

Dragona, D. (2014) "Counter-Infrastructures, Critical Empowerment and Emancipation in a networked world" in (eds) Hamilton K, Badani B in *Art and Infrastructures*, Media N Journal. Vol 10, No 3

<http://median.newmediacaucus.org/art-infrastructures-information/counter-infrastructures-critical-empowerment-and-emancipation-in-a-networked-world/>

--

## **Counter-Infrastructures Critical Empowerment and Emancipation in a Networked World**

Daphne Dragona  
PhD candidate  
Department of Communication and Media Studies  
National and Kapodistrian University of Athens  
daphne.dragona@gmail.com

### **Introduction**

"With every receding seam, from cable to code, comes a techno-political risk. Without edges we cannot know where we are nor through whom we speak" Julian Oliver writes while discussing stealth infrastructures in the urban environment. [1] Similarly, his colleague Danja Vasiliev remarks "we hardly know what our device does behind our back." [2] The network of networks within which we communicate and interact today is to a great extent based on infrastructures and devices that are more and more disappearing, becoming invisible. And with such a disappearance, the user, if we follow the thought of the artist Olia Lialina, is "silently becoming invisible" too, losing his or her rights over the technology used. [3] It seems therefore like we have entered the era of stacktivism, a term which derives from Benjamin Bratton's 'Black Stack' and describes the invisibility of the infrastructures, the fact that we might have no understanding or access to them. The 'stack' according to Bratton 'staged the death of the user' while other kinds of nonhuman Users, like the sensors and the algorithms, were at the same time empowered. [4] And as the 'stack' reflects a new nomos for the relationship among technology, nature and human, it is also made clear that this non-transparency, opacity and invisibility concerns the functioning of the networked environment in its entirety, and the capturing of users' interactions throughout their daily life. [5]

And while Thrift's 'technological unconscious,' the 'operation of powerful and unknowable information technologies that produce everyday life' as David Beer explains, seem to take over, at the same time voices opposed to this 'blackboxing' sovereignty significantly grew in number. [6, 7,8] Networks should be made visible, computerized systems should become transparent, and technologies should be made responsive and available, Saskia Sassen writes. [9] Citizens and network users should reclaim a new right today, their right to 'infra-structure' which relates to an ongoing search, re-invention and re-appropriation. [10] A new form of ownership and a new

form of literacy directly related to infrastructures therefore seems to be needed which connects to what Greenfield has also framed as a need for translators, for “people capable of opening these occult systems, demystifying them and explaining their implications” to the others. [11,12,13]

Taking this context as a starting point, the paper will discuss the role of the initiatives, critical perspectives and alternatives that have been formulated by artists, arguing that they can be seen not only as steps towards critical awareness but also as significant moves towards users’ emancipation. Looking to the last ten years, the paper will present significant examples from a scene of artists who have been active in the field, capturing the changes in networked infrastructures and architectures of communication, and responding to them with collaborative projects, actions and workshops. The paper’s last portion will further identify and discuss main common features of these initiatives through case studies. Paying attention to the overall aims, methodology, and outcomes of these case studies, the paper will focus on how artists’ initiatives empower users to develop their own competencies and skills through a creative engagement with technology.

### **Remodeling Communication : A look back**

“The question is to make something happen: Don’t moan, organize,” Matthew Fuller writes reflecting the active stance artists such as Harwood, Wright and Yokokoji were taking in the previous decade. [14] The three artists, working as Mongrel and as Mediashed, developed in the context of their overall work the *Social Telephony* series of workshops and projects (2001-2009). The basis of this series was the re-appropriation and re-use of users’ phones or specific existing phone networks that could reveal different processes of communication, and embrace the building of social relationships through unexpected patterns. [15] The artists’ reasons for using this particular infrastructure were clear; they wanted to work with the technology that was most familiar to people at that time, and to avoid complicated systems. At the same time, the phone and the reference to the handset and voice served for them as a way to invite people to re-imagine communication beyond standard norms. [16] Their projects involved, for instance, turning SMS to voice simulations for radio broadcast, or passing messages through automated telephone systems, inviting users to think of a message that would concern the many as it would be spread as a virus. Often, as they were working with different ethnographic groups, the different ‘innovative techniques’ used derived from specific cultural backgrounds. Social networks supported by repurposed infrastructures were fitting in the case of Harwood, Wright and Yokokoji, accomplishing distinct media ecologies. [17]

