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Towards a Telematic Dimension Space

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Telematic performances connect two or more locations so that participants are able to interact in (more or less) real time. Such practices blend a variety of dimensions, insofar as the representation of remote performers on a local stage intrinsically occurs on auditory, as well as visual and scenic, levels. Telematic performances are here understood as (a bundle of) NIMEs.

1. Telematic Performances as NIMEs

The technical constellation in telematic performances can be understood as a 'NIME', as a

- **N**ew **I**nterface for **M**usical **E**xpression, or as a
- **N**ovel **I**nterface for **M**ultimedial **E**xploration

But how should we understand the invariable "X (Interface)"? In the experience of our research unit, as well as in reviewing the existing literature and projects, it has been useful to differentiate four possible approaches:

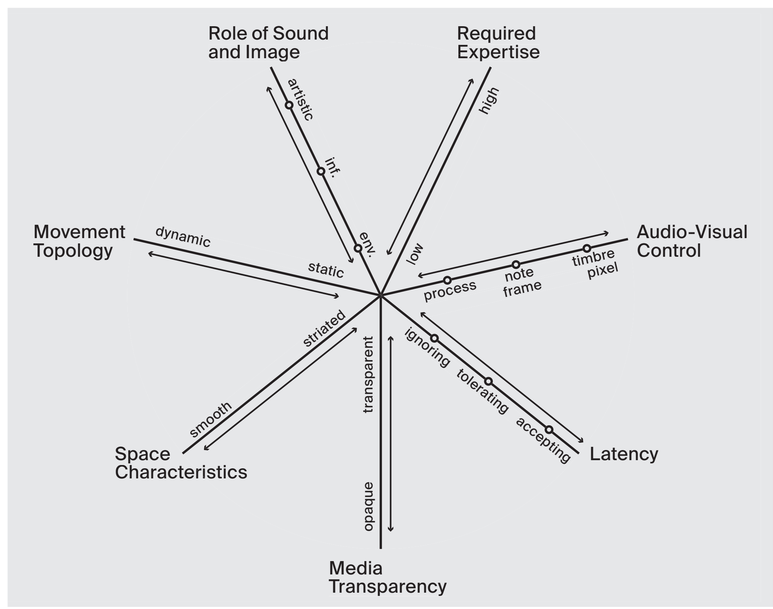
- Novel **X (Instrument)** for Multimedial Exploration
- Novel **X (Media)** for Multimedial Exploration
- Novel **X (Network)** for Multimedial Exploration
- Novel **X (Space)** for Multimedial Exploration

Artistic practices, research questions or aesthetic conceptualisations will be guided in different directions if we consider the telematic NI(X)ME as instrumental or spatial, as a network or a medium. Nevertheless, such metaphors seem too general and tentative for a more comprehensive and thorough design of new or evaluation of existing telematic interfaces.

2. Dimension Space Analysis

Dimension Space Analysis is called in as a tool to better understand the properties of and relationships between entities composing a system, in this case a NIME. Seven axes are described in the model. The dimensions focus on the interrelation between the agents of the different locations.

Space Characteristics: A telematic space where the positioning of its components is clearly perceivable is regarded as *striated;* a telematic space where multidimensional transitions between the locations are consciously configured, is regarded as *smooth.*
Latency: The inevitable occurrence of delay in data transmission between different locations can conceptually be *ignored* (in structures which are not latency-sensitive), *tolerated* or *accepted* (as a resource for artistic exploration).
Media Transparency: Telematic performances are highly mediated. Immersive uses of the involved media tend to make them invisible, *transparent,* whereas more critical approaches explore the meaning of the interface itself, rendering it *opaque.*
Role of Sound and Image: Acoustic and visual material exchanged between locations can contribute to an overall atmosphere, it can transfer information or it can be treated with aesthetic means. Its role is therefore *environmental, informational* or *artistic.*
Audio-Visual Control: Audio-visual artefacts can be processed on a macroscopic, a middle or a microscopic level. Manipulation is then applied on the *process,* the *note / frame* or the *timbre / pixel.*
Movement Typology: In telematic concerts, musicians and representational media usually have a static position on stage; in dance performances however, all elements might be brought into motion and can be understood as *dynamic.*
Required Expertise: This axis represents the level of practice and familiarity with the system that a user or performer should possess in order to interact as intended with the system in a range from *high* to *low expertise.*

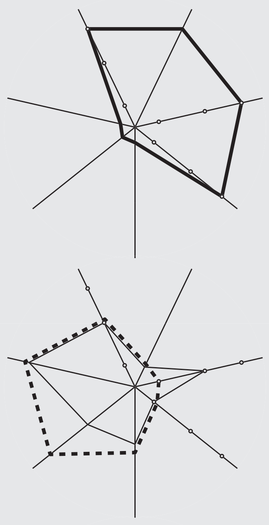


Connecting the points from each axis, a dimension plot is generated in the style of a radar chart, allowing intuitive visual comparisons.

