Exploring User-Driven Techniques for the Design of New Musical Interfaces through:

The Responsive Environment for Distributed Performance

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McGill
Centre for
Intelligent Machines

SHARED REALITY LAB

Computer-Supported Cooperative Work (CSCW)

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Aims to understand and support collaborations

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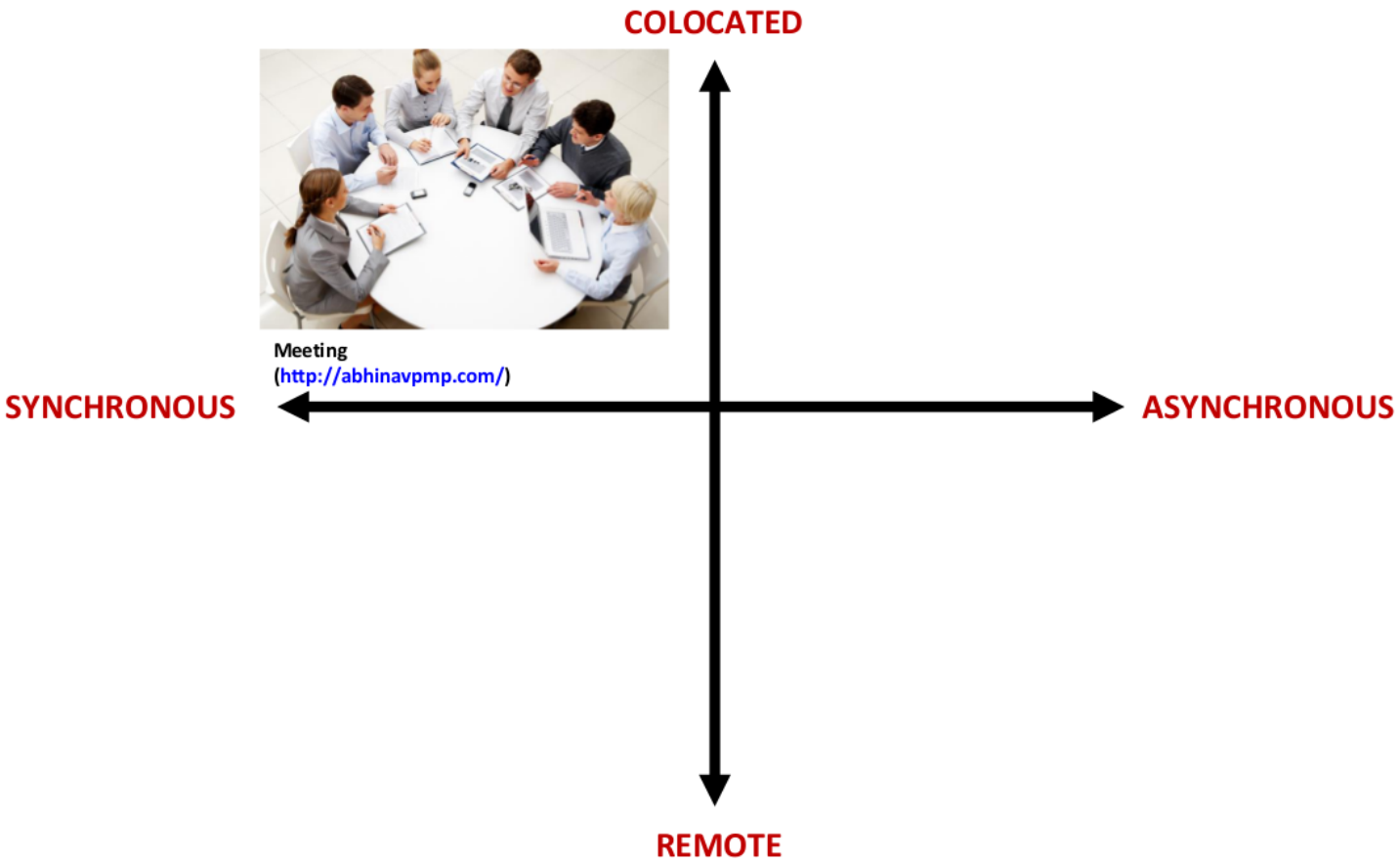

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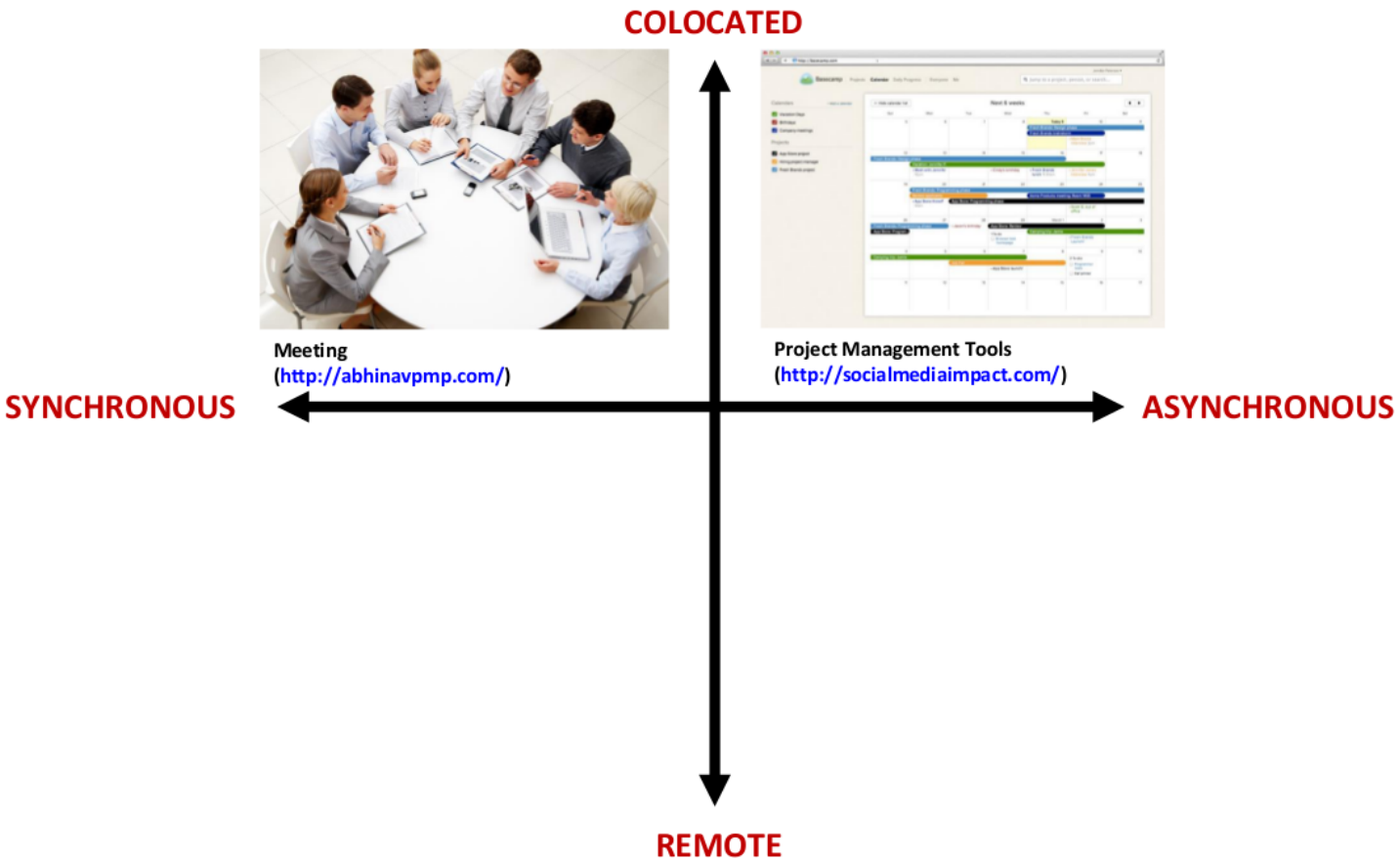