A similar invitation to re-imagine connectivity can be found some years later in the projects of Telekommunisten. Taking things a step closer to fiction as well as to paradigms of the past, Telekommunisten made the topologies of networked infrastructures a focal point for their work. In *R15N* (2012) for instance, an unknown topology of a telephone system which was connecting randomly, challenges users to communicate and organize themselves while in *Octo* (2013) a playful centralized structure of pneumatic tubes invited users to send and receive messages by using a central control station. [18,19] Which messages does it make sense to send when communication is possibly controlled? Using play and fiction as main elements of their work, the collective has been building networks around new and existing

infrastructures with the aims of exposing the network and questioning the centralized systems of daily online communication.

One of the early projects addressing critical or alternative perspectives to centralized infrastructures is the *Hive Networks* project initiated by Alexei Blinov, Vladimir Grafoc and Ciron Edwards of Raylab in the midst of the previous decade. Described by their creators as networks that could “watch, listen, sense and touch the world around them” *Hive Networks* was designed to “actively source, distribute and create content” promising to “turn the world on” and to empower users with autonomous networked systems. [20] The project emerged (not accidentally of course) in a period of ‘embedded capitalism’ and of growing discussions around the ‘internet of things’ and its invisible connections. [21] As a response to this, the project’s creators embraced what they called ‘creative exposure’ and invited users to set up their own devices or nodes, in order to get to know what remains hidden and incomprehensible in infrastructures. [22] *Hive Networks* was based on open hardware, open software and open spectrum (WIFI), and at the center of its philosophy lay the idea that low cost, off-the-shelf technology could be repurposed to offer users systems that they themselves could own and control. While the project was itself an artwork, at the same time it shared the same features with several community ad-hoc and urban mesh networks; it also opened the way for different initiatives to come.

Around the same time as the efforts of *Hive Networks*, the Bricolabs Shared Network was actively working in a similar direction. Joined by artists, programmers, hackers or ‘artisans’ -as the members still call themselves-, the network has been focusing on how new ways of sharing knowledge can become possible, and how users should reclaim their rights through the re-use of infrastructures. Jaromil for example stated in 2007 that “instead of spending resources on creating new objects we should, perhaps, first look to exploit and explore to the fullest what is already available. Then we need to create alternative infrastructures to run everything on every object.” And even more specifically, he clarified “We claim the right to run any software on the devices we own and to re-distribute them as we like. Devices should be built free to run anything.” [23] Bricolabs members believed (and still believe) that the re-appropriation and re-purpose of infrastructures can build social connections. A great example of this has been the *Bricophone*, which explores the potentialities of a low cost community-oriented phone network that requires no static infrastructure. [24]

In response to the sociopolitical insurrections of the last few years, the type of infrastructures described in these projects were proposed as tactical modes of communication. One well-known initiative is the OpenMesh Network in Egypt, created after a government-initiated internet blackout, and aimed at helping communities build their own mesh. [25] One should also not forget how the net activists Telecomix assisted citizens during similar blackouts in both Egypt and Syria by helping them to reconnect using old infrastructures such as modems and faxes. Within such a framework, tactical projects by artists also appeared. One such project was Nicholas Knouf’s *Fluid Nexus*, a application for Android phones that enabled the exchange of messages from one person to the other using short-range networking technologies; another such effort was *Occupy here* by Dan Phiffer, directly developed for the Occupy Wall Street protesters as a “distributed network of wifi locations” for offline exchange of information. [26,27] Rphilipp Ronnenberg on the other hand

responded to the ‘kill switch’ of governments with a three-sided project entitled *Post Cyberwar*, a series which builds a speculative yet possibly functional scenario. [28]

By re-imagining communication and building anew on existing social links, by exposing the network topologies and the way infrastructures work, and by repurposing and reusing existing technology, one could say that the initiatives taken by these artists belong to what Armin Medosch refers to as the ‘Network Commons.’ [29] As offline networks, toolkits and platforms, these playful structures and speculative scenarios of connectivity might all be considered part of a growing commons based on a “combination of social and urban topologies,” “constructed, possessed, managed and distributed by all.” [30,31] But then what is the role of art in this? The answer possibly lies in the new relationships these projects formulate between people and technologies, and in the ways that these relationships are brought to processes of social change. Either one takes Fuller’s approach, which adopts Goriunova’s ‘organizational aesthetics’ to study the work of Mongrel and Mediashed, or Jaromil’s approach, who sees artists’ tools as ‘social sculptures’ that can enrich experience in one’s local environment. [32,33] In any case, it becomes clear that artists are undertaking an active role of organization and change involving potentialities, skills and affects.

