ssmn

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SSMN SNF-Research-Project at the ICST / ZHdK

Spatialization Symbolic Music Notation SSMN

Emile Ellberger | Germán Toro-Pérez | Giorgio Zoia | Kaspar Mösinger | Johannes Schütt | Linda Cavaliero

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SNF-Research-Project at the ICST / ZHdK

in collaboration with:

- Editions Papillion
- Vincent. Gillioz 3D audio producer & composer

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2004-05	Giorgio Zoia (GZ) Emile Ellberger (EE)
2006	Johannes Schütt (JS)
2007	Gerald Bennett
2008	Germán Toro-Perez (GTP)
2009	1st SNF submission • Editions Papillon - Genève • Vincent Gillioz Productions - L.A.
2010	2nd SNF submission
2011	<u>SSMN team</u> EE/JS/GTP/GZ + Linda Cavaliero (LC), designer + Kaspar Mösinger (KM), IT
2012	Tanzhaus Seminar Grimentz Workshop

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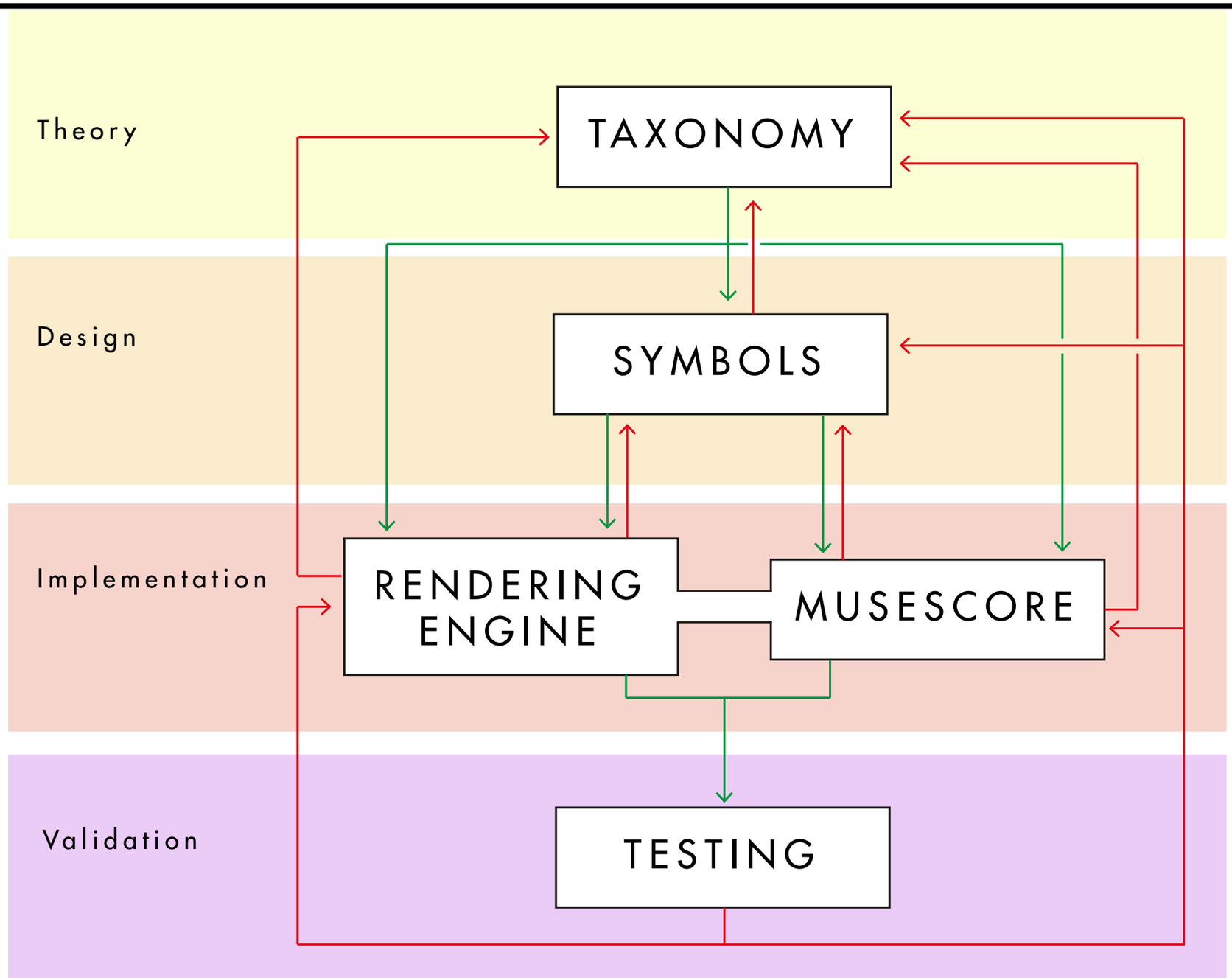