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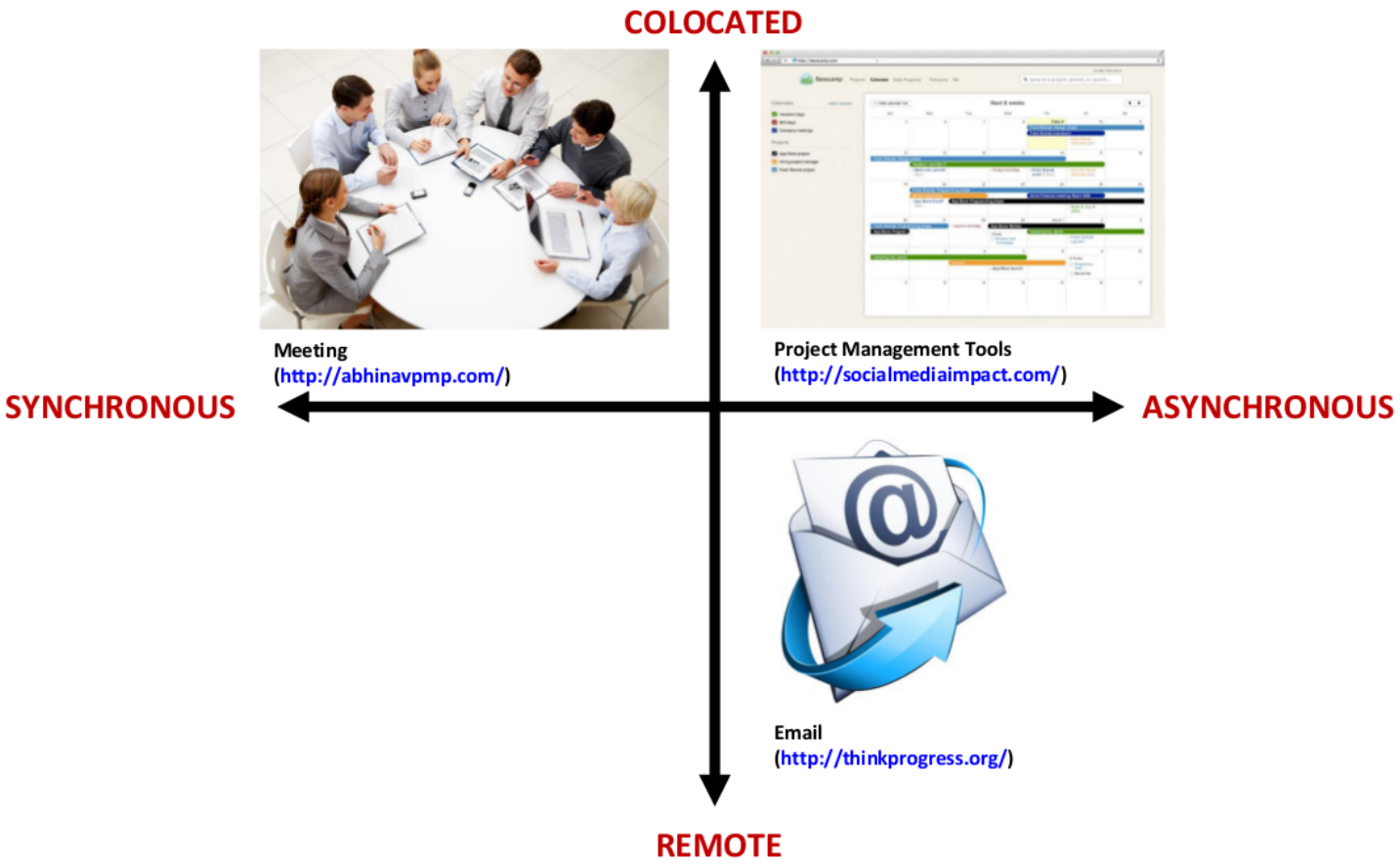

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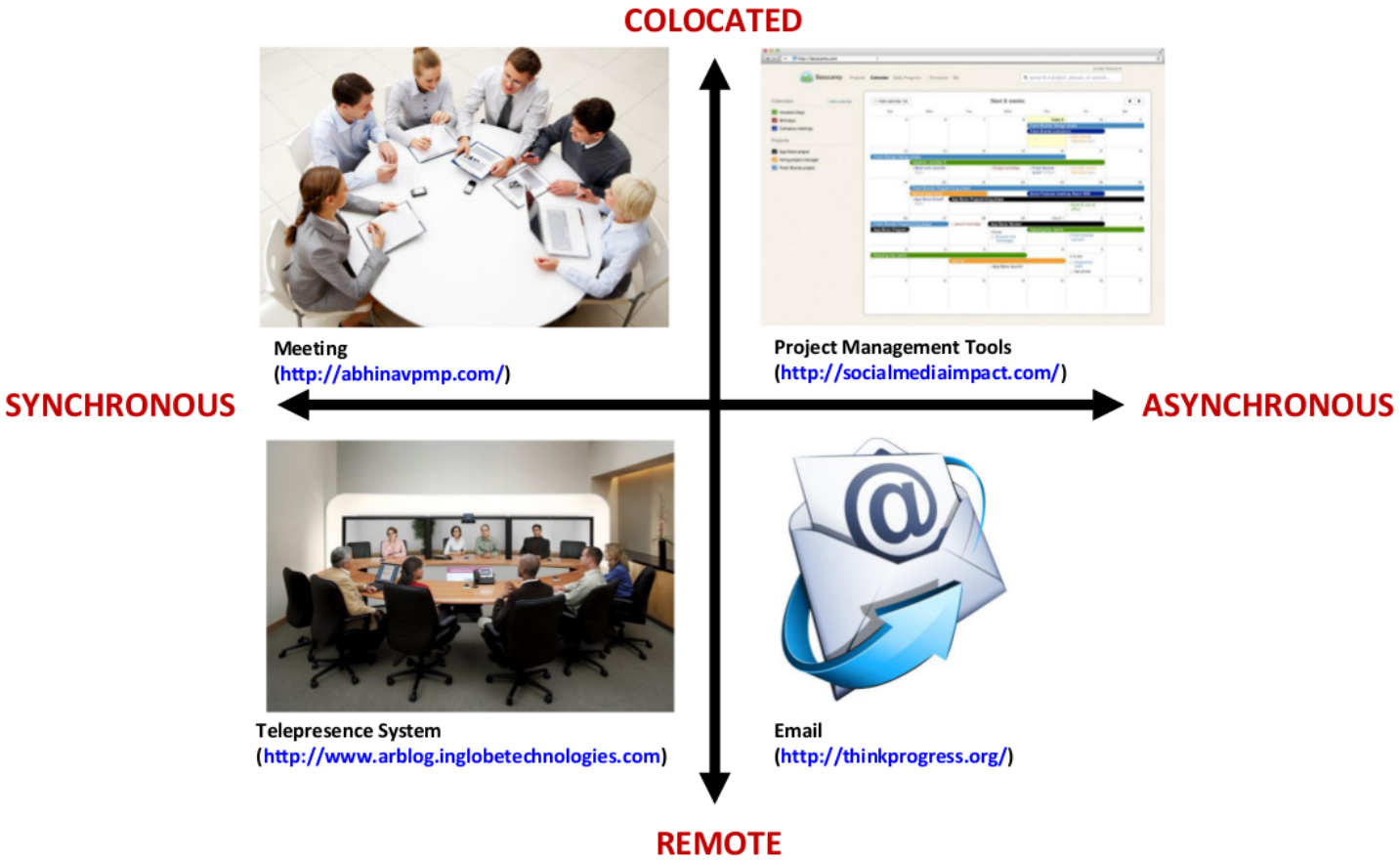