### **Commoning Infrastructures: the role of art**

“Activist artists and makers are frequently toolmakers, committed to sharing their know-how. Their most appropriate textual genre may not be the manifesto but the manual,” David Garcia states. [34] While this might not be fully accurate if we take into consideration the inspiring manifesta that are still being written, Garcia’s emphasis is very important; it is the sharing of knowledge that the initiatives described above seek. The projects validate Garcia’s point through their numerous pages of instructions on setting up one’s own device, installing different firmware, or using different network architectures of connectivity. But going a bit further, we might examine the ways in which these and other artists present their aims, methodology and outcomes in hands-on workshop settings, such as a series that took place in Athens in 2013.

*Datenspiel* was a project by Goethe Insitut-Athen, organized as a parallel event of the Hybrid City II conference, and curated by the author. [35] The four different workshops organized attempted to ‘game’ the city’s infrastructures in order to provide citizens with tools that would assist in the disruption of current data aggregation practices, and in their emancipation from centralized and controlled modes of communication. Looking into the fundamental notions and architectures of networks on one hand, and on the materiality of technological devices and infrastructures on the other, the *Datenspiel* workshops aimed to open the ‘black box’ of today’s networked communication, allowing counter-mechanisms to be put into action. Using free and open source software, low-cost materials and innovative creativity, participants, in collaboration with the artists, were invited to develop their own prototypes and test them indoors and outdoors. Each workshop had a team of 10-15 participants, most of them artists and architects, who applied after an open call for participation.

*Covert Computing*, a workshop designed and run by Julian Oliver, aimed to tackle issues of trust in a period of embedded computing, stealth infrastructures and weaponized objects. Oliver's interest lay mostly in how contemporary network insecurities start from the fact that we know little about the properties of the infrastructures around us. The aim of the workshop was playful yet radical; a covert network of objects was to be built by citizens themselves and be fully functional. For this reason each participant was invited to buy an inexpensive off-the-shelf microcomputer that would become his or her own node, and to bring a found "ubiquitous" object that would be used to 'embed' the node.

Following in part a logic initiated by *Hive Networks*, workshop participants repurposed the low-budget microcomputers with new firmware, installed in order to build an autonomous network. To achieve this, participants first learned how networks work, how data are transmitted, and about the main concerns of centralization and cloud computing. They then learned how microcomputers and routers could be adjusted through basic commands, and personalized them in order to permit communication and sharing of files. Their work resulted in a network of objects that varied from smoke detectors to tobacco cases, fake flowers or books, built to be used independently, but also to connect to each other. Turning harmless-looking objects into powerful devices that could capture data and route traffic, participants got to know how to create and use their own autonomous networks for different needs in the future.

Danja Vasiliev's *Netless* workshop was a collective experiment more than a workshop, aimed at creating a grassroots communication network that took advantage of the movement of its participants as city inhabitants. The project is based on the idea that an offline network can be formed by communication nodes which are either attached to transportation vehicles, or carried by inhabitants while moving within the urban environment. When the nodes meet, they establish a short-range wireless anonymous communication session, without being logged.

*Netless* proposes a tactical network that follows a similar logic to Knouf's *Fluid Nexus*. While Vasiliev had presented models of the project before, this was the network's first trial in the urban environment. [36] For this reason, the workshop followed an interesting methodology in which users became themselves the nodes of the networks, carrying the devices that would transmit and receive information.

As in the *Covert Computing* workshop, the *Netless* group of participants first learned how to build their own netless nodes by opening a model of an inexpensive router, modifying it and adding the necessary components. They then studied, along with the artist, the open and expanding topology of a 'star' network in relation to the fixed topography of the particular urban area where the experiment would be developed. Finally, they went out into the streets to try out the network, searching for other nodes in a game-like experience.