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<table>
<tr><th>EE</th><th>GZ</th><th>JS</th></tr>
<tr><td rowspan="2">• Coordinate overall SSMN research activities
• Communicate with external parties (Tanzhaus, Uni Geography department, young composers to beta-test)</td><td>• R&D advisor
• Evaluate needs and propose strategies</td><td rowspan="2">• Advise on spatialization needs of composers using scoring for instrumentalists
• Create audio examples for relevant Taxonomy
• Propose strategies and create rendering app open to diverses surround systems and software (multi-channel, 5.1, binaural, 3D; MaxMSP, DPSpat, Ambisonic Player, MIDI samplers, etc.)</td></tr>
<tr><td>GTP
• Taxonomy draft version II
• Input compositional requirements ;
• Assure administrative issues and in-house coordination</td></tr>
<tr><th>LC</th><th>KM</th><th>VG</th></tr>
<tr><td>• Work with KM on Musescore requirements
• Design library from Taxonomy
• SSMN logo
• blog</td><td>• R&D Musescore symbol placement, parameters for each symbol, assure
• OSC /MIDI flow so that composers can freely use MaxMSP for audio and DSP manipulation;
• porting 2D to 3D</td><td>• Provide compositions to test SSMN
• Propose scoring strategies (SSMN staff)
• Propose abstract (metaphoric) symbols- frog jumping fire, fish, roller coaster random walk- etc.
• Propose minimum SSMN in score possibilities for beta testers.</td></tr>
</table>

