

Tagging the Whole World: Chipless RFID as an Invisible, Ubiquitous Infrastructure of Identification

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The radical, ubiquitous digitalization of the physical world becomes possible with a new generation of printable, chipless RFID (radio frequency identification) tags. Billions of objects – from trees, parcels, chairs to every single page of a paper file – but also subjects (e.g. their teeth) can be easily tagged, classified, and rights of access defined. Physical processes are turned into trackable data. RFIDs thereby form an infrastructure of identification (Frith 2021). Bowker & Star (2000) showed early on how infrastructures of classification “sort things out”. The translation of people and objects into readable identities ~~does~~ not only changes their perception and self-understanding, but also transforms institutional, societal, and political orders (cf. Pelizza, 2021; Carrera & Hernanz, 2015) as well as knowledge, control and surveillance practices.

In our presentation, we want to discuss the theoretical background of our research project as well as the first empirical findings on chipless RFIDs as an infrastructure of identification and give a first glimpse into potential future settings therein.

„Being Tagged“

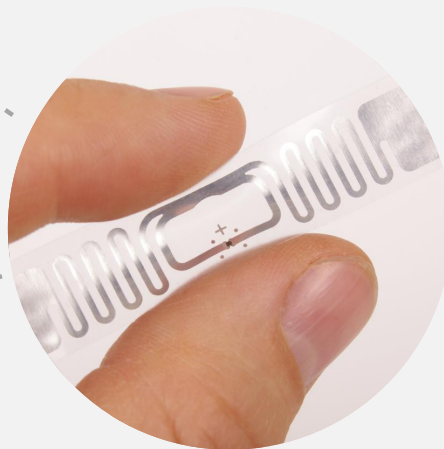
chipless RFIDs as part of an Infrastructure of Identification

Jasmin Troeger, Daniel Erni, Jutta Weber

Chipless RFIDs

Chipless: The ID of the RFID tag is no longer chip-coded.

the new chipless RFID systems, work with extremely low-cost, printable chipless tag structures that can be applied practically anywhere.



chipless RFID tags can be easily printed on different materials such as paper, polymer films, skin, glass, textiles and other objects in the world of products.

They can be read at the same time without visual contact (possibly through packaging) over longer distances of up to 10 meters, even in an ensemble.

Characteristics such as indirect and parallel readability, the ability to be applied to any object or surface, even hidden ones, and mechanical flexibility make RFID tags important agents in the inventory of the world



... ubiquitous, mobile and rather invisible

- RFID tags and readers can be largely invisible,
- allowing information to be exchanged over distance without the individual being aware of it;
- Passive RFID tags are always on and usually cannot be turned off;
- Passive chipless RFID technology is expected to become increasingly ubiquitous.
- object-data interactions move as people move, passively producing identifiable traces of mobility

Unlike their mobile phones, people may not be aware that they have come into contact with RFIDs.

Unlike an Internet browser, people cannot close a browser window and stop data transmission.

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Infrastructures of Identification¹

¹Frith, Jordan. *A billion little pieces: RFID and infrastructures of identification*. Infrastructures. Cambridge, Massachusetts: The MIT Press, 2019.

Infrastructure and its Relevance

Sorting Things out – Star & Bowker



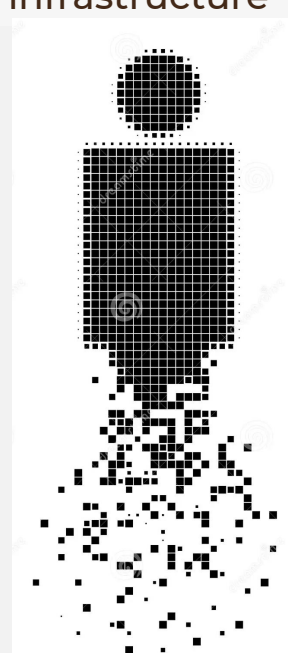
Bowker and Star studied how classification infrastructures function as sorting procedures. These infrastructures categorize phenomena into discrete categories, such as racial labeling in apartheid South Africa or the International Classification of Diseases. Linked to chipless RFID tags:

