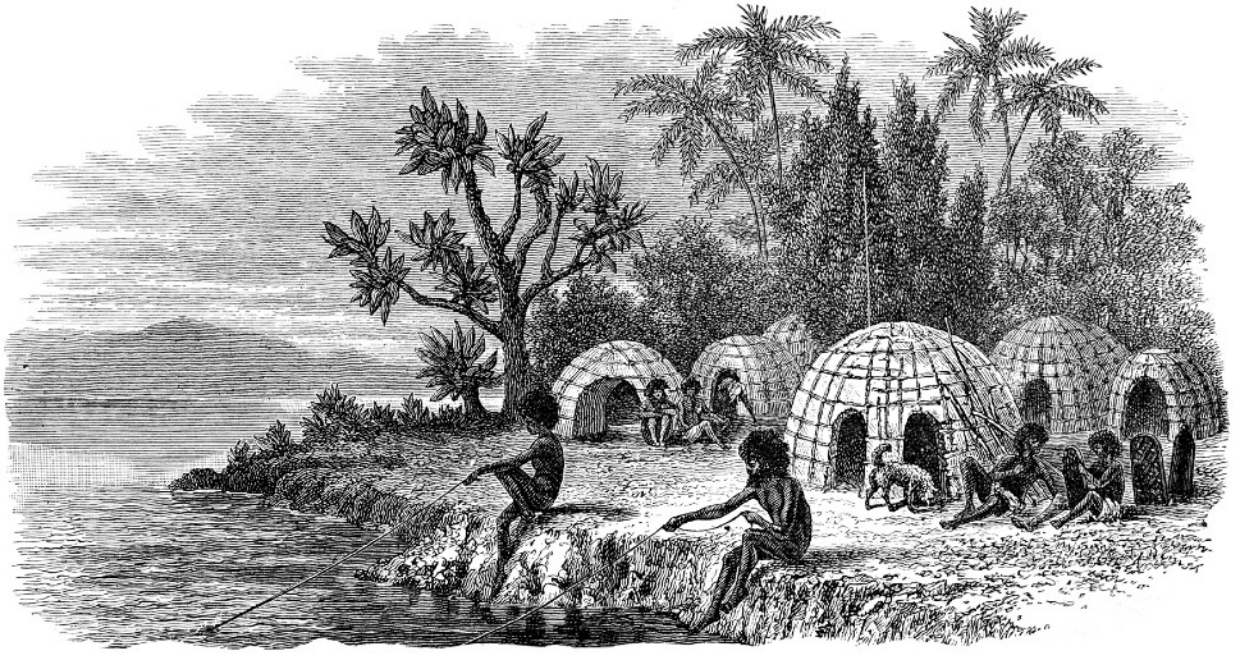


“A Native Australian Encampment in Queensland.”

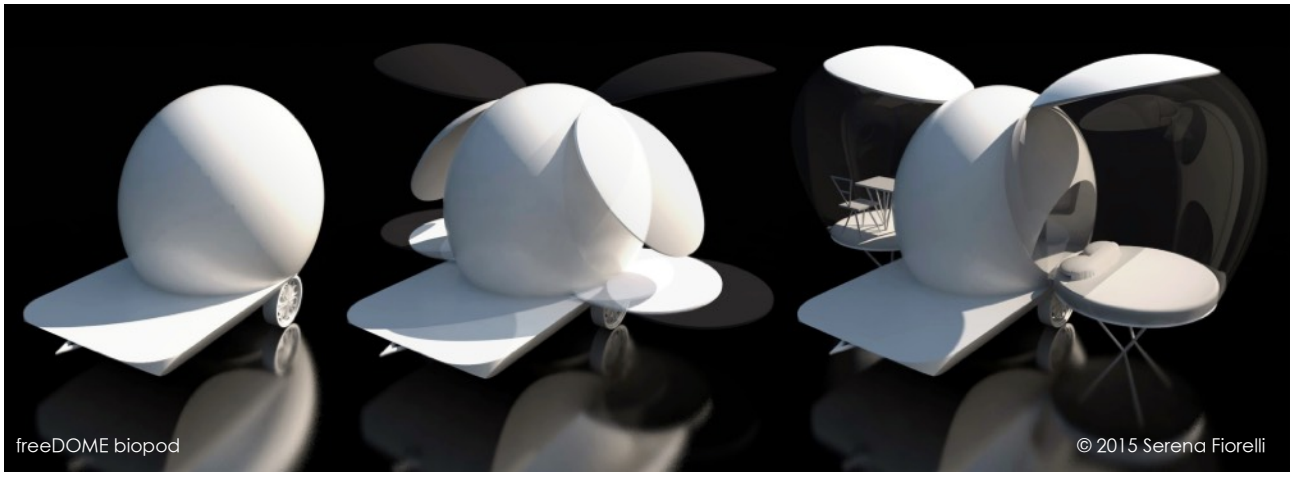
the **NEXT CIVILIZATION**

From the resilient world of Indigenous people (and insects), instructions for living…

Serena Fiorelli _ bioMIMESIS Design

From semi-nomadism to remote working. **freeDOME**: the ladybug mini studio-home and a resilient community model for a new human/nature interaction and territory regeneration

- biophilic and biomimetic design -



"Perhaps we should be looking at these mentors, at all biological (and cultural) elders on earth that have figured out how to create a sustainable world before us” J. Benyus.