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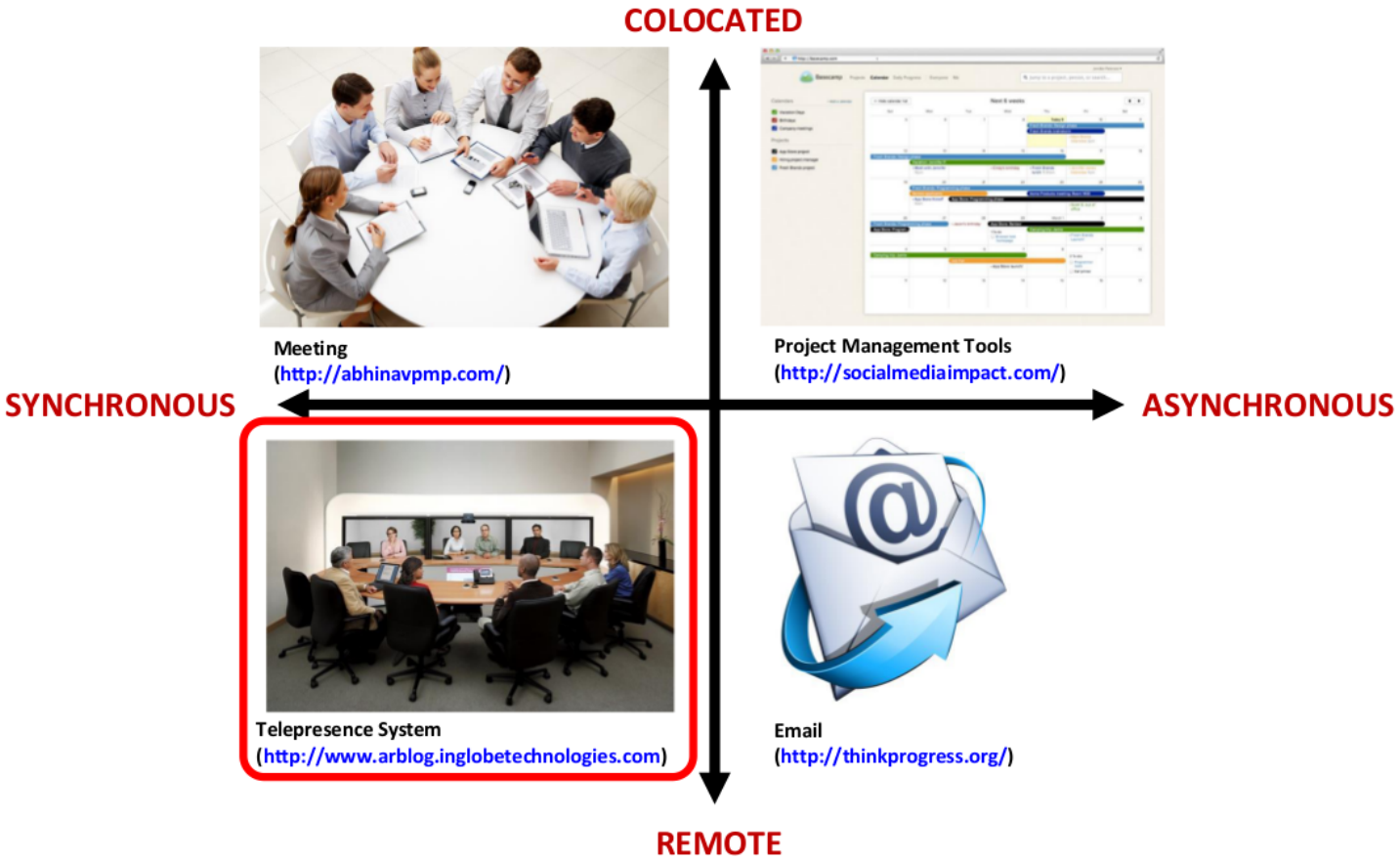
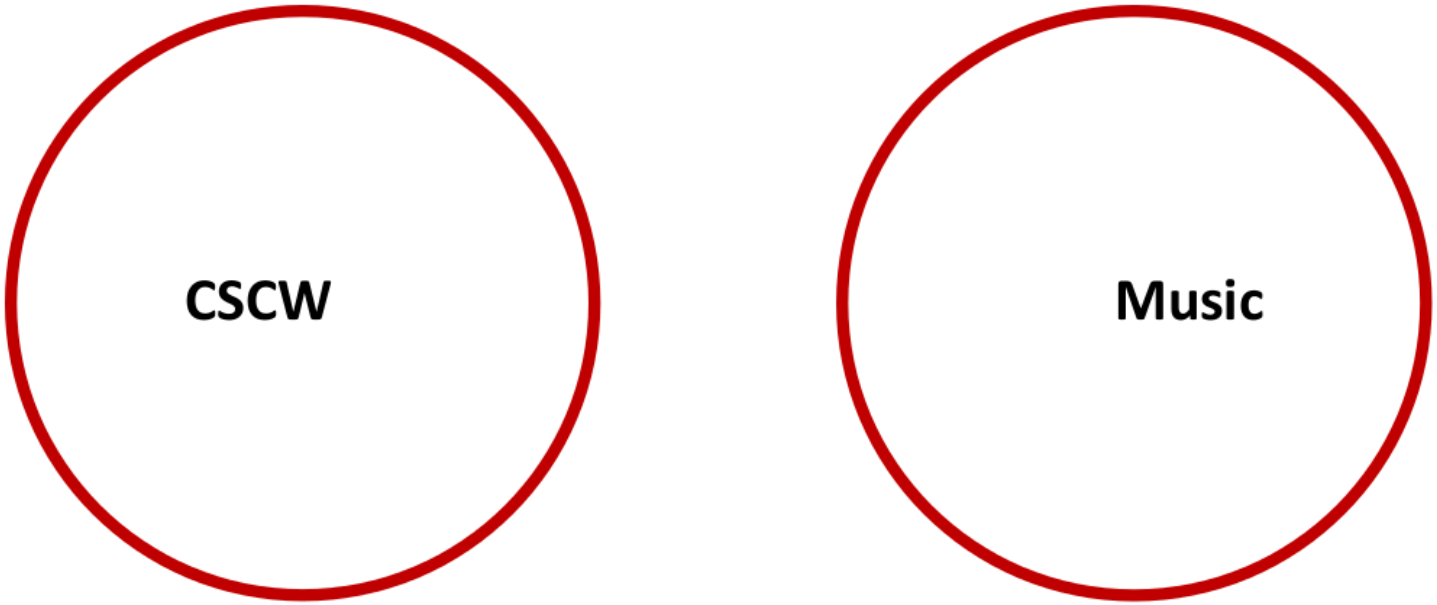


Motivation

How can we better support the
creative, playful and spontaneous
aspects of distributed collaborative activities?

CSCW and Music



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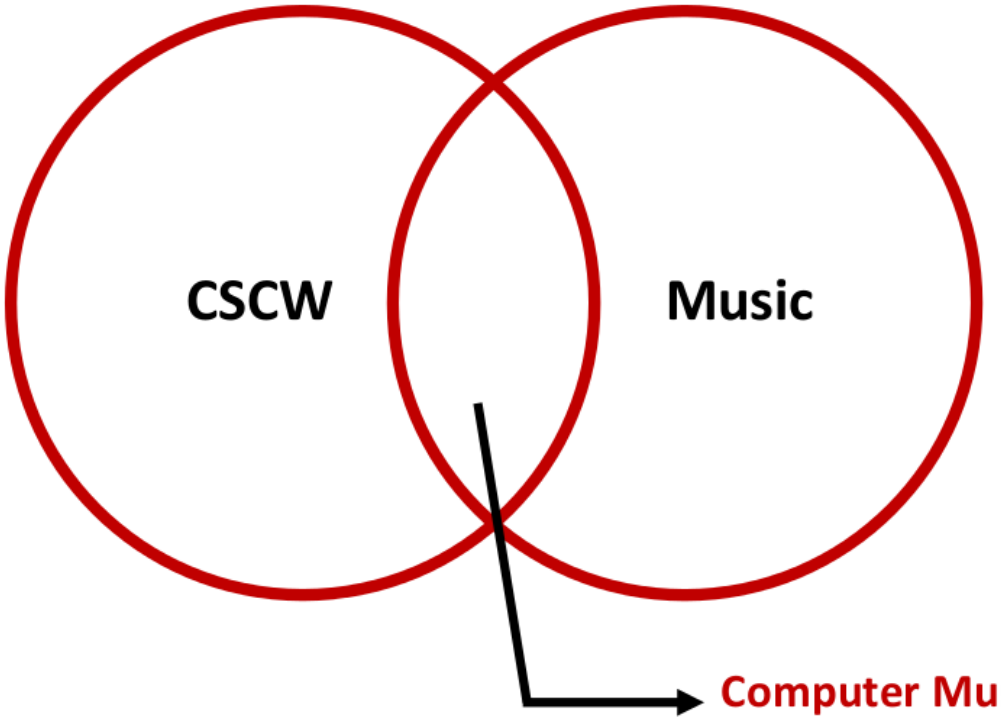
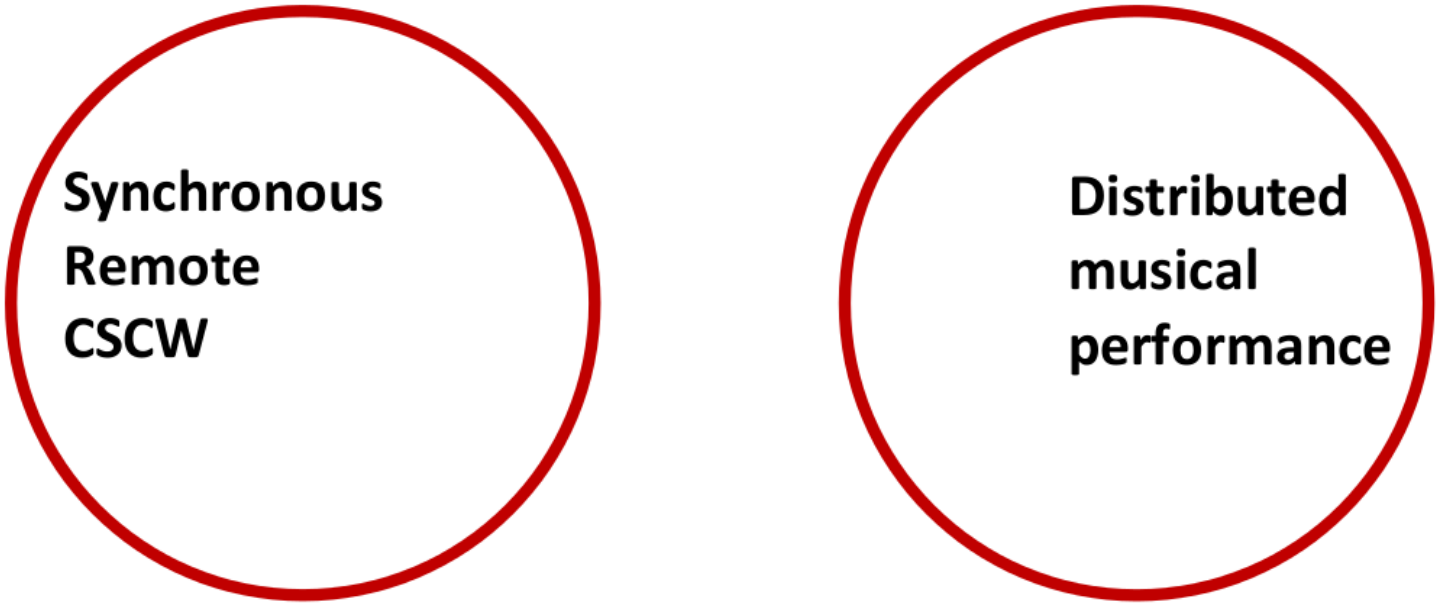