While *Netless* plays with a fictive scenario of a network, the project itself, as discussed earlier in the case of imaginary or speculative projects, raises questions that concern today's networked reality. Inviting users to send messages that need to concern the many, and asking them to seek other nodes in order to circulate information, the workshop embraced a collaborative and participatory character that

proved to be enjoyable and thought provoking. *Netless* as a counter-proposal addressed interestingly the social and the informational, the machinic and the human, as in the works of Mediashed / Mongrel, Telekommunisten or Knouf. If “mesh networks are the technical analogue side to human trust networks,” as Kraneburg has put it, then the creator of *Netless* (as he says himself) aimed to create “a hybrid (parasitic) system, which requires the ‘human’ as resource in order to function.” [37,38]

*City CPU mapping* with Gordan Savicic was a different type of workshop. In this case, the artist invited participants to join a collaborative cartographic effort to map the infrastructures found in a central Athens neighborhood. The workshop followed a series of Savicic’s projects that captured city plans as if they were a computer mainboard diagram, or an information system.

To achieve this, participants in *City CPU mapping* first learned how to use online-mapping tools in order to create new narrations between the city itself and its data body. They then discussed examples of early cartographic visualizations and contemporary mapping tools to address the following central question: What data can possibly be fetched and read out directly from the streets, and how does it differ from pure statistical data? The group decided collectively about what features to map.

Using the Open Street Map platform, their personal smart phones, and basic analog annotation tools such as pens and printed maps, participants went into the streets of the city and developed a grassroots cartography. WiFi networks, GSMs networks, and cell tower locations were the main elements located and mapped. Participants also enriched their cartography through the selective use of sensors to map sound, air pollution or movement.

Through decisions about information categories, measurements, and data captured, as well as about the rendering of such features through layers, colors, and location markers, the participants gave birth to a playful and creative cartography that reflected the way citizens saw their city and its infrastructures.

The *Electromagnetic Cityscapes* workshop, run by Sabrina Basten and Audrey Samson, addressed the intangible nature of networked connectivity, and explored the impact that the electromagnetic spectrum can have on citizens’ movements. With the increasing prevalence of WiFi, RFID, Bluetooth and other novel radio technologies, new relationships and dynamics form within the urban environment that the citizens cannot directly feel.

The aim of the *Electromagnetic Cityscapes* workshop was dual; on one hand to render a city’s electrosmog discernible, and on the other hand to demystify the role of fast evolving technology. More particularly, the aim was to create audible electromagnetic walks based on detectors formed from old electronic devices. At the artists’ invitation participants brought to the workshop old electronic devices to use in the building of antennas that would allow the body to physically feel the flows and waves of the networked world.

Breaking things open, studying circuits and coils, and learning how to recycle materials was an essential part of the workshop. The methodology used was described

by the artists as “playful and non-hierarchical” as it invited participants to use their skills and interests in a free, open and collaborative way.

The workshop highlighted that new perceptions, new movements, and new interactions are possible through ‘re-incarnated objects,’ which in an unexpected and creative way can raise awareness about the networked environment, and our attitude towards the obsolescence of technology.

The four workshops organized for the *Datenspiel* event share distinctive features that might help draw some conclusions about the methods artists use to empower infrastructural literacy.

Firstly, all artists opposed the centralization and ‘stackivism’ of today’s networked systems and technologies with hands-on experience. Participants engaged with the materiality of devices, systems and their components. Breaking things open and re-purposing or modifying them equipped participants with the knowledge and confidence of what they really had at hand.

Secondly, the tools, systems and devices that they modified and built became their own, following an inclusive rather than exclusive sense of ownership which also embraces sharing. As Vasiliev and Oliver characteristically claim, “The right to deconstruct, modify and ruin are rights that come with ownership,” and if companies do not allow users these rights, then these need to be reclaimed from the start. [39]

Thirdly, all workshops turned back to the human element, to the important contribution of the citizen or user. Deep understanding of how networks, systems, and infrastructures work allowed users to build and code prototypes in opposition to the automation of machinic algorithmic control.

Fourthly, the workshops used only open source or free software in order to support a new ethic of sharing, contributing, thinking and working together.

Fifthly, the workshops embraced playfulness, or more accurately, a feeling of playful cleverness (as Stallman has put it) for activities that have a hack value. [40] Objects in disguise and game-like tactics were part of the artists’ methodologies. Using anonymity and invisibility, as do the algorithmic actors ruling networked centralized systems, the workshops’ tools, platforms and devices tried to give back to the users the some of the power they had lost.