Understanding the logic of obtaining, managing and consuming local natural resources, particularly plants, energy, water and food, and try to use and recycle every object without leaving a trace, is crucial for ensuring sustainability of human life and a key for the survival of territories. Today Permaculture (permanent agriculture), has an essential role to play in the conscious redesign of our fragile territories, (both rural, urban or suburban), designing and managing landscapes so they are able to satisfy population's needs as food, water and energy and at the same time to preserve the resilience, wealth and stability of natural ecosystems. Through the principles of permaculture, biomimetic and circular economy, and learning from the oldest civilizations on earth, this pilot project is designed to establish new ecosystems defining best practices for safeguarding biodiversity, local know how and the sustainable use of natural resources in a way that fosters the economic, environmental and social redevelopment of territories and cities in transition. It anticipates the accelerated release of technology beneficial to all life, focused on the provision of basic needs such as housing, water, food, energy, community, information and mobility[1].

For next generation FREEDOM - After **Covid 19's "**forced immobility", even if not all jobs can be done remotely, "knowledge technologists" (smart workers), are likely to become the dominant social force over the next few decades. **"**Human development is about much more than the rise or fall of national incomes. It is about creating an environment in which people can develop their full potential and lead productive, creative lives in accord with their needs and interests. People are the real wealth of nations"[2]. Lower employment levels and smaller incomes have left younger Millennial (gen. between 1981-1996) with less money than previous generations. For this social class, owning a house and a car is not a priority anymore, giving rise to what's being called the "sharing economy": instead of owning they prefer to live in more flexible, adaptable, shareable and resilient environments within vibrant walkable urban or peri-urban neighborhoods (NewBurbs) and their houses are often used as places to connect, work, buy or studying online, mainly remotely from different locations (teleworking). "This generation, 1.8 bn people, which accounts for about a quarter of the world's population"[3], is reshaping future societies and defining new models of housing affordability.

With the fast growing young-urban population, new strategies must be found for creating the places where they can live and work, and the mobility systems that connect them, in order to meet the profound challenges of the future. The purpose of the research-project is designing a multifunctional and inter-connective bio-shell for all (especially millennials) where to live, work and think, while acquiring healthier and sustainable behaviours, fulfilling the need to belong to a community and reducing their ecological footprint[4].

"I might have nothing, but I'm proud of my shell" (African Vodun, Blier, 1995).

Tele-working or tele-isolation?

With the new scenario of 'individualistic organization' of work, the risk of social isolation is very high, as Bauman stresses in "Liquid modernity" (2016), while "the need to develop social and emotional skills is becoming more and more a requirement for survival and success in life and work" (Goleman 2007).

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[1] in **Fiorelli, S.**, Biloria N. (2019), *'A Smart mobility and living system for Smart city and Fragile territories regeneration based on Permaculture and Biomimicry'*, TERRITORI FRAGILI / FRAGILE TERRITORIES, a cura di: Lorenzo Pignatti, Filippo Angelucci, Piero Rovigatti, Marcello Villani, ISBN: 978-88-492-3668-2, Gangemi Editore. Roma, pp. 1238 - 1245. https://www.academia.edu/42906041

[2] Larson, B.R. and Leites, J.: *Human Development Report 2001, Making New Technologies Work for Human Development,* Published for the United Nations Development Programme (UNDP), New York Oxford University Press (2001).

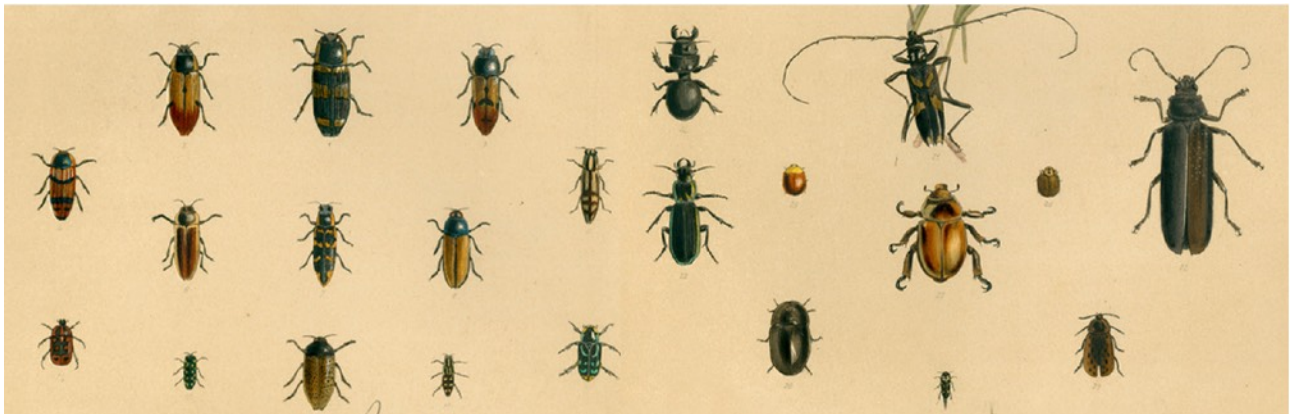
[3] Finanacial Times: '*The millennial moment*' — in charts https://www.ft.com/content/f81ac17a-68ae-11e8-b6eb-4acfcfb08c11