Computer Musicking
(Fencott and Bryan-Kinns, 2013)

Public Sound Objects
(Barbosa and Kaltenbrunner, 2002)

CSCW and Music



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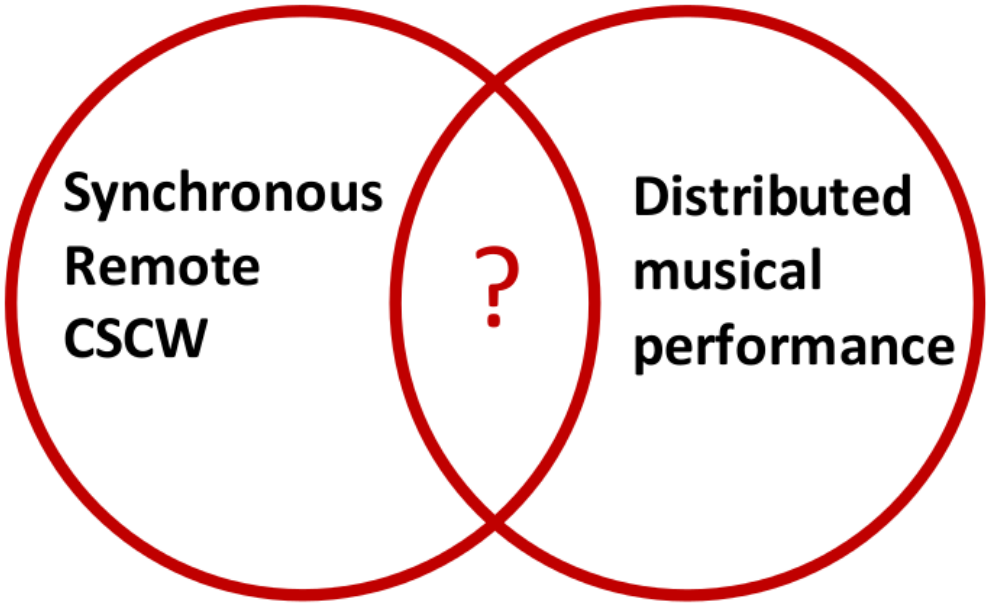

Existing systems

"Apart" Project

(Schroeder, Renaud, Rebelo and Gualda, 2007)

SoundWIRE

(Chafe, Leistikow, Chisolm and Scavone, 2000)

Ultra-videoconferencing

(Cooperstock and Spackman, 2001)

Augmenting Distributed Performance

Increase the level of interaction among participants

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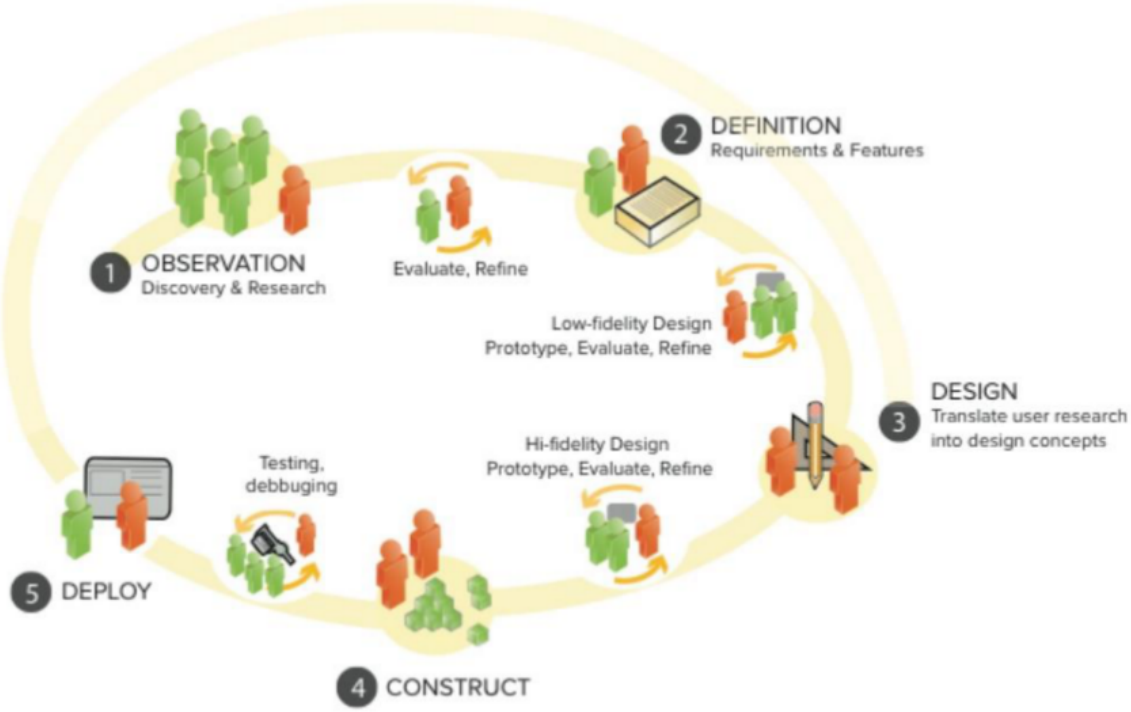
Increase the level of interaction among participants

Without detracting from the higher-level task of performance

User-Centered Design

- Key principles of usability design (Gould and Lewis, 1985)
  1. Early focus on users and tasks
  2. Empirical Measurement
  3. Iterative Design



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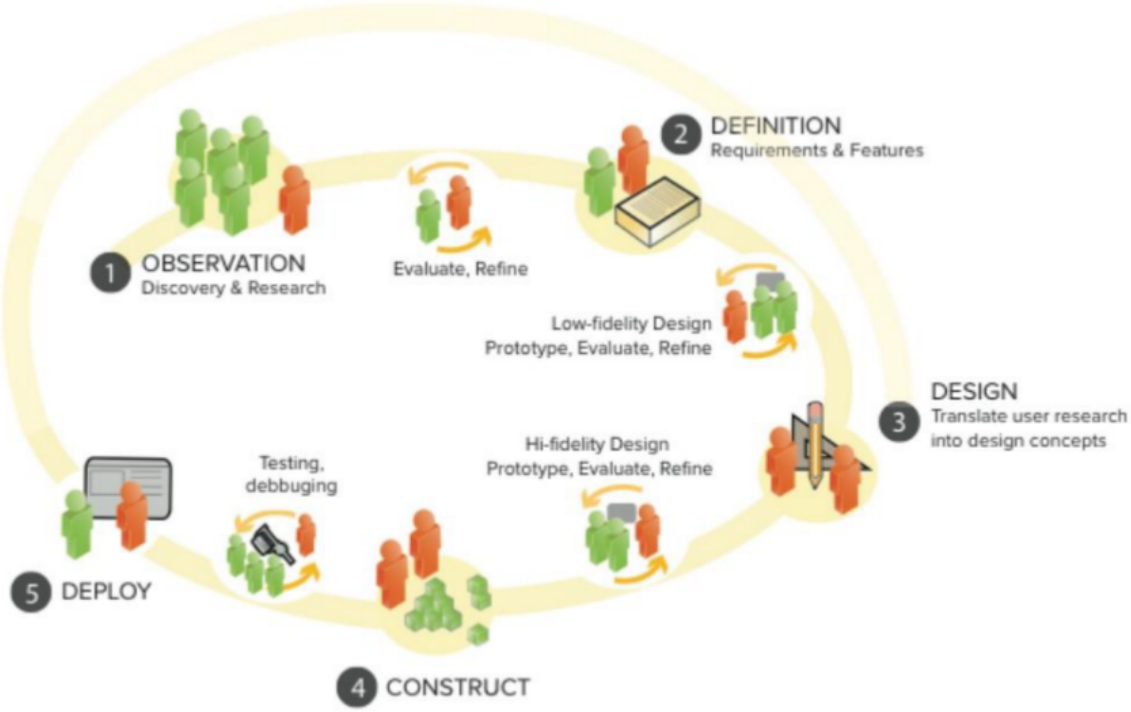