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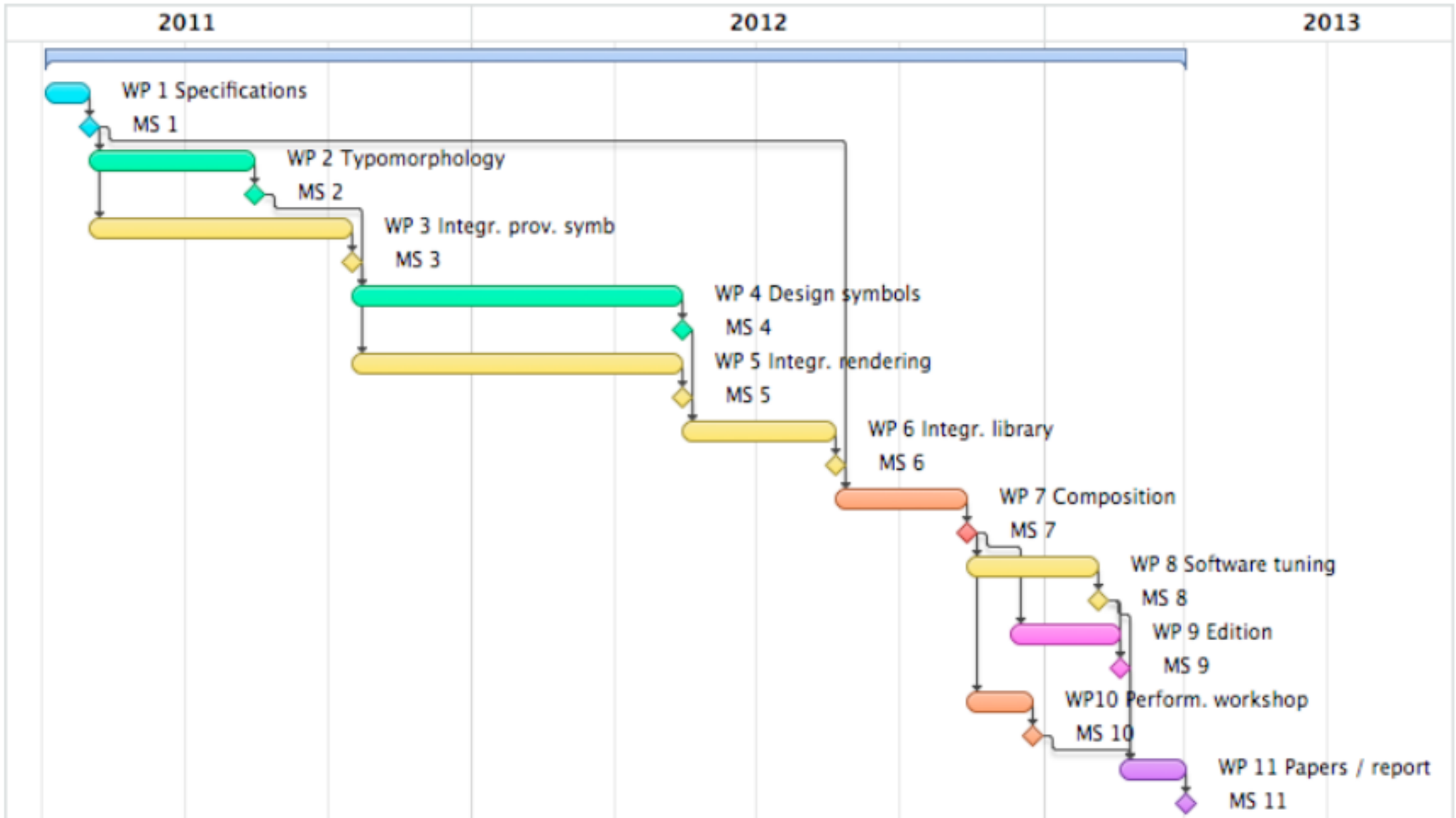

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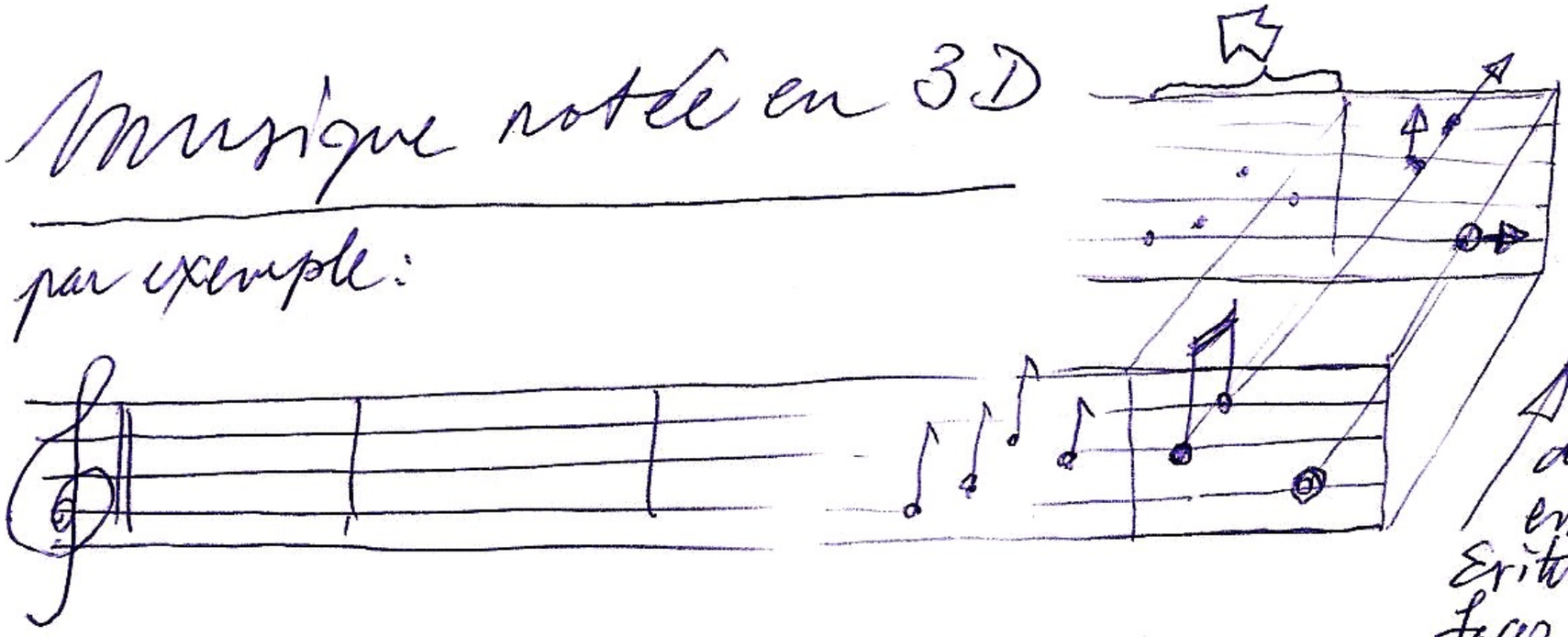
Musique notée en 3D