[4] in **Fiorelli, S**., Agnis, S. (2018), *'Transforming Cities: A 3D User Experience Design for Social Behavior Change and Urban Sustainability'*, conference proceedings of Persuasive Technology XIII, 2018, April 16-19, Waterloo, Canada.

Our houses are no longer limited to simple shelter, but have turned into small businesses, offices, shops, hotel, schools, universities online…The house is becoming part of the economic infrastructure of our countries. Established that old housing models consume much more energy and space than needed for these digital activities, and that technology is realistically affecting our future, we will have to adapt our living-working spaces to the new digital jobs, static and individualistic, in the most sustainable way. It is necessary to build a better model for our "biological embodiment", a new habitat where the technological environment interact better with the cultural and the natural one, also helping in reducing our environmental impact.

“The more our world functions like the natural world, the more likely we are to endure on this home that is ours, but not ours alone” ~Janine Benyus.

The research-project explores the phenomena of social isolation due to the changing modern work and life style models and looks for possible design solutions by investigating the insect world and translating this into design principles, from the micro to the macro scale. It empirically investigates the 'anthropological leap' that Homo Sapiens, along with his habitat, is technically making, evolving to "Homo Technologicus" (Longo, 2001) and researches the natural environment for designing his new "digital biohabitat”. The project aims at discovering basic biological principles applicable in designing both innovative human-centered devices (bioPod) and intelligent collective systems (the campUS) where individuals can interact with each other and their environment, where the private and the public can connect, and where people can finally satisfy their needs for freedom, self expression and sociality without incurring in isolation consequences, as Indigenous Australians used to do. Finally the project empirically engages with the challenges of designing "freeDOME biopod": a mobile and autonomous load-bearing shell structure inspired by insects, especially coleoptera, exploring their structure, the bending properties and the spectacular structural colors of their wings[5].



Entomology of South Australia (Coleoptera). Angas, George French, 1847.

Symbolically, freeDOME biopod is a modern evolution of an indigenous DOME Hut, a primordial symbol, evocative of the first humans, ecological and temporary settlements, for a semi-nomadic, free lifestyle. It is a metaphor of a non footprint - a 'no-made' house, for 'a life without objects',

The Aboriginal inhabitants - native dwellings. Angas, George French, 1847,

[5] in **Fiorelli, S.** 2017, *‘freeDOME smart mobile office-home. The bio-logic design adaptation to the dynamic evolution of living’* , The Design Journal**,** 20:sup1, S3185-S3201, DOI: 10.1080/14606925.2017.1352824; <http://dx.doi.org/10.1080/14606925.2017.1352824>.

Gunditjmara Indigenous Dome-hut, (reproduction). Gunditjmara, Budj Bim heritage park, southwestern Victoria. Ph. Fiorelli S., 2020.