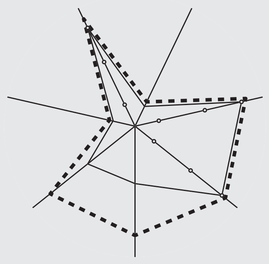
- Novel **X (Instrument)** for Multimedial Exploration: shift to the *(top) right;* often encountered in the *music* field;
- Novel **X (Media)** for Multimedial Exploration: shift to the *bottom;* often encountered in the *media art* field;
- Novel **X (Space)** for Multimedial Exploration: shift to the *left;* often encountered in the *theatre* and *dance* field;
- Novel **X (Network)** for Multimedial Exploration: no clear tendency due to the overlay of different dimensions.

——— acoustic-musical layer
- - - - - visual-scenographic layer
▬ ▬ ▬ leading layer

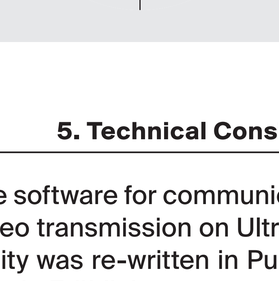
3. Historical Examples



Chris Chafe,
I am Streaming in a Room (2018): Exploration of internet acoustics and its mapping on physical spaces.

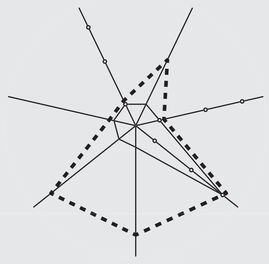


Rimini Protokoll,
Call Cutta (2005): Mobile phone theatre linking a stroller in Berlin city space with a call center agent in India.

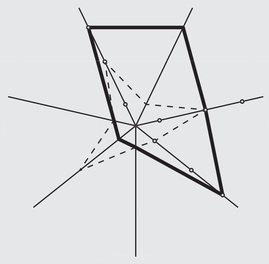


Maurice Benayoun,
Tunnel under the Atlantic (1995): Distributed, interactive multimedia installation linking participants from an audience in Paris and New York.

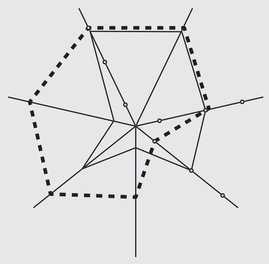
4. Examples from the Institute for Computer Music and Sound Technology



Florian Dombois: *Telematic Intermezzo*
Between the pieces of a telematic concert between Zürich and Hong Kong, the medial setup with cameras and screens was revealed little by little, e.g. by using screens as light sources, showing cameras filming themselves through mirrors, or passing acoustic information through screens interpreted as "wormholes".



Bojan Milosevic: *Teoda*
Two small ensembles at two locations interact in a pulse-based composition. Latency is augmented between the two locations so that there is a shift of one quaver note. The two ensembles play the same piece out of two different scores in two different versions. The metrical shift is explored compositionally.



Benjamin Burger: *Moving Screens, Sounds, and Bodies*
Movement is included in a performance at locations with four dancers (a male-female couple on each stage) and two musicians (one on each stage). Mobile screens for the representation of the remote performers and stage are integral part of the performance. The screens are tracked with motion capture, an in-house built video mapping system places the relevant cut-out from the remote space on the mobile screen.

5. Technical Considerations

The software for communication and video mapping is open source or developed in-house. Audio transmission is based on JackTrip, video transmission on UltraGrid. For easier handling (minimizing firewall issues and facilitating connection and routing) the JackTrip utility was re-written in Pure Data by Roman Haefeli. The software for surface projection mapping (Sparck) has been developed by Martin Fröhlich:

- Tpf-client: https://gitlab.zhdk.ch/TPF/tpf-client/
- Tpf-server: https://gitlab.zhdk.ch/TPF/tpf-server/
- Sparck: http://tecartlab.com/

References
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J. P. Cáceres and C. Chafe, C. Jacktrip: Under the hood of an engine for network audio. Journal of New Music Research, 2010/39(3), 183–187.
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