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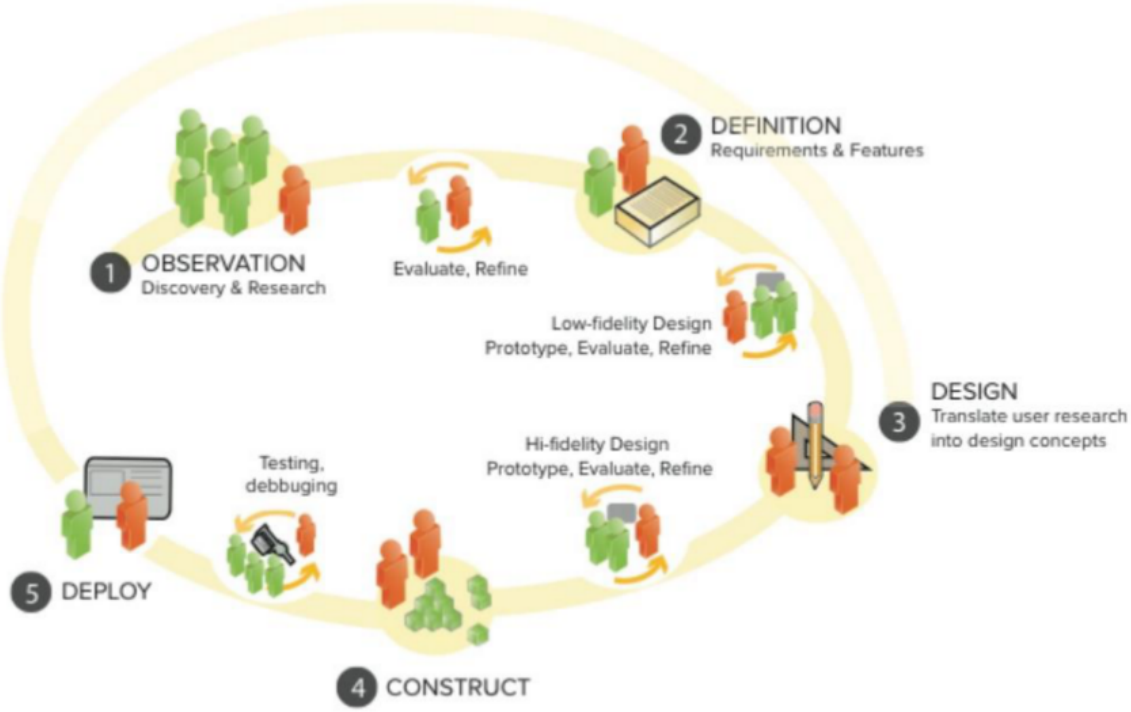

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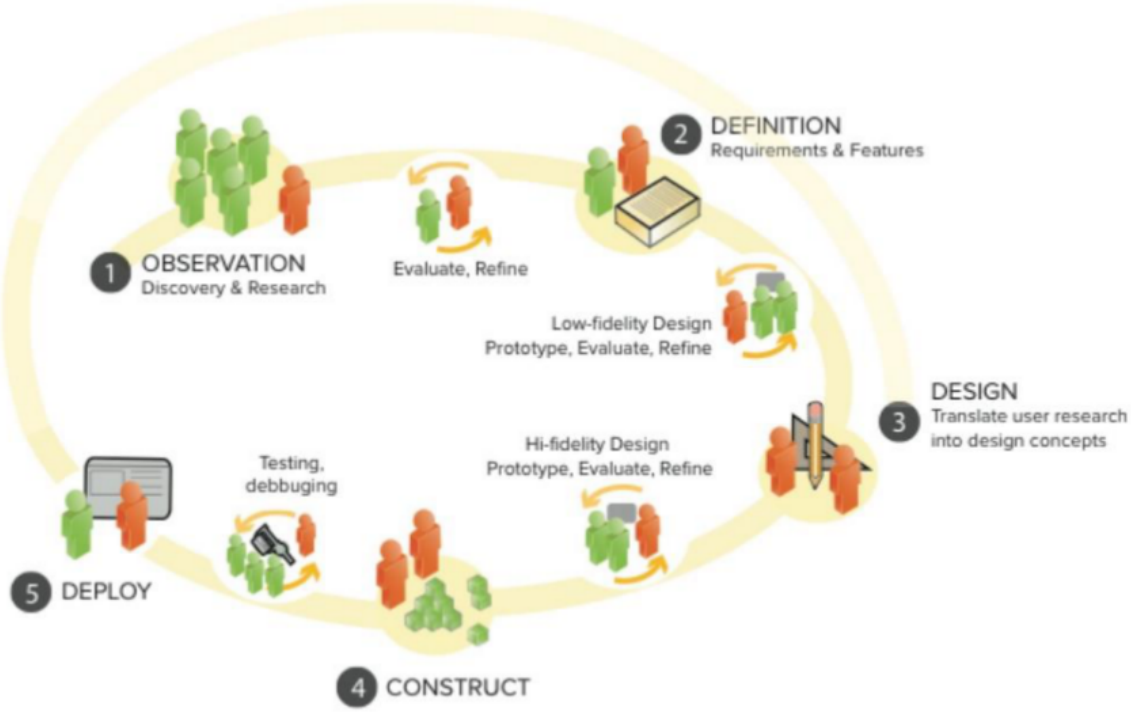

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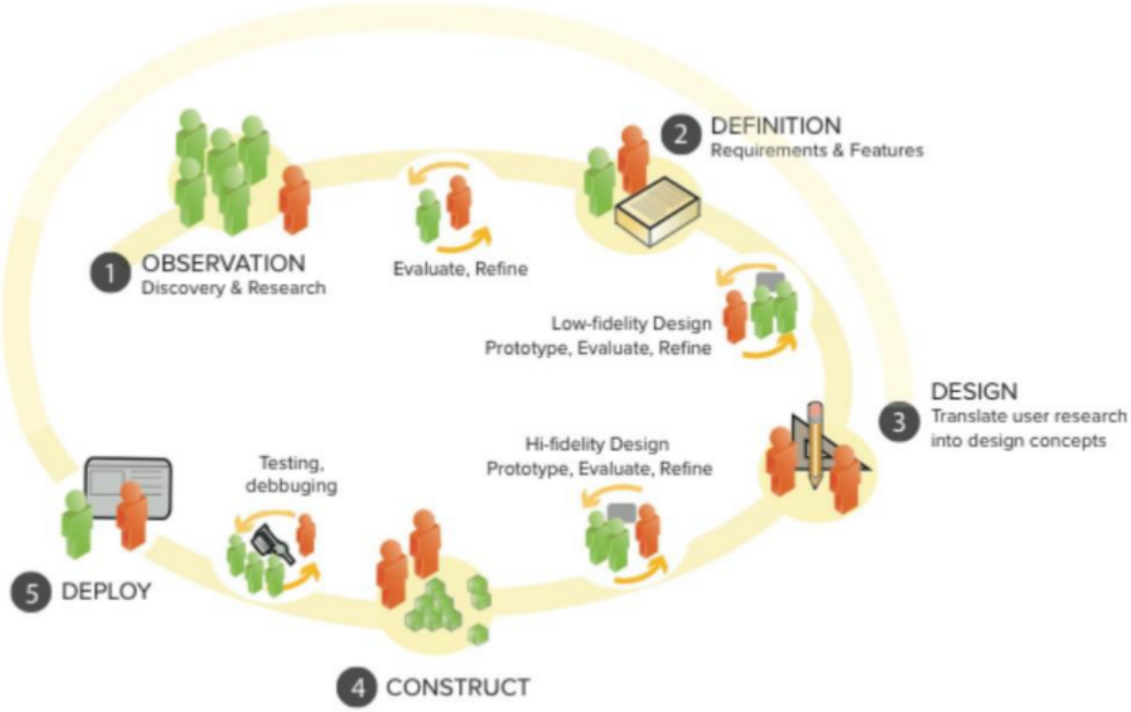

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- "Usability" alone is not enough
- New directions in HCI necessitate alternatives to "usability" (Kaye et al., 2007; MacDonald et al., 2013)
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1. Designed, developed and released novel systems for:
   - Distributed Performance (`http://github.com/delshimy/RENMP`)
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Understanding the User

User Observations:

- Observed 15 musicians
- Focused on interpersonal interactions

User Interviews:

- Evaluation Criteria
  - Enjoyment
  - Creativity
  - Self-expression
  - Interaction with others

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Shared Space

- Similar to "shared workspaces" from CSCW (Ishii, 1990)
- Allows distributed musicians to physically interact with one another