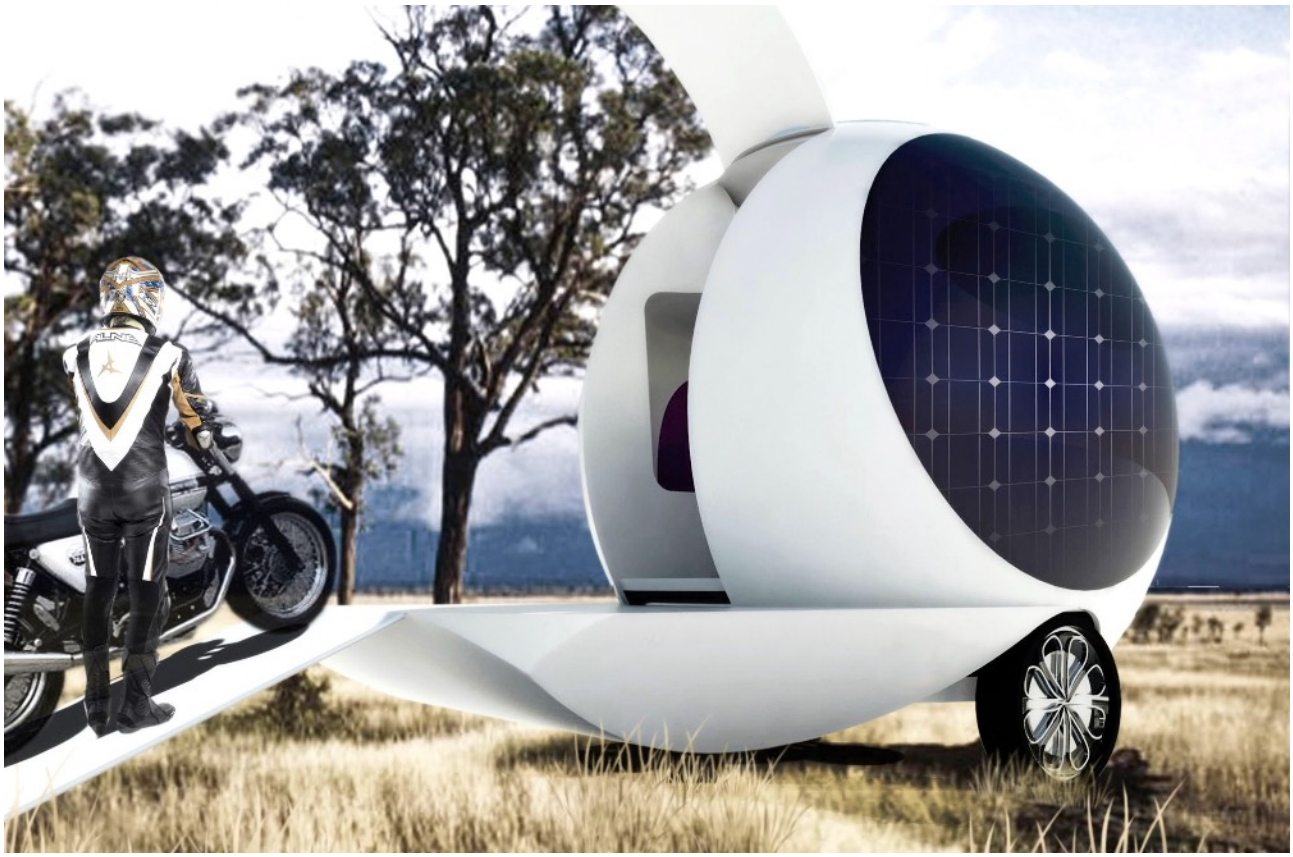
which would bring humans back to a new dialogue with nature through an extreme simplification of our lifestyles, more healthy and dynamic, aimed at shifting our impact from destructive to regenerative.

In this modern digital world, where all activities are moving on-line and less space is needed, **“freeDOME is the place where both nature and humanity coexist in harmony through the smart use of technology”.**

The research and project have been developed between Italy, where the automotive design and the ‘Made in Italy’ design in general have represented the national identity for centuries, and Australia, where the semi-nomadic Aboriginal culture, their relationship with the land and the wild extended territory, perfectly favour the hypothesis of new forms of “semi-nomadic and resilient communities”.

bioCREATIVITY on the road - living structures -

"In case of need I’ll take my territory on my body, I will territorialise my body: the house of the turtle, the hermitage of the crustacean, but also all the tattoos that transform a body in a territory" (Deleuze & Guattari, 1987).



freeDOME biopod

COVID-19 kept us in psychological and physical isolation.
It seems now more and more necessary for our living and working environments to become smarter, more responsive, more flexible, and adaptive to the new social and technological changes. Equipped with the necessary safety instruments, our houses will have to help us to connect instead of segregating us from each other and the natural environment. The mobility challenge opens therefore, together with the issues of flexibility, interactivity and sustainability, the new scenarios of the future living.
“Freedom of movement will drive human progress.” Henry Ford.

"FreeDOME biopod" represents the future mobile shell for sustainable, free and semi-nomadic lifestyles, in particular for remote workers, with many benefits for both human and urban metabolism.

freeDOME “semi-nomadic Camps”

In addition, how to make our cities and territories more welcoming and more hospitable in a planet at risk of environmental catastrophes? How to coexist in a growing condition of ethnicities, cultures and needs?

What’s extremely urgent nowadays is focusing on improving the quality of neighborhoods with open and green spaces where people can walk, interact and connect, with adequate security measures, to improve their physical and mental condition. The ultimate goal of politicians, citizens, and all inhabitants of fire-prone or flooding-prone areas should be to improve community resilience. *“Life´s been on earth for 3.8 billion years, and in that time it has learned what works and what´s appropriate here and what works and last there”* J.Benyus. By understanding how natural systems work, how all things are interrelated and interdependent, and how they interact with each other, we can create “Persuasive urban systems”[6], (and peri-urban), that reflect the properties of natural systems – sustainable, energy efficient, harmonious and life-affirming. We can design food production systems, intentional communities, bio-inspired businesses or any other human system in a more sustainable way. Furthermore, it is now being recognized by all governments around the world that creating strong bonds and mutual support between rural and urban areas is the key to achieving intelligent, circular and inclusive development for a sustainable world[7].