par exemple:



l'orientation de cette "fuyance" est libre.
Eviter que les deux faces se superposent!

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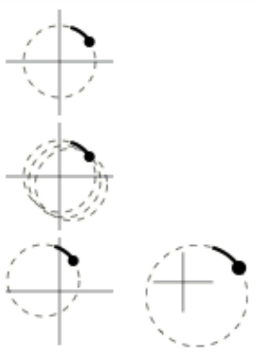
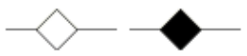
Symbol :	Name :	Description :
	Quadrant 01	Descriptive symbol Quadrant design proposals The circle trajectory = drawn by Musescore
	Quadrant 02	
	Quadrant 03	
	Quadrant 04	
	Quadrant 05	
	Trajectory 01	Descriptive symbol Black dot = actual position Trail = sense of speed Doted line = complete trajectory 3 circles = circle repeated 3x Quadrant size = gives a sense of scale of the trajectory
	Keyframe 01	Grammar symbol White = keyframe Black = end of trajectory

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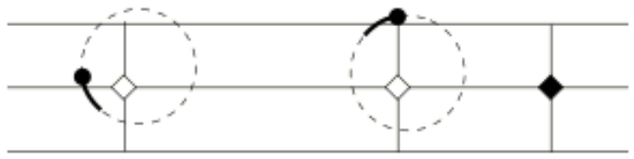
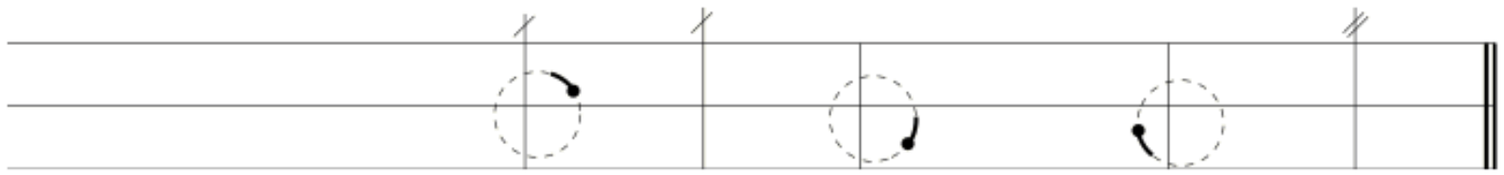
	Score 01	Test of keyframes 01
	Keyframe 02	Grammar symbol 1 line = keyframe 2 lines = end of trajectory
	Score 02	Test of keyframes 02
	Trajectory 02	Point of arrow = direction Trail of arrow = sense of speed Doted line = complete trajectory
	Keyframe 03	Grammar symbol 1 line = keyframe 2 lines = end of trajectory (2 possible design: cross or double)