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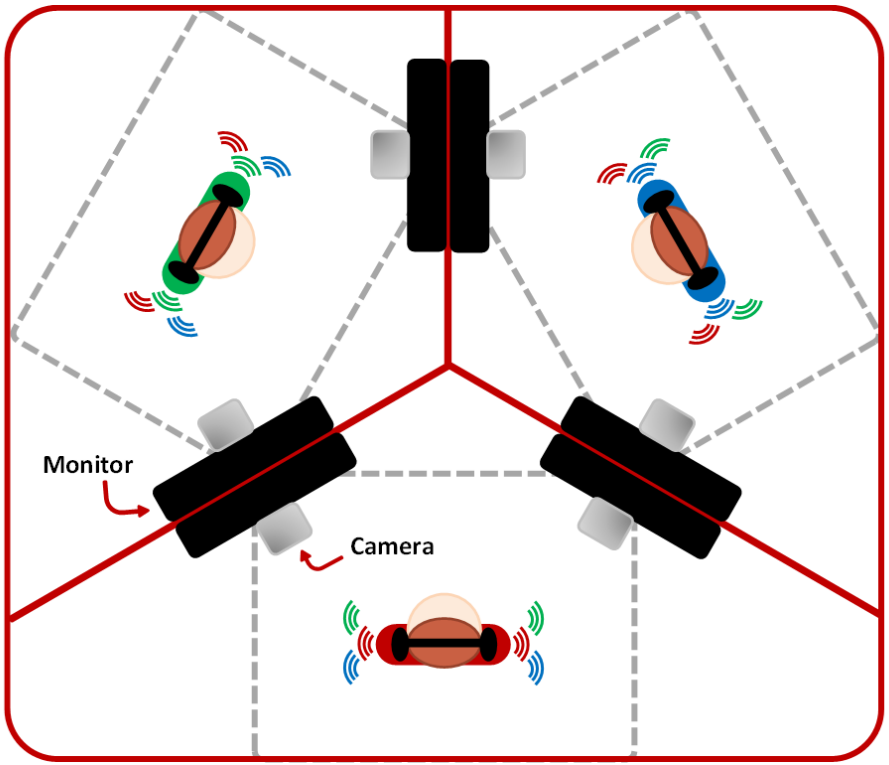

First Feature

Rationale

- Capitalizes on a simple and common behaviour
- Emulates a natural property of sound
- Volume control is cumbersome mid-performance

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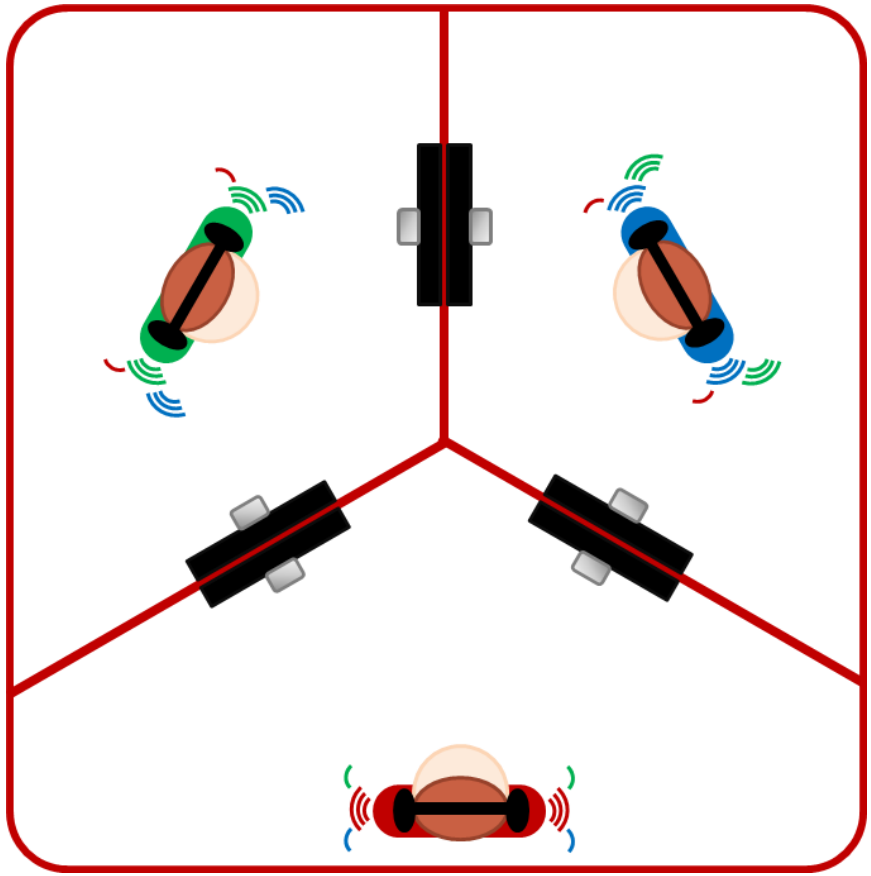
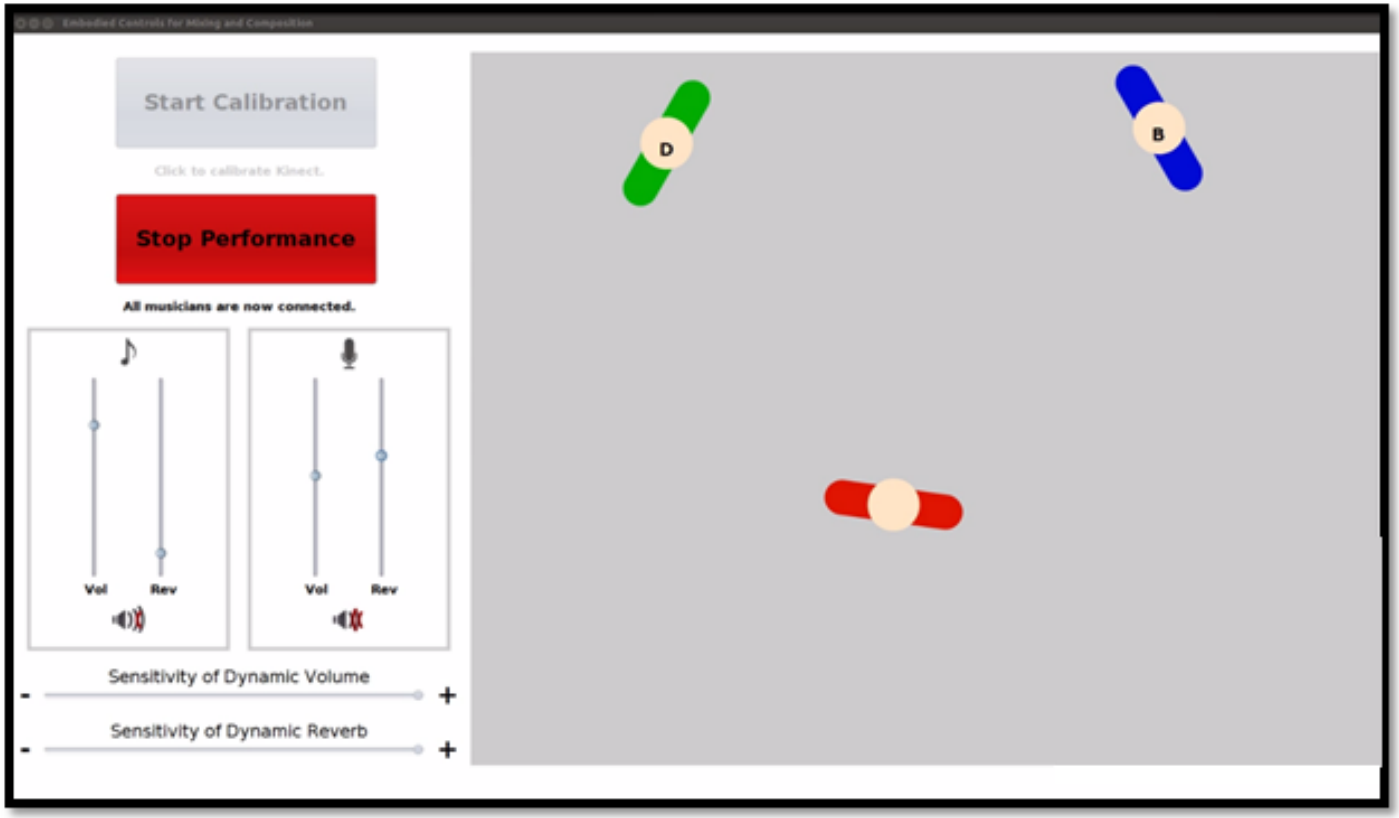
Dynamic Volume