Biomimesis design is an architect studio and an innovative start-up focused on the development of “living labs” (bioCamps) based on micro-housing, mobility and community systems that emulate life itself while safeguarding the territory and the environment. Referring to biological and ecological principles, “freeDOME” project is aimed at re-qualifying and connecting urban, peri-urban and/or rural under-used spaces, through an integrated smart system based on intelligent vehicular Pods and Camps where people can connect and share, grow their own food and develop a new form of work-life environment that can lead to a more inclusive, healthy, active and sustainable lifestyle. This system will reduce the traffic to and from city centres, the consumption of fuel, water, energy and land therefore our environmental footprint. The project operates on two fronts to promote a sustainable technological dimension towards a non-fragile and integrated habitat model:

A. Via the development of a fully self-sustaining autonomous “biopod" (a smart mobility solution in the form of a novel living + working bioShell for “millennials and new nomads”, fully off-grid and capable of generating its own energy, supporting flexible and highly integrated and networked

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[6] Stibe, A. and Larson, K.: ‘*Persuasive Cities for Sustainable Wellbeing: Quantified Communities’.* In M. Younas et al. (eds.): Mobile Web and Intelligent Information Systems (MobiWIS 2016), LNCS 9847, pp. 271–282. Springer International Publishing (2016)

[7] UN-Habitat. ‘*Implementing the New Urban Agenda by Strengthening Urban-Rural Linkages - Leave No One And No Space Behind’.* First published in Nairobi in 2017 by UN-Habitat Copyright © United Nations Human Settlements Programme, November 2017.

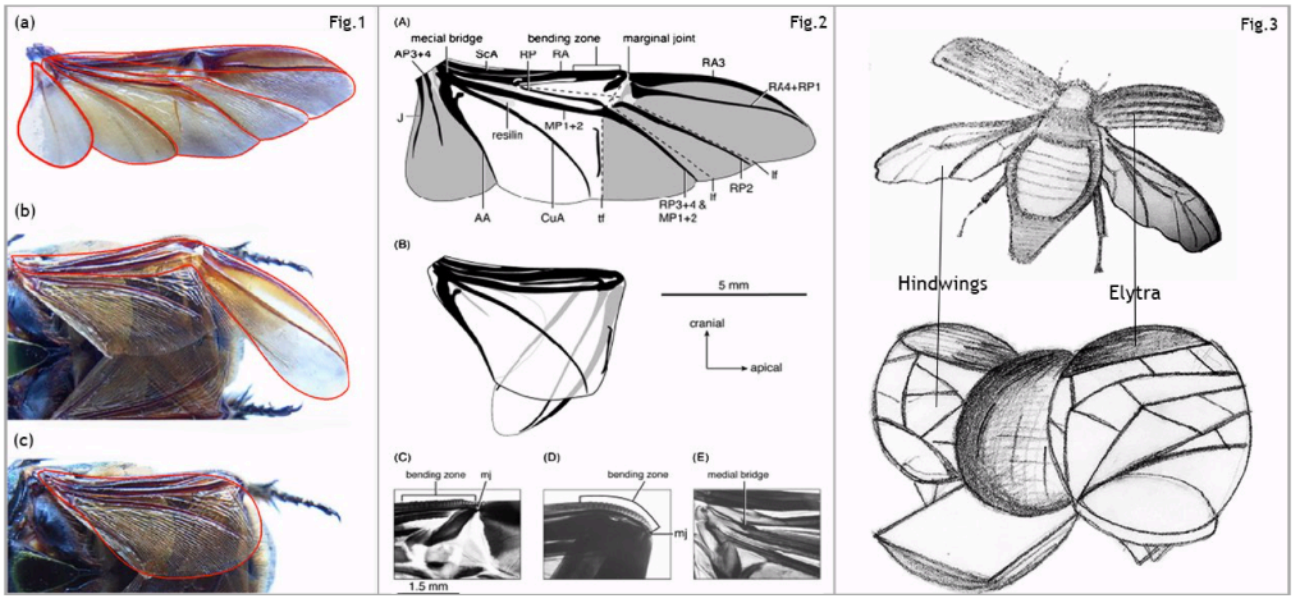
living style). The shells, defined as "freeDOME bioPod", will function as a smart and green solution for accommodation, work and commuting, facilitating internal mobility and sustainable integration between humans and natural habitats.