Finally and most interestingly, the following point becomes clear. The empowerment and the emancipation of users derives from the development of skills they may already possess. “We are not experts, we are just playing around and we impart our enthusiasm for discovery. Participants in the workshop work together, helping each other, figuring it out together.” [41] Basten and Samson explain and this brings us possibly to Ranciere’s theories of emancipation. What artists do is to “instigate capacities already possessed,” “inviting people to use their own intelligence.” [42]

## Conclusions

Revealing how networked systems work, exposing infrastructures and demystifying them in playful ways, the projects and the workshops discussed are steps towards the substantive empowerment and emancipation of users. In a period when infrastructures become ‘invisible’ and what we know about them grows ever smaller, these efforts call for different systems of communication and information, shared and supported, owned and controlled by the many rather than the few.

“Don't hate the machine, be the machine. How can we turn the sharing of knowledge, tools and spaces into new radical revolutionary productive machines...?” Pasquinelli wrote back in 2004. [43] Since then a great number of artists’ initiatives have emerged, provoking discussions, and raising awareness. Offline sharing networks, tactical modes of connectivity, playful topologies have proposed counter-practices and modes of understanding that set the user in the center, regaining control not only of her data but also of information flows, connectivity and infrastructures. It has become clear now that as de Lange writes “we must shift attention from technologies that seamlessly blend in with everyday life, towards technologies that move people and enable them to move others.” [44] And this is where the role of the artists comes in to play, constantly communicating knowledge and empowering users’ skills.

And lest one hear all this as techno-utopianism, new and more concrete solutions projects evolve and appear all the time. In 2014 two toolkits developed by artists officially launched: David Darts’ *Pirate Box 1.0*, a mobile offline sharing and communication system, and *Superglue* by the Superglue team, a visual web authoring tool and personal server. [45,46] Autonomous infrastructures therefore slowly seem to be claiming space in users’ everyday lives, and soon will show how they can also effect change. Hopefully they are forming what Tiziana Terranova calls the ‘red stack,’ an infrastructure of autonomisation that links together technology and subjectivation. [47]

Acknowledgments.

This research has been co-financed by the European Union (European Social Fund – ESF) and Greek national funds through the Operational Program "Education and Lifelong Learning" of the National Strategic Reference Framework (NSRF) - Research Funding Program: Heracleitus II. Investing in knowledge society through the European Social Fund.

## References

1. Julian Oliver, “Stealth Infrastructure” in Rhizome, <http://rhizome.org/editorial/2014/may/20/stealth-infrastructure/> (assessed 10 June 2014)
2. Danja Vasiliev, “Critical Exploits”, video documentation of a lecture with Julian Oliver in the Lighthouse Arts, <http://www.youtube.com/watch?v=v8IINpefM6s> (accessed 10 June 2014)
3. Olia Lialina. “Turing complete user” in