D. El-Shimy, T. Hermann, J. R. Cooperstock. A Reactive Environment for Dynamic Volume Control. NIME '12.



Graphical User Interface



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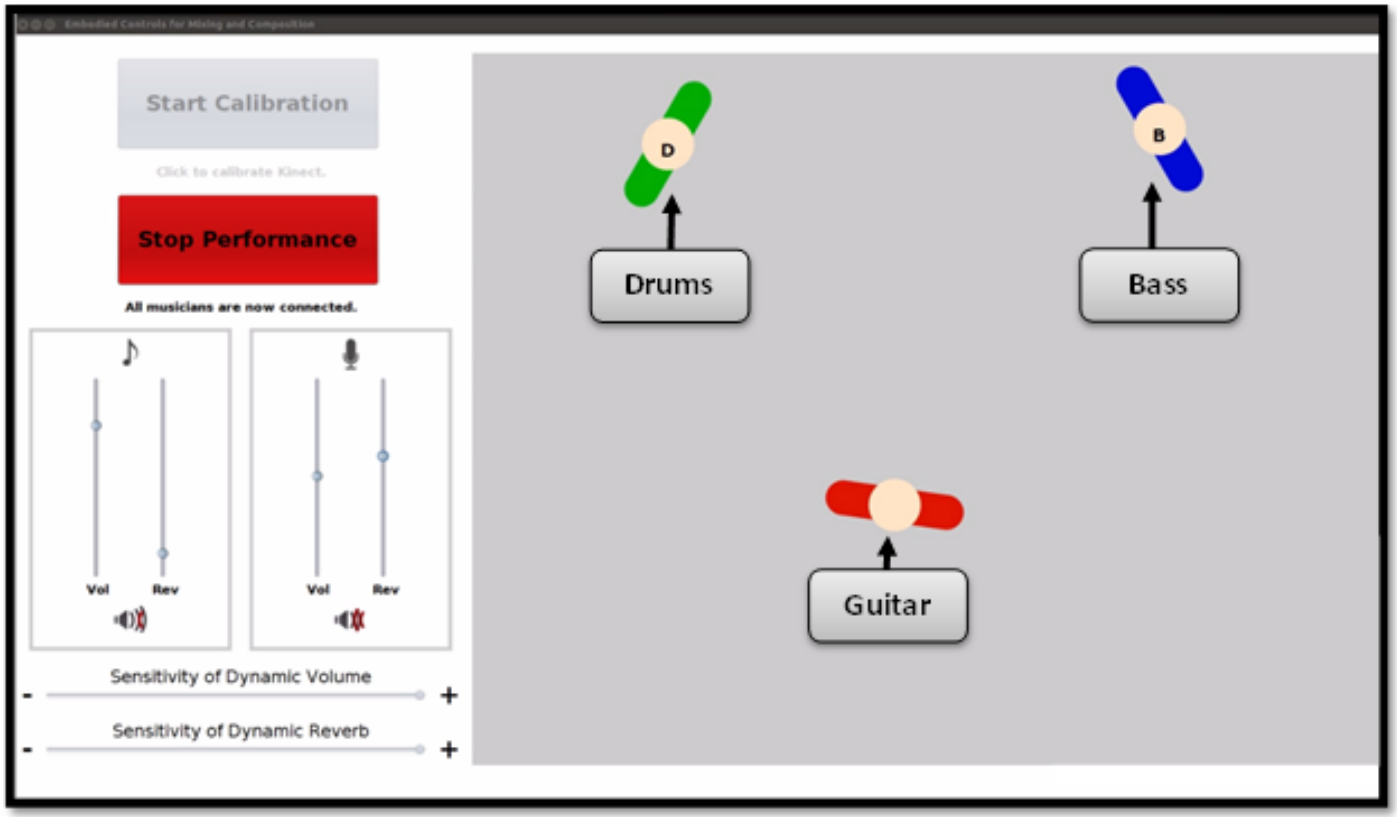

Dynamic Volume

Second Feature

Rationale

- Capitalizes on another simple and common behaviour
- Provides functionality that is familiar to musicians
- Expands the system while keeping it simple and easy to use

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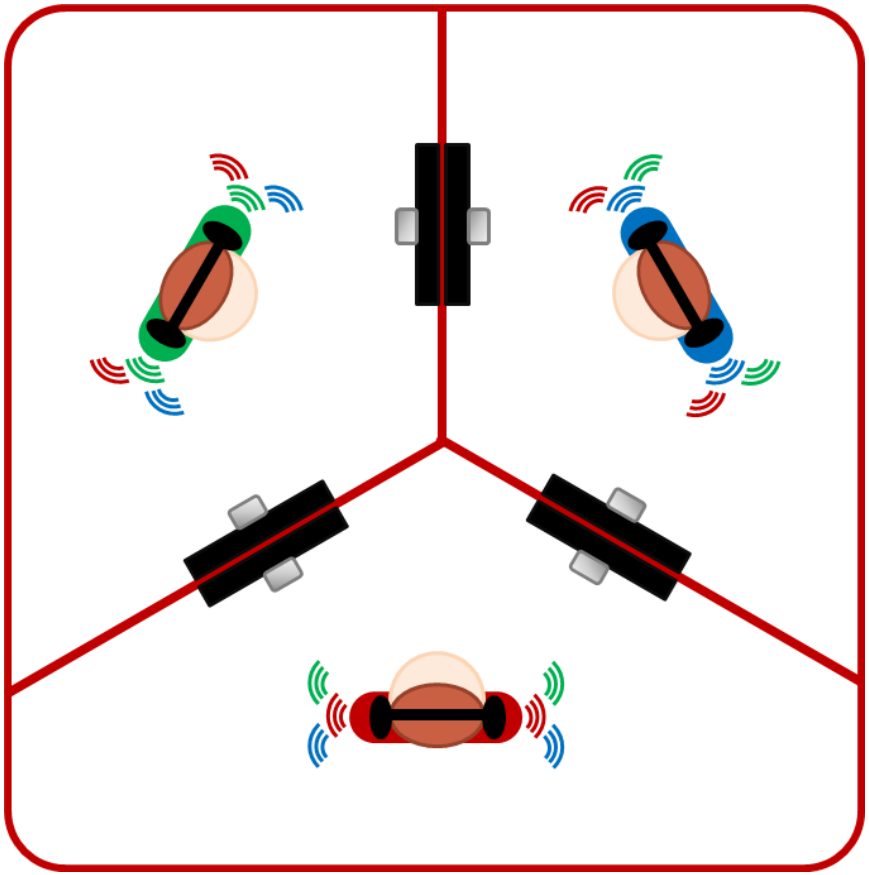
Track Panning

D. El-Shimy, J. R. Cooperstock. Reactive Environment for Network Music Performance. NIME '13.



Track Panning

Third Feature

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- Arose through user testing
- Restores spatial properties of sound that are absent in the distributed context

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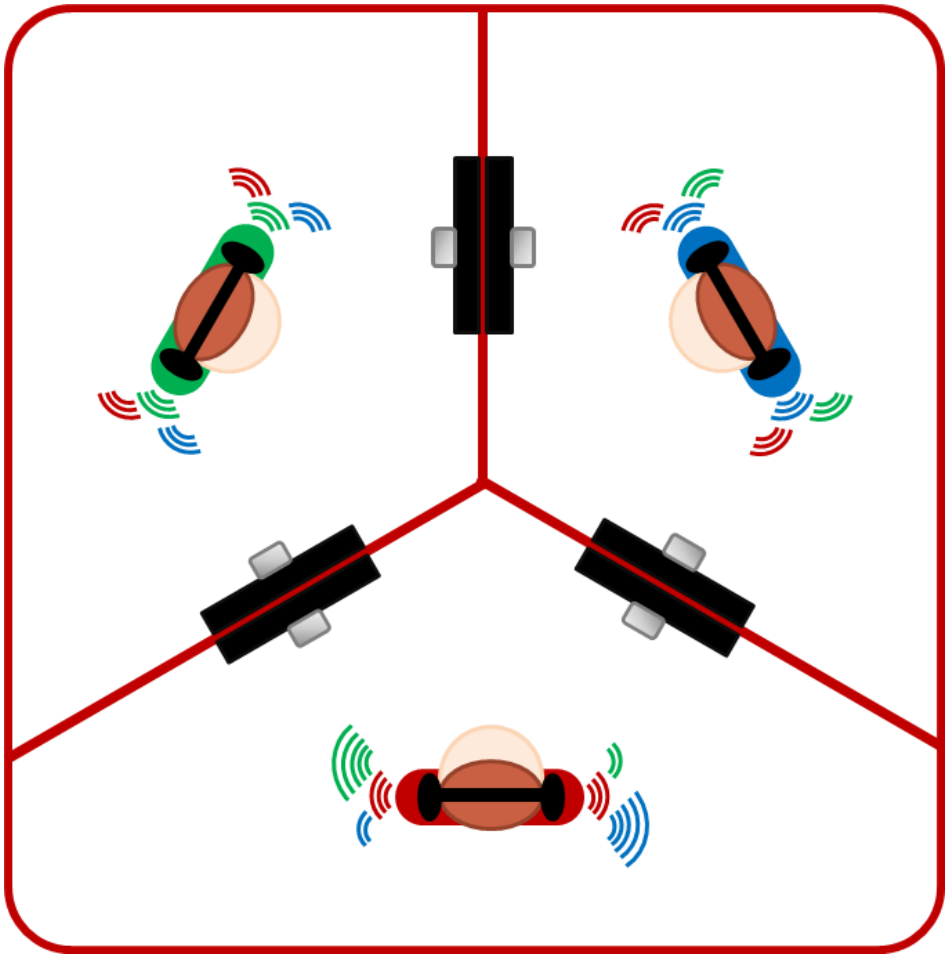
Musician Spatialization