B. Via the definition of an integrated, adaptable and scalable pilot project *“FreeDOME bioCamp”* as a new solution for the ecological and social recovery of otherwise derelict, fragile or under-used urban, suburban or rural zones in a resilient, flexible and inclusive way and their networking. The camps will serve as *self-sufficient farms* for hosting the autonomous pods and will be distinguished by their high connectivity, accessibility and environmentally-friendly features. The ‘rural farms’ will represent “open-sky hubs" where the individual, through his “bio-shell" will be able to work or study remotely, reducing traffic, emission and in the same time collaborating with the ecosystem. The ‘urban farms’, seen as smarter sharing-neighborhoods for the 21st century millennials living, are also envisioned as new urban transformation engines, which will render a new land use and gentrification culture to fuse seamlessly within the dense urban fabric. Here they should be placed at 20 minutes walking distance and be connected with the suburban and rural camps through greenways or "ecological corridors” for bikes and the Pods.

bioINSPIRATIONS. The creative method reflects its central relevance in biomimetic, (together with biophilic and permaculture design). Gaining inspiration from nature isn't a novel concept but a repeating theme in human history. However modern biomimicry is far from just copying nature's shapes. It includes systematic design and problem-solving processes, which are now being refined by scientists, engineers and designers worldwide.

"*I'm not trying to imitate nature, I'm trying to find the principles she's using*" - Buckminster Fuller.

freeDOME bioPOD is a bionic load-bearing shell structure inspired by insects, especially coleoptera (ladybugs) not just morphologically but mostly for their structural, material and mechanical properties (as their lightweight exoskeleton, the strength, flexibility and waterproofing of their elytra). Specially we are mimicking the bending properties of their wings, for biomimetic design application: like the coleoptera, the Pod is equipped with a dual system of opening wings where the elytra (upper wing) provides energy and protection to the hind-wings, two inflatable/ expandable membranes that, when open, triple the Pod's volume. The two resulting bubbles from the opposite wings can be utilised for COVID-19 isolation for 2 people, meanwhile allowing them to connect with the natural environment and other community members. They can also be used as cafes, offices, studios, classrooms, showroom, and for many other personal-social needs. Furthermore, we are studying biomimetic applications of the beautiful structural colours and texture of beetles forewings for customisation and camouflage purposes.



Cross folding in the beetle wings (1-2) and biomimetic application (3)

FreeDOME mimics many aspects of the insect world, not just their physical structure but also the social one. For example the project explores social insects colonies collective behaviour - in entomology called eusociality - and Indigenous communities as fundamental sources of inspiration for a new self and social organization proposal, sustainable and resilient.

RESILIENT COMMUNITIES: traditional habitus and habitats

For decades entomologists have known that insect colonies are capable of complex collective actions, even though individuals adhere to straightforward routines.
"In essence, we believe that social insects have been so successful and they are almost everywhere in the ecosphere, because of three characteristics:
• flexibility (the colony can adapt to a changing environment);
• robustness (even when one or more individuals fail, the group can still perform its tasks);
• self-organization (activities are neither centrally controlled nor locally supervised)"
(Bonabeau and Meyer 2001: 108).

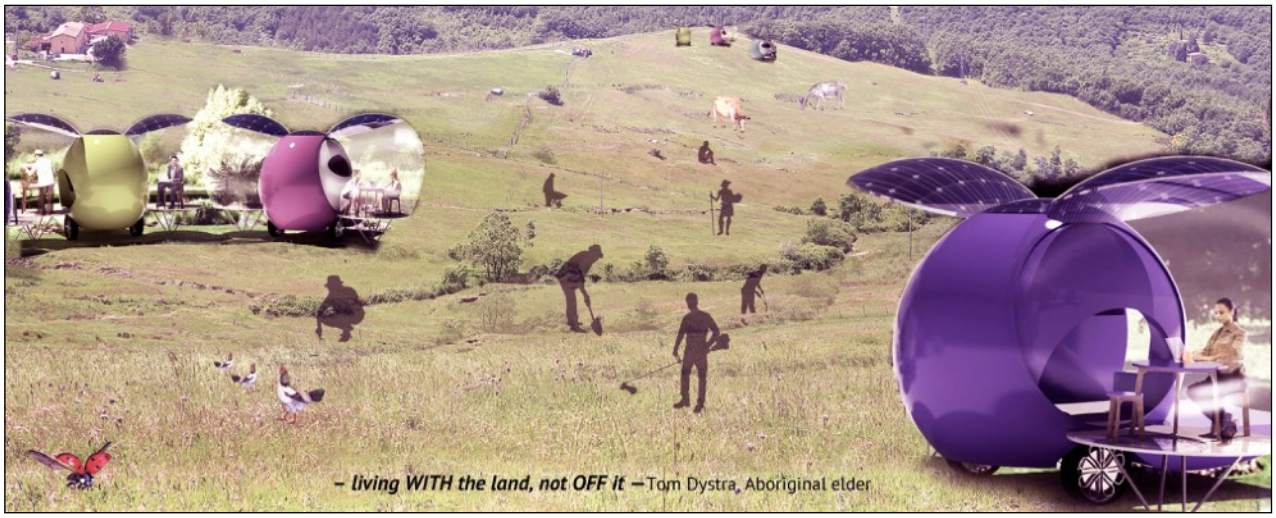
Furthermore, as insects teach, community life requires a higher intellectual capacity compared with the choice to lead a solitary life.
"It seems that in the insect universe there is a correlation pretty evident among sociality and intelligence: ecological niches, architecture, sociality, speciation, and knowledge interact with each other in a complex way, that has amplified the benefits, driven innovation, raised Intellectual capabilities and brought to huge diversity "(Gould, JL & Gould, CG 2008, p.95).