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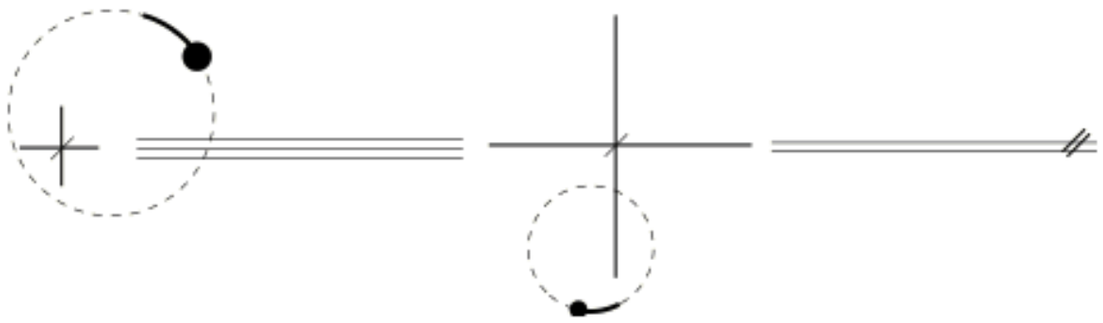
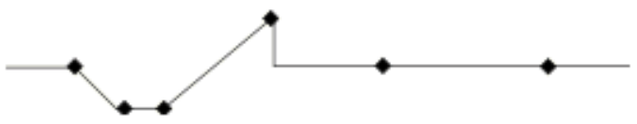
 Score 06	All 3 score lines erased Instead a line between trajectories = interpolation 3 long lines = circle repeated 3x 2 long lines = circle repeated 2x at the end: 2 smal lines = end of 2nd trajectory
Score 07	Sinusoidal line = could be a sound effect…
Quadrant 06	
 Score info 01	Speed or other information

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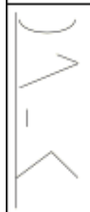
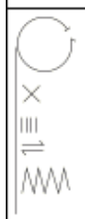
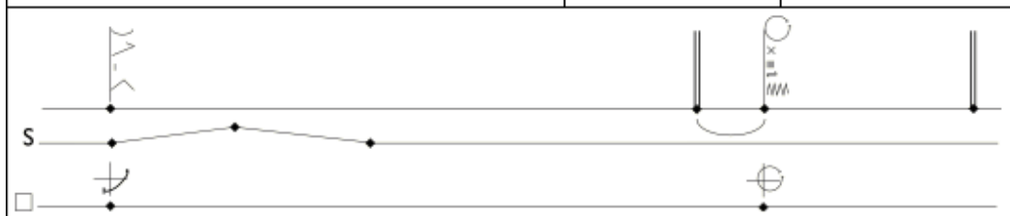
	Trajectory 05 + Quadrant 01		
	Info 02	interpolation	
	Score 09	2 trajectories 1st traj is interpolated to 2nd traj	
	Composed symbol 02	= curve = direction up right = once = speed acceleration & deceleration	
	Composed symbol 03	= circle = stationary = repeated 4 times = speed acceleration & deceleration	
S	Info 03	Speed information	
□	Info 04	Descriptive information	
	Score 10	2 trajectories line 1 = composed symbols line 2 = Speed information lind 3 = descriptive symbol	