- How ubiquitous, versatile mobile technology automates processes of classification and identification processes, because
- Tiny tags make materiality sortable in new ways; similarity becomes uniqueness that feeds into a larger computing infrastructure
- These differentiated "things" can be animals, cars, retail items, people (almost anything).
- While differentiation on an individual level may not seem groundbreaking, when applied to billions of objects it becomes an integral part of computing in physical spaces.

Shadow bodies produced by infrastructure

Ellen Balka and Susan Leigh Star (2015) coined the term "shadow bodies" to describe the traces of a body created by the illumination of some of its processes in information systems.

- Shadow bodies refer to “the reflections, illuminations and impressions captured in data that provide glimpses into the daily lives of individuals” (p.3).
- While individual data points may appear unremarkable, but when a infrastructure of different identification practices are combined with location-specific readers, these data points accumulate over time.
- The fragmented shadow body gradually becomes more complete with each RFID read in different collection systems.





Biometric identification and chipless RFIDs

- Biometrics, such as facial recognition and fingerprints, are key data points that contribute to social sorting and surveillance.
- RFID in passports is linked to biometrics, which is an infrastructure of identification used to sort bodies.
 - Chipless RFIDs are now not only linked to biometrics (as in passports and ID cards), but can now be linked to any object in the world.
 - Chipless RFIDs serve as an infrastructure that facilitates sorting and differentiation within vast databases of human physical characteristics.

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A look into the future

A look into the future

Imagine on the one hand a situation at a national border where the ID is checked by different biometric procedures as part of an identification infrastructure based on person-data interaction, and on the other hand a chipless RFID identification infrastructure based on object-data interaction. Are they different, and if so, how? Do they correlate, or is there a co-constitution?

Research Team:

Prof. Dr. Jutta Weber - University of Paderborn / Prof. Dr. sc. techn. Daniel Erni - University of Duisburg-Essen
Jasmin Troeger, M.A. - University of Paderborn

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Italia Conference

2023

Interesting Worlds to Come

*Science & Technology Studies facing
more-than-human challenges*

University of Bologna, Italy
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Conference theme

Interesting Worlds to come. Science & Technology Studies facing more-than-human challenges

"May you live in interesting times," the (allegedly) traditional Chinese curse goes. It is apparently derived from the actual motto "Better to be a dog in times of tranquility than a human in times of chaos." Taken together, these sayings recall that the ambiguity implicit in something defined as "interesting" depends on the perspective of who/what is involved. The 9th STS Italia Conference invites scholars from Science & Technology Studies and cognate areas to unpack the ambiguous concept of "interest" as a necessary step to tackle the challenges faced by our planet and to design worlds to come from an inter-national, inter-species and inter-generational justice perspective.

As the last couple of years has taught us once more, current challenges interest heterogeneous networks of human and non-human beings in a long-term perspective. While marking the advent of a new viral form of life, the COVID-19 pandemic has affected a number of other species, including but not limited to humans. War in Ukraine has reminded us not only of the multiple ongoing wars in and outside the Global North, but also of the destructions they bring about for the future generations of living beings and their environments, and of the extractive deluge needed to conduct them. Draughts and floods in many areas of the world have revealed not only the interdependence of remote locales, but also the differentiated, situated outcomes of climate changes for diverse species, milieus and generations.

At the same time, STS pursue an understanding of "interest" that transcends mere affection and assumes agency, involvement and intervention. Given the more-than-human nature of those challenges, more-than-human alliances need to be interested to address them. Humans alone are failing to meet the IPCC goals, to curb ongoing wars and to prevent future pandemics. We have been told that we must either adapt or perish, but the truth is that we need help. We need help to set benchmarks, to measure, to model and even to forecast.