A social insects colony

How can we talk about resiliency if we don't refer to Indigenous Australians who have been among the most resilient civilisation ever?

Ingenuity. An 1845 sketch by J.H. Le Keux shows an Aboriginal village near the NSW/SA border.

Indigenous Australian communities can be considered one of the highest example of resilience in human history. Not just thanks to their resistance to overcoming the devastating social and environmental consequences that British colonization caused to their civilizations, but from 50,000 years earlier in their history, when arriving from South East Asia (new Guinea from the most accredited theories), they had to adapt to an unknown and uninhabited territory. Here they had to learn to collaborate in perfect balance with the ecosystem, for example through the wise use of fire (used to keep the vegetation open and create ideal habitats for attracting game). Historians, writers and academics are now rethinking Australia's perception of Indigenous land management. They argue that the first Australians had complex systems of agriculture that went far beyond the hunter-gatherer tag. "They were, in fact, our first farmers, whose intimate knowledge of managing native plants and animals sustained them for thousands of years" B. Pascoe[8]. Moreover, thanks to their organization in semi-nomadic communities and villages, the traditional Aboriginal economy was much more complex and varied than many think, with finely built domes, methods of collecting and storing seeds to prolong the season of many months, as well aquaculture systems with fish traps, all designed in a perfectly integrated way with the ecosystem.



freeDOME bioCamp, Radicofani, Tuscany.

[8] **Bruce Pascoe** (born 1947) is an Aboriginal Australian writer, professor at the Jumbunna Institute for Indigenous Education & Research at the University of Technology Sydney. He is best known for his work *Dark Emu: Black Seeds: Agriculture or Accident?*, which reexamines colonial accounts of Aboriginal people in Australia and cites evidence of pre-colonial agriculture, engineering and building construction by Aboriginal and Torres Strait Islander peoples.

Certainly both these above examples show that community life has more advantages than solitary life to favour the 'evolution of the species' and the protection of the biodiversity.
So **-Diversity brings Resiliency which brings Evolution-**

Conclusions…the NEXT CIVILIZATION

"Though the problems of the world are increasingly complex, the solutions remain embarrassingly simple." ~Bill Mollison

freeDOME is a nature based community model for a new biodiversity and human environment interaction. This "NEXT CIVILIZATION" model is based on the past examples of biological (and cultural) elders on earth that can teach us how they created a sustainable world before us. On one side there is the Aboriginal system with the MICRO primordial huts and their MACRO community ecosystem. On the other side, the MICRO insect exoskeleton, or biological shell, and their MACRO community organisations. The repeating patterns in these resilient systems are the individual and the community: if we can mimic this system we can create a parallel world, more sustainable, diverse and resilient than our current world.

Biomimesis design mission is designing this new system through FreeDOME project: an holistic solution which mimic the above structures from the micro to the macro scale:
the "POD" is the MICRO, the self intimate space, where the individual nourishes and protects their subjectivity, emotion and culture. The "CAMP" is the MACRO, the community system for its social interaction, his way of living the world and socializing through his acculturated body.

freeDOME, the **LADYBUG** "living-lab" model for resilient communities, is based on both cultural and biological diversities: here **people with different skills, culture and potentials can learn to co-exist, collaborate and co-create through nature for safeguarding the biodiversity.**
It is based on the principles of biomimicry, biophilia and permaculture design and all disciplines that teach how to collaborate with the ecosystem by:
- designing innovative technological solutions and business inspired by nature,
- designing sustainable environments where humans can live in harmony with nature,
- providing basic ecosystem services such as water and air purification through plants, carbon storage, energy production, food and shelter.

The community structure is based on the three main principles of resiliency above described: flexibility, robustness and self-organisation. Which are the same principles that have governed Indigenous Communities for over 50,000 years and the natural world for billions of years.
To become truly resilient we must take a step back, learn to simplify our habitus and habitat, and move forward with smarter solutions. This can be the moment in human history when ADVERSITY and DIVERSITY become source of evolution and not barriers anymore. Only by learning the lesson from nature we can create a more sustainable, connected and resilient world, as Indigenous Australians did before.