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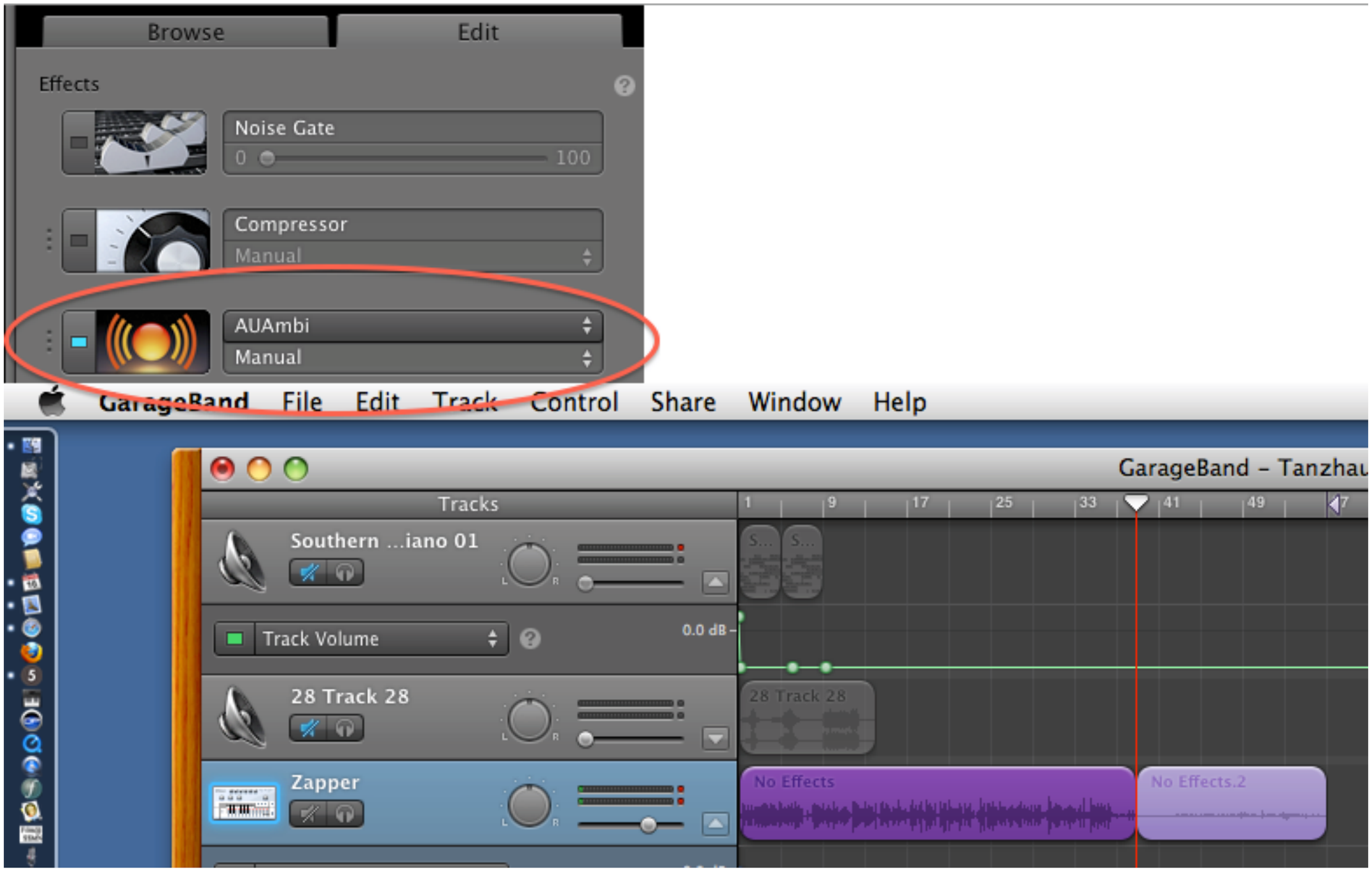

ii. Vertical displacement (mechanic driven)

1. Up

- *Min/Max height*
- *Speed*

2. Down

- *Min/Max height*
- *Speed*

3. Palindrome

- *Min/Max height*
- *Speed*

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i. Shape of the room (generic shapes)

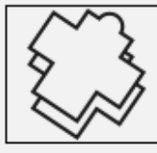
1. Cube

- *Length* (m)
- *Width* (m)
- *Height* (m)

2. Hemisphere

- *Diameter* (m)
- *Height* (m)

3. Church (cross form)



- *Length* (m)
- *Width* (ev. cross) (m)
- *Height* (m)

4. Other shapes or external space

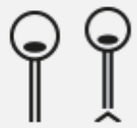
- *Dimensions**

* According to a detailed description and depending on edit and rendering possibilities

ii. Position of performers (M)