D. El-Shimy, F. Grond, A. Olmos and J. R. Cooperstock. Eyes-Free Environment Awareness. Springer JMUI 2011.



Musician Spatialization

Limitations of User-Centered Design

- System evaluated according to standard user tests, but...
- Narrow feedback
- Unsuitable for testing small, iterative changes
- Difficult to isolate novelty factor
- Difficult to determine long-term impressions

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- Preliminary Discussion
- Formal A/B/A Test
- Questionnaires
- Post-Test Discussion
- Recommendations

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Fourth Feature

Rationale

- Reverb allows musicians to experiment with another parameter beyond volume and panning
- Improves overall sound quality
- Reinforces "shared space" due to echoing nature of reverb

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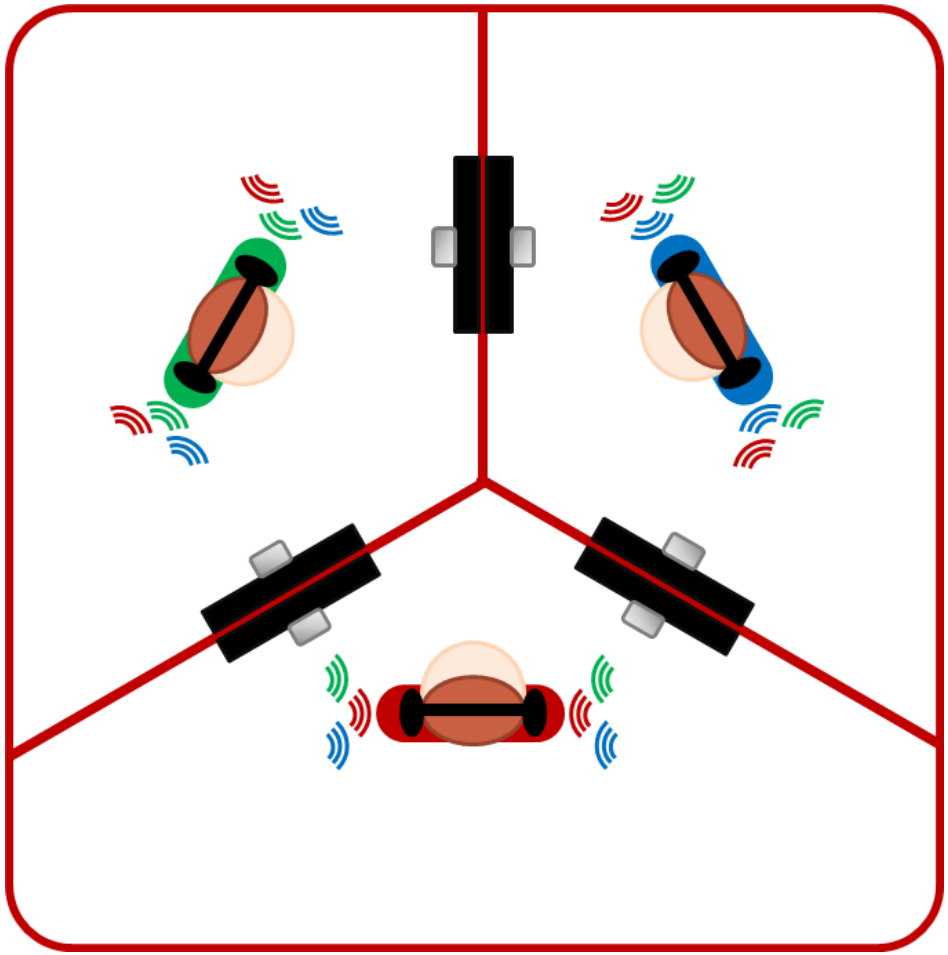

Dynamic Reverb

Results of Long-Term Deployment

- Analyzed musicians' interactions, discussions and questionnaires
- Musicians found system practical and would use it again in the future
- Creativity benefited least from system features

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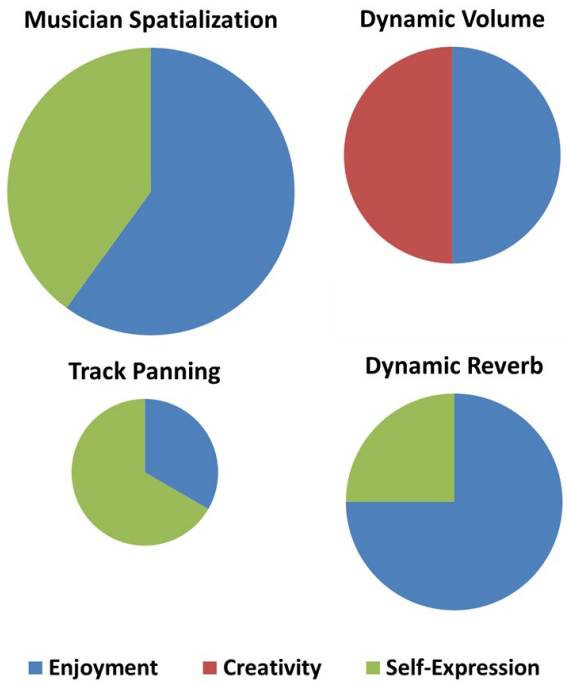

Participatory Design

- Participatory Design actively involves all stakeholders
- Collaboration becomes two-sided

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Participatory Design

- Collaboration with Steve Cowan (Musician/Composer/Teacher)
- Composer was asked to write pieces using our system features
- Created a separate system simulating group performance

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- Head tilt emulates listening closely on one headphone at a time
- Suitable for seated musicians

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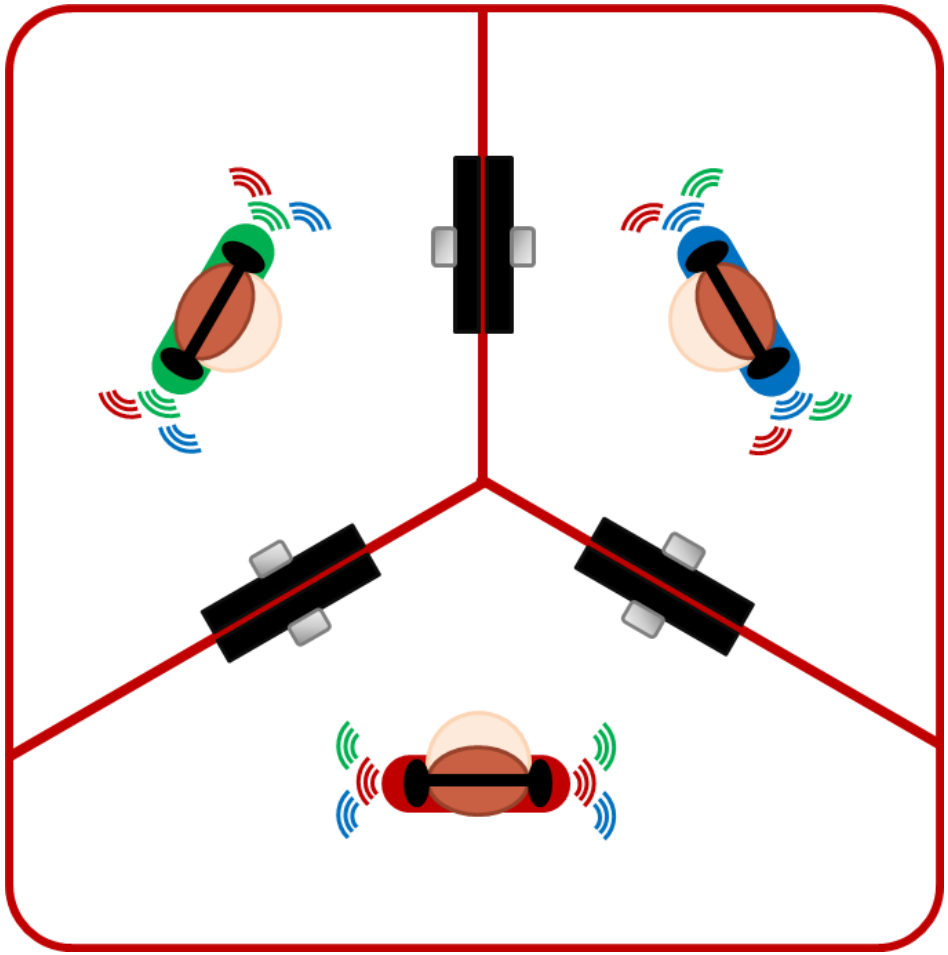

Mix Control

Composer's Feedback

D. El-Shimy, S. Cowan, J.R. Cooperstock. EmbodiComp: Embodied Controls for Mixing and Composition. ICMC '14.

- Click-based audio mixing and editing is "draining"
- System provided a "fun" alternative
- Features can help improve the creative process

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Lessons and Recommendations

- Applying recommendations from distributed CSCW led to improvements within a second context
- There is no "one size fits all" solution
- Recommendations:
  - Start by validating the basics
  - Rigorously determine *what* to evaluate
  - Tailor *how* to evaluate it
  - Fluidly change the user's role
- Such recommendations were not available at the onset of the projects
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Thank you!

Questions?

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