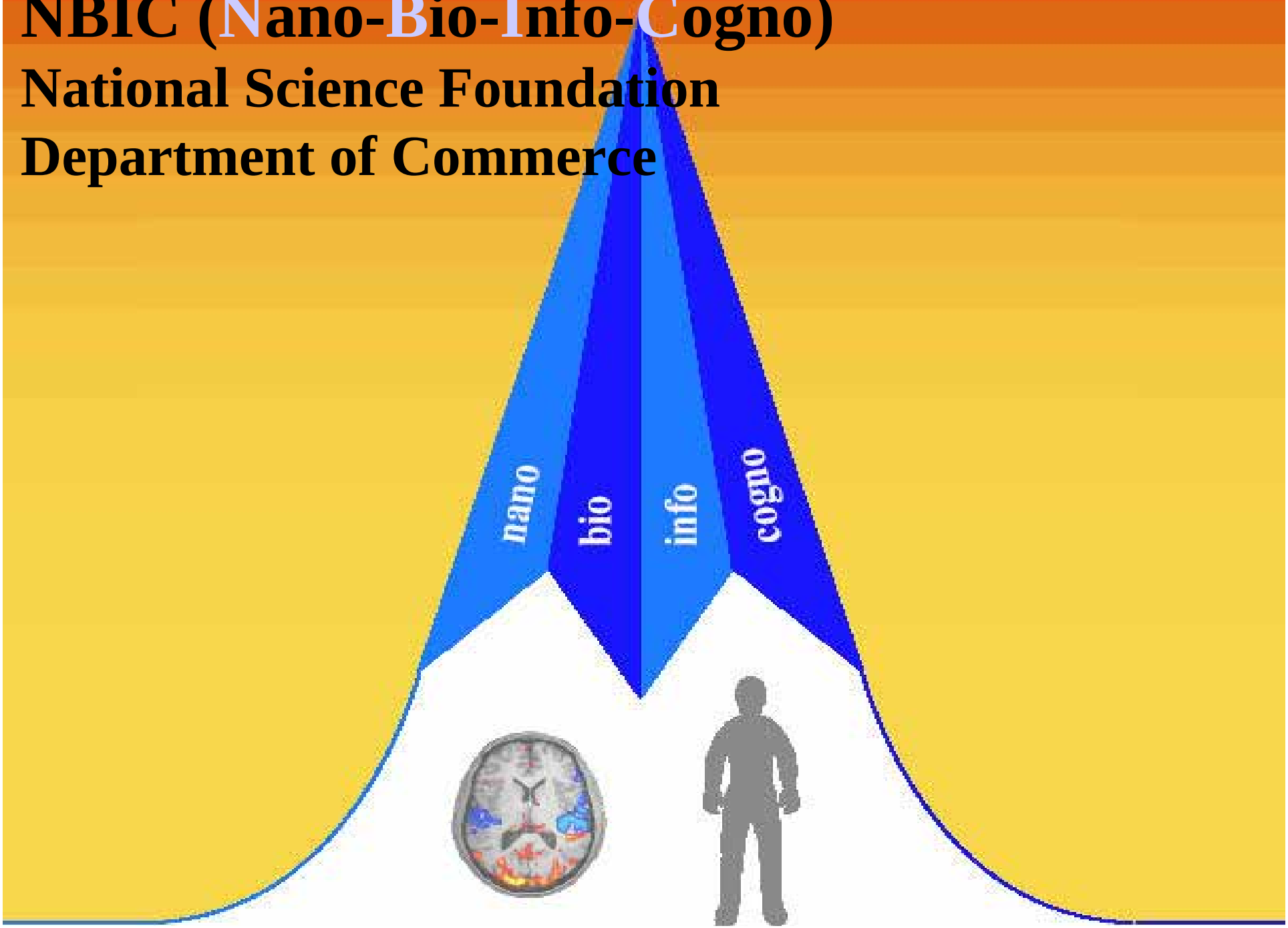


3: INTELLIGENCE & BEYOND

NBIC (Nano-Bio-Info-Cogno)

National Science Foundation

Department of Commerce




hybrid


The **Brain**:The Final Frontier?


To go Faster we need to look Further…..

*Bio**Design Database***

Sensors – based on nerve functioning (stress, strain, temperature, vision, chemical)
Mechanism design - skeletal structure or pure biological geometry
Mechanical structures, schemes and mechanisms - exoskeletons, flexures/elasticity--bugs have it all
Fluid systems - pumps, valves, cooling of dwellings
Heat transfer management – cooling of core body temperature, transfer of heat from one region to another
Energy management – creation of heat, reflection, absorption, insulation
Taking advantage of phase change - one beetle uses its' shell to collect condensation and then hydrate itself
Water resistance and waterproofing
Chemical resistance
Color management and color changing ability – chameleon / octopus, pigments, bioluminescence.
Behavior - swarming and collective behavior, making computers behave with a "hive mind" similar to ants/bees.
Motion control (incl. visual processing and feedback) algorithms –MIT AI lab
Methods of locomotion
Actuator development - muscle mimicry, potential energy windup like in grasshopper or ballerina legs, etc.
Learning / perception algorithms -
I**nteraction principles** - human-machine interaction is very different to human interactions with living things
Use of exothermic reactions - producing light, heat
Energy storage - nice fat cell in your next walkman?
Sticking surfaces / adhesion
Construction techniques – e.g. a gopher and beavers.
Fluid management - pumps, valves, hearts, etc.
Textures –
Fibers – materials, properties
Information dissemination – inspired by dandelion seeds, owl calls, bee dances, disease spreading, etc.....

BioDesign Lessons

Humility
Nature is THE master designer
Spider web vs. steel
Abalone shell vs. Kevlar

Imitate, don't duplicate
Be creative in your interpretation of natures lessons
Understand why nature chose its solution

Biodesign ≠ Sustainability
Be clear about your motives for applying Biodesign

Yet another argument for a multidisciplinary approach
The microscope is the designer's new best friend

Biologist+Designer > Many Designers

Mimicry can be the first step towards creative thinking

We are on the cusp of a great movement
An opportunity for all of us to play a part

Conclusions

- The tool to influence the Concept Process
- Stimulate Creativity in design
- Results in innovative solutions
- Allows contributions from other Disciplines
- Expand knowledge and remove barriers


Molte GRAZIE!!