"*The more you know, the less you need"* ~Ancient Aboriginal Saying.

About the author:

Serena Fiorelli, Architect, permaculture designer and founder of bioMIMESIS design, she obtained a master degree in architecture at the Polytechnic of Turin and a master in "Plant future, social innovation and design" at the University of Florence. Mainly in Australia since 2010, here she studied Permaculture, Biomimetics and the Indigenous Australian Culture. During her collaboration with Politecnico di Torino and UTS in Sydney, she presented at international conferences on technology, design and territorial regeneration, while working on multidisciplinary projects between Australia and Italy. She is currently founding bioMIMESIS design, a studio and innovative start-up based on the R&D of bio-inspired micro-housing, communities and mobility systems for fragile territories regeneration.

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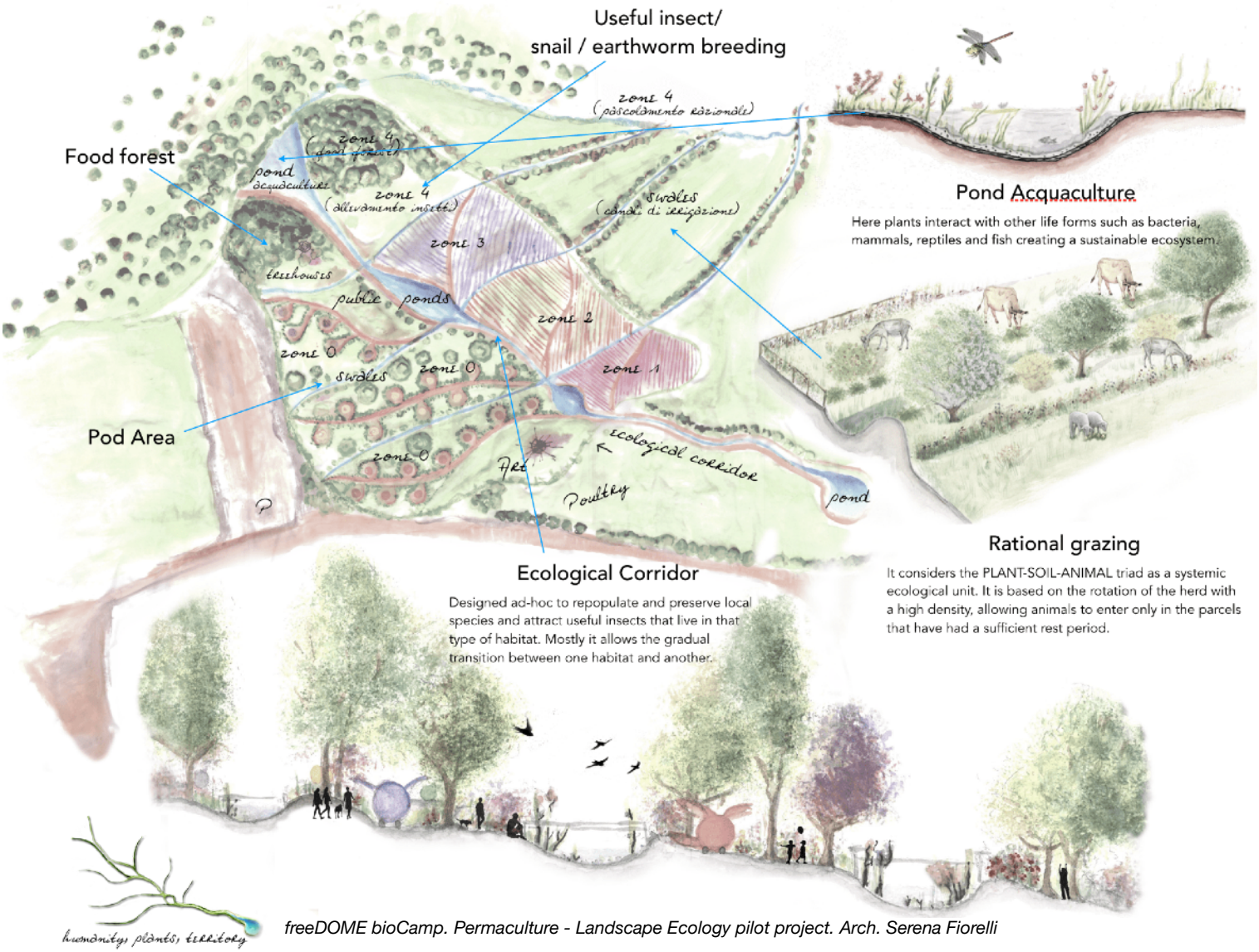
** "With the respect and acknowledgement of the Australian Aboriginal and Torres Strait Islander peoples as the first inhabitants of the nation and the traditional custodians of the lands where we live, learn and work".*



freeDOME bioCamp. Permaculture - Landscape Ecology pilot project. Arch. Serena Fiorelli