Interior : [^] over (default – no symbol)
Exterior : [ˬ] under

a. Fixed



– *xyz* or *aed* (coordinates)
– *Yaw* (direction)

b. Variable (displacement)

i. Line

– *xyz(a) or aed(a)*
– *xyz(b) or aed(b)*
– *Speed*

ii. Arc

– *xyz(a) or aed(a)*
– *xyz(b) or aed(b)*
– *Curvature*

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i. Localization of single *root* points

	– *xyz* or *aed* (rectangular or polar coordinates)

ii. Localization of projected audio (PA)

	– *xyz* or *aed* (rectangular or polar coordinates)

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iii. Localization of groups

	– *Shape of perimeter* (circle, rectangle, triangle)* – *xyz* (for each element, within the perimeter) – *xyz* or *aed* (geometrical center of the perimeter)
	– *Shape of perimeter* (circle, rectangle, triangle)* – *xyz* (for each element, within the perimeter) – *xyz* or *aed* (geometrical center of the perimeter)

* The perimeter can be a 3–D space: sphere, cube, etc.

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iv. Localization of planes (foreground, background, etc.)

– *aed*
– *Spread angle** or *Front Center Back Left Right Above Below*

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Candidate Selection

- Common western music notation capabilities (no pure sequencer)
- WYSIWYG

- In active development
- Runs on OSX
- Open-Source Software

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MuseScore

- Has an active community: 3 devs working full-time on it
- Qt based (-> OOP, cross-plattform joys and tears)
- internal synth: fluid
- Jack for midi output
- OSC capabilities for remote-control
- *.mus file format XML-based

- MuseScore 1.X vs 2.X

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MuseScore + SSMN => MuseScoreSSMN

- UI integration as natural as possible

- No plugin interface
- Extending an evolving software
- Keep the extension as separate as possible

MuseScore Datei Bearbeiten Einfügen Noten Darstellung Format Ansicht Plugins Hilfe (1:01)

R.59040f4 Nightly Build of MuseScore-SSMN: Promenade_Example

100% Page View

Concert Pitch

Paletten

- Vorschlagnoten
- Schlüssel
- Tonartvorzeichen
- Taktart
- Taktstriche
- Linien
- Arpeggio & Glissando
- Atemz. & Pausen
- Klammern
- Artikul. & Ornamente
- Vorzeichen
- Dynamik
- Fingersatz
- Notenköpfe
- Tremolo
- Fall/Doit
- Text
- Spatialization

Promenade_Example*

Bilder einer Ausstellung

Promenade

Allegro giusto, nel modo russico; senza allegrezza, ma poco sostenuto.

f

Objekt-Inspektor

Radar

Takt: 2 Schlag: 3.000

MuseScore Datei Bearbeiten Einfügen Noten Darstellung Format Ansicht Plugins Hilfe (1:01)

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Promenade_Example*

Bilder einer Ausstellung

Promenade

Allegro giusto, nel modo russico; senza allegrezza, ma poco sostenuto.

Objekt-Inspektor

SpatializationSymbol

Farbe:

Sichtbar

Offset X: 0.14sp

Offset Y: -5.61sp

Position

Position: 0 0

Radar

Takt: 2 Schlag: 3.000

MuseScore Datei Bearbeiten Einfügen Noten Darstellung Format Ansicht Plugins Hilfe (1:01)

R.59040f4 Nightly Build of MuseScore-SSMN: Promenade_Example

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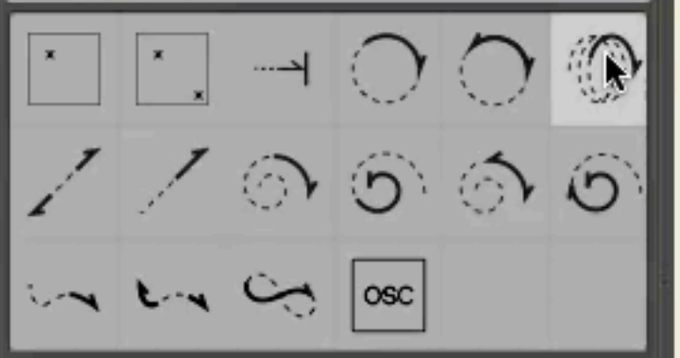