- <http://contemporary-home-computing.org/turing-complete-user/> (accessed 10 June 2014),
4. Benjamin Bratton, "The Black Stack" in *e-flux* 53, 3 (2014)  
<http://www.e-flux.com/journal/the-black-stack/>
  5. Benjamin Bratton, "On the nomos of the cloud: The stack, Deed Address, Integral Geography" in <http://bratton.info/projects/talks/on-the-nomos-of-the-cloud-the-stack-deep-address-integral-geography/>
  6. Nigel Thrift, *Knowing Capitalism*. (London: SAGE, 2005), 15
  7. David Beer, "Power through the algorithm? Participatory web cultures and the technological unconscious" in *New Media Society* 2009: 11 (6), 988
  8. The notion of 'blackboxing' is assigned to Bruno Latour.  
Bruno Latour, "Pandora's hope: essays on the reality of science studies". (Cambridge, Massachusetts: Harvard University Press, 1999)
  9. Saskia Sassen, "Talking back to your intelligent city" in <http://voices.mckinseysociety.com/talking-back-to-your-intelligent-city/> (Accessed
  10. Alberto Corsín Jiménez, "The right to infrastructure: a prototype for open source urbanism", *Environment and Planning D: Society and Space* (2014), volume 32, 342 – 362
  11. de Lange, M., de Waal, M., *Virtueel Platform Research: Ownership in the Hybrid City*, Virtueel Platform (2012)
  - 12 Lisa Parks, "Flow Favorites: Around the Antenna Tree: The Politics of Infrastructural Visibility:", in <http://flowtv.org/2010/03/flow-favorites-around-the-antenna-tree-the-politics-of-infrastructural-visibilitylisa-parks-uc-santa-barbara/>
  13. Adam Greenfield, "The kind of program a city is" in *Speedbird*  
<http://speedbird.wordpress.com/2009/10/08/the-kind-of-program-a-city-is-2/>
  14. Matthew Fuller, "Foreword: The telephone and its Keys" in *The Social Telephony Files*, (Southend on Sea: YoHa Limited, 2010), 4 – 9
  15. Harwood, Wright, Yokokoji, *The Social Telephony Files*, (Southend on Sea: YoHa Limited, 2010), 14
  16. *ibid*
  17. *ibid*, 46
  18. <http://telekommunisten.net/r15n/>
  19. <http://telekommunisten.net/octo/>
  20. <http://hivenetworks.net/>
  21. Armin Medosch, "Meshing in the Future- The free configuration of everything and everyone with Hive Networks" in *Media Mutandis Node.London Reader*, ed Maria Vishmidt et al. accessed online <http://www.nettime.org/Lists-Archives/nettime-l-0602/msg00076.html> (10 October 2014)
  22. Small mobile open source networks in the *Networked Performance* blog  
<http://www.turbulence.org/blog/archives/003612.html>
  23. Rob Van Kranenburg, "Bricolabs" in *the Internet of things*, (Amsterdam: Institute of Network Cultures, 2008), 28 - 41
  24. *ibid*
  25. <http://www.openmeshproject.org/>
  26. <http://telecomix.org/>
  27. <http://occupyhere.org/>
  28. <http://www.phiron.de/projects/openpositioningsystem/>
  29. Armin Medosch, "The Rise of the Network Commons" in the *Next Layer*  
<http://www.thenextlayer.org/node/1231>

30. ibid
31. Michael Hardt & Antonio Negri, *Declaration*, (New York: Melanie Jackson Agency, 2012)
32. Fuller ibid
33. Jaromil, personal communication via Skype 12 October 2014
34. David Garcia, "The Politics of Making, Effective Artistic Tools" in *The Rise of the Informal Media*, Open No 23, (Amsterdam: Skor 2007), 80-91
35. <http://uranus.media.uoa.gr/hc2/>
36. <http://k0a1a.net/netless/36>
37. Christian Nold and Rob Van Kranenburg, "The internet of people. Post Oil World" in *Situated Technologies Pamphlets 8*, (New York: The Architectural League of New York)
38. Marc Garret, "An interview with Danja Vasiliev" in *Furtherfield* <http://www.furtherfield.org/interviews/interview-danja-vasiliev> (Accessed 10 October 2014)
39. Danja Vasiliev, ibid
40. Richard Stallman, "On Hacking" in <https://stallman.org/articles/on-hacking.html>
41. Sabrina Basten, Audrey Samson, A., "Hackin' some coils into wearables" <http://www.body-pixel.com/2011/08/09/interview-with-sabrina-basten-audrey-samson-part-1-hackin-some-coils-into-wearables/>
42. Jacques Ranciere, *Education, Truth, Emancipation* (London: Continuum International Publishing work)
43. Matteo Pasquinelli, "Radical machines against the techno-empire. From utopia to network" in *Ambiguities of Activism: Alter-globalism and the Imperatives of Speed* By Ingrid M. Hoofd
44. Michael de Lange, "The Smart City you Love to Hate: Exploring the role of affect in Hybrid Urbanism" in Chartitos, D., Theona, I., Dragona, D., Rizopoulos, H., *Subtle Revolutions Proceedings of the 2<sup>nd</sup> International Hybrid City Conference*, pp77-84 URIAC, Athens (2013)
45. [piratebox.cc/45](http://piratebox.cc/45)
46. [superglue.it](http://superglue.it)
47. Tiziana Terranova "Red stack attack! Algorithms, capital and the automation of the common" in *Quaderni di San Precario* <http://quaderni.sanprecario.info/2014/02/red-stack-attack-algorithms-capital-and-the-automation-of-the-common-di-tiziana-terranova/> (accessed 10 October 2014)