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- **STS Italia – The Italian Society of Science and Technology Studies**

STS Italia was founded in 2005 to build up an Italian network of researchers oriented to study Science and Technology starting from the social dynamics which characterize and interweave science and technology themselves.

Nowadays the field of Science and Technology Studies (STS) represents a well established and prominent research field at the international level. As a field, it allows scholars and professionals from different disciplines to dialogue with each other. Furthermore, it mobilizes interests of both academic institutions and other social actors (e.g. not academic institutions, companies and so on).

The aim of STS Italia is to promote initiatives and events able to increase the visibility and diffusion of the STS approach, as well as to create chances for exchanging and sharing research experiences, projects and studies connected to social dimensions of technoscientific phenomena.

In collaboration with

- **University of Bologna, Department of Philosophy and Communication Studies**
- **University of Bologna, Department of Political and Social Sciences**
- **Processing Citizenship**

Processing Citizenship is a European Research Council (ERC) funded research project (grant agreement No 714463, <https://processingcitizenship.eu/>) that studies the registration and identification of third-country nationals in Europe as co-production of Alterity and European order. The *Processing Citizenship* team (PI Annalisa Pelizza, Chiara Loschi, Lorenzo Olivieri, Wouter Van Rossem, Paul Trauttmansdorff) organizes panel 10 "Games, experiments and redesign – Testing STS multimodal approaches" and panel 42 "Revisiting identification and registration of humans and more-than-humans: long-term perspectives and implications". The project also organizes the round table in memoriam of Bruno Latour on June 28th. Latour's work has indeed been a source of deep and lasting inspiration for *Processing Citizenship*.

- **INFRATIME**

INFRATIME is a Marie Skłodowska Curie Global Fellowship funded project (grant agreement No 892522 - www.infratime.eu) studying how the temporalities of urban transformations and networked urban infrastructures interfere with the new climatic regime. INFRATIME PI Claudio Coletta co-organizes panel 21 – "A caring interest for the planet: making archives and readers *sensitive* in times of the new climatic regime". The project also organizes the roundtable "Taking Time, Shaping Time. Pacing Urban Climate Transitions" which discusses the temporalities of urban climate transitions from the perspective of scholars, practitioners and decision makers engaged with actual cases of transition in European and global cities.

Media partner

- **Tecnoscienza**

Tecnoscienza (<http://www.tecnoscienza.net/index.php/tsj>) is a scientific journal focussing on the relationships between science, technology and society

Panel 42: Revisiting identification and registration of humans and more-than-humans: long-term perspectives and implications

Time: Thursday, 29/June/2023: 4:30pm - 7:00pm · *Location:* Aula Unione 3

Session Chair: Chiara Loschi

Session Chair: Annalisa Pelizza

Session Chair: Paul Trauttmansdorff

Discussant: Sally Wyatt

Topics: Health policies, governance and practices in a postpandemic era; Technoscientific promises, imaginaries and expectations; Methodological challenges in a more-than-human world; Postcolonial technoscientific futures; Governance of and by data infrastructures; Sociotechnologies of (in)secure worlds to come

Keywords: registration, identification, infrastructure, *longue durée*, chain of translation

This panel aims to reflect on the long-term perspectives and implications of today's societies and their interest in identifying and registering human and more-than-human life. Practices of identification and registration shape the realms of human, artefact and animal mobility, policing, health and medicine, education, or the climate transition, to name a few. They are often rightly criticized as attempts at control and surveillance, but this criticism usually adopts a temporally punctual perspective and is less inclined to examine their long-term implications. Our panel suggests exploring, and discussing, the *longue-durée* of identification and registration.

Groeber's (2007) history of identification traces the imperative to "register everyone and everything" back to the sixteenth century in Europe. Authors like Carroll (2006) and Mukerj (2011) have highlighted a link between identification and registration and nation state formation. Mitchell (2002) has extended this argument to imperial and colonial ambitions. Establishing data systems and relying on more or less stabilized infrastructures, identification and registration enact new and old subjectivities, orders, knowledges, practices, and classifications as "spatial, temporal, or spatio-temporal segmentation[s] of the world" (Bowker and Star 2000, 10). Forms of monitoring and screening, information-sharing and categorization can become catalysts for new institutional orders and relationships (Andersson 2015). Kloppenburg and Van der Ploeg (2020) demonstrate how recent biometric techniques of identification are "producing and enacting [new] gender and ethnic classifications and identities" (p. 57). Pelizza (2021) has proposed to see registration and identification as a chain of translation which enacts specific subjects, enrolls stakeholders, and alters institutional orders. And yet today, identification and registration do not only concern humans, but also animals, artefacts, plants, commodities, and other heterogeneous assemblages (see Tsing 2015). What are, for example, the long-term consequences of the identification – the *reductio ad unum* – of novel inter-species viruses? And what novel orders may emerge in the long run?

The panel invites conceptual and empirical contributions that help shedding light onto long-term methodological perspectives and implications of processes and practices of (human and more-than-human) registers, databases, infrastructures, or other sociotechnical knowledge practices such as monitoring, screening, categorization, and selection (considering also critical events such as global epidemics recurrent in the history). We would like to engage with (the interaction between) past, present, and future genealogies, epistemologies and power relations, as well as conflicts, compromises, and ambiguities revolving around identification and registration.

This panel welcomes a broad range of papers that leverage genealogical and/or STS concepts and methods to explore, amongst others, the following themes:

- Genealogies of data systems and/or population registers
- Identification and registration in the realms of medicine, mobility, security, climate transition, citizenship, and others
- The coloniality of identification and registration systems
- Their consequences for power relations and geographies of responsibility
- Human and more-than-human population censuses, taxonomies, systematizations, and other technologies of knowledge-based governance
- Statistics and the production/circulation of numbers
- Futures and future-making practices and their governance implications
- The role of sciences and scientists in societies of identification and registration

"Ambiguation" between regulation and data practices

Chiara Loschi¹, Annalisa Pelizza^{1,2}

¹University of Bologna, Italy; ²PI ERC Processing Citizenship

The European legal framework in migration and asylum domains determines what and whose knowledge about third country nationals is legitimate. Such epistemic harmonization and standardization effort is pursued, among others, by means of a rhetorical tactic that we call ambiguation. Ambiguation refers to the use in EU policy of generic labelling for institutional agencies and processes tackled with data production, exchange, use and evaluation, in order to keep the implementation of EU policy at national level pliable. Besides achieving standardization, ambiguation seems to support contingent administrative reorganization of tasks within member states. While ambiguity has been scrutinized as an inherent phenomena to EU regulations to ensure directives wide applicability (Anesa 2014), or investigated as a policy tool, in the form of a strategic 'institutional ambiguity' to manage and deter peoples' movements (Stel 2021), the present paper wishes to switch the focus to investigate how within a policy context characterized by ambiguation, data infrastructures can de facto shift EU/member states governance through definitions of what counts as relevant knowledge. They first shape composite actors, and, secondly, entail the production of non-knowledge and thus exclusion of some actors. In so doing, the paper suggests a sociomaterial framework to account for which and how many 'Europes' are enacted and legitimized through data infrastructures. It also aims to contribute to the investigation of knowledge-related material dimension of migration management and 'alterity processing' (Pelizza 2020).

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Beyond biometrics: a speculative archival approach

Soline Ballet, Anja Jelovšek

University of Ghent

Biometrics within border control and migration governance contribute to a presumably all-encompassing infrastructure of registration and identification producing knowledge of people on the move. With biometric recognition technology, the face and fingertips become sites of bodily registration, which creates a shift from border to body control. Adopting faciality as a conceptual lens shows how this technology produces individualization on the one hand, and datafication on the other. Biometric data stored into databases is then instrumentalized for surveillance of people on the move. Critical scholarship aiming to tackle the logic and consequences of biometrics in border control usually emphasizes the omnipotence of this technology. However, a more temporal perspective on biometrics and the datafication of borders could point at their coloniality as a continuation of systems of registration and ordering. In parallel, recently, alternative bottom-up practices and imaginaries of and beyond biometric border systems have been conceptualized, highlighting the means of subversion of people on the move, yet missing a critical temporal lens. In this paper, we move away from how biometric databases systematize and objectify knowledge which then shapes subjects, their possibilities and futures. Instead, we see this as an epistemological opening to speculate on alternative imaginaries of borders and mobility. In the form of a speculative archival project, we unravel how attempts to prefiguratively organize alternative border knowledge through radical imagination are always entrenched with tensions.

Datafication As Registration Of Plant Disease Knowledge

Lucilla Barchetta

Cà Foscari University of Venice/NICHE, Italy

The research explores datafication as a practice of registration of plant disease knowledge. The datafication of plant disease has two interrelated components: the creation of a trace that is recorded and circulated in the form of data and the re-use of such a trace in other knowledge-making processes. The study shows how the datafication of plant disease knowledge involves considering how mediated biosocialities, digital infrastructures of interdisciplinary collaborations and plant disease data conflate into one another, thereby influencing what accounts for registration and who accounts for registration.

The research draws from the author's experience as an ethnographer in a digital infrastructure of interdisciplinary collaboration set up online from the early phase of the SarsCov2 outbreak and continued to the present. In particular, it turns ethnographic attention to the collaborative efforts that brought together phytopathology scientists and data scientists to create a digital repository for plant disease detection.

The design and implementation of digital repositories require a complex process of data homogenization that often entails reconfigurations, adjustments in, and disputes over database structures, taxonomic codes, and semantic choices. Hence, homogenization is necessary to build digital platforms responsive to the needs and values of phytopathologists and data scientists. On the one hand, it enables a form of disciplinary historicity and reflexivity. Data homogenization requires

phytopathologists to review registration histories and make them understandable to data scientists. On the other hand, data homogenization rearticulates histories of registration by making databases of plant diseases machine-readable to computing and AI technologies.

This study examines what registration means in relation to the plant disease datafied environments, the digital infrastructure used to process data, and the institutions and scientific researchers involved in plant data work.

Frontex in Wonderland: Banal Securitization and Normalization in the Field of EUropean External(ized) Border Management

Eline Waerp

Malmö University, Sweden

The dissertation delimits the ‘field of EUropean external(ized) border management’, which it takes as its unit of analysis. Asking how this field is enacted and through what logics, it provides a genealogy of the field from the creation of the European Border and Coast Guard agency (Frontex) in the early 2000s until today, including the discourses and practices comprising it and the actors promulgating them. The analysis demonstrates the coalescing of the seemingly conflicting discourses and practices of security, crisis and humanitarianism over time, and how Frontex draws on them in producing an ostensibly apolitical and technocratic ‘border knowledge’ which obscures alternative, de-securitized perspectives.

The theoretical framework, comprised of the Copenhagen and Paris school of security studies, allows for an exploration of how the process of securitization unfolds through discourses and practices in both spectacular and mundane ways. Critical discourse analysis of Frontex’s annual risk analysis reports from 2010-2021 has been conducted, as well as interviews with Frontex and DG Home officials, border guards, and civil society representatives. The dissertation draws attention to the banal securitization and the normalization of securitization that has taken place in this field over the last two decades, along with how practitioners in this field negotiate their role in the (re)production of this securitized episteme.

Mapping microbial ecosystems: censing the unknown through molecules

Victor Secco

Ca’ Foscari University of Venice, Italy

Biology as a science has had for a long time a particular interest in taxonomy of life. The visible differences in shapes, sizes and comparative morphology of living organisms defines much of the system of classification in biosciences up to this day. With the development and increase use of genetic sequencing another possibility for systemising and accessing the diversity of life through molecules has become possible. Based on these new technologies scientists working with microorganisms have become interested in mapping the vastly unknown world of microbe diversity.

This paper is based on ongoing ethnographic research among bioscientists who are working in between laboratories and environments in an effort to map and identify microbial diversity in Europe. I follow these scientists in between laboratory and field practices to reflect on the steps and processes that map categories of microbes through metagenomic technologies. I explore how molecules and ecosystems are being related in practice in order to identify microbes and what are the expected consequences of such effort. I wonder what it means to map the microbiomes of environments and what are the possible long-term implications of such efforts mainly in relation to understandings of human and environmental health. Finally, I explore also the material and institutional infrastructures that allow for such exploratory projects of cataloguing and mapping to take place in the current context of science in Europe.

Performing how to live and dwell in the space: the Italian population registers in a long-term perspective

Enrico Gargiulo

Università di Bologna, Italy

Population registers play a major role in Italy: introduced between 1862 and 1864, immediately after the Italian unification in 1861, they are meant to be statistical and administrative devices aimed at providing an accurate and dynamic picture of the population, and thereby allowing authorities to acquire information on its composition and the ways people are located and move within the territory. In the intentions of their designers, population registers were comparable to a “daily and perpetual census”, through which to obtain an accurate “picture” of the population located in every municipality of the Italian state. Even though these devices are theoretically expected to merely register social reality without affecting it, they do have performative effects, which differ from those of other demographic devices such as censuses and are more explicitly political. First, population registers do not merely enumerate but turn the material relations between people and space into a formal act called registration, and produce a legal status called residency, which is the precondition for exercising many

rights. Second, despite their apparent inclusivity, population registers are structurally restricted to certain components of the population. Only some ways of dwelling and living in the space are considered legitimate, and only these are accepted legally and permit registration. Third, a conflict around the meanings and the purposes of population registers has marked the entire history of these devices. It has opposed those authorities that want to monitor and those that desire to establish administrative borders by selecting the “deserving” part of the population. In retracing the genealogy of the Italian population registers and by showing how their performative power is due to their specific legal form, this contribution seeks to shed light onto long-term methodological perspectives and implications of processes of registration, infrastructures, and sociotechnical knowledge practices of monitoring, categorization and selection.

Tagging the Whole World: Chipless RFID as an Invisible, Ubiquitous Infrastructure of Identification

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The radical, ubiquitous digitalization of the physical world becomes possible with a new generation of printable, chipless RFID (radio frequency identification) tags. Billions of objects – from trees, parcels, chairs to every single page of a paper file – but also subjects (e.g. their teeth) can be easily tagged, classified, and rights of access defined. Physical processes are turned into trackable data. RFIDs thereby form an infrastructure of identification (Frith 2021). Bowker & Star (2000) showed early on how infrastructures of classification “sort things out”. The translation of people and objects into readable identities does not only changes their perception and self-understanding, but also transforms institutional, societal, and political orders (cf. Pelizza, 2021; Carrera & Hernanz, 2015) as well as knowledge, control and surveillance practices.

In our presentation, we want to discuss the theoretical background of our research project as well as the first empirical findings on chipless RFIDs as an infrastructure of identification and give a first glimpse into potential future settings therein.

The division of biometric work. Production chain and value making in election technologies from Kenya and Senegal.

Cecilia Passanti

Université Paris Cité, France

Biometric identification systems for voter registration are a generic and travelling products. They are based on a complex chain of material and value production. Through the study of the biometrics production chain, interviews and ethnographic observations, the article traces the contours of the division of labor between the production of the technology and the production of the identification by the public administration. The article emphasizes the role of the field (understood as the public administration, civil servants, and data) in the production of technology and proposes a more circular reading of value production. The article contributes to the understanding of public administration as a terrain of material, value, and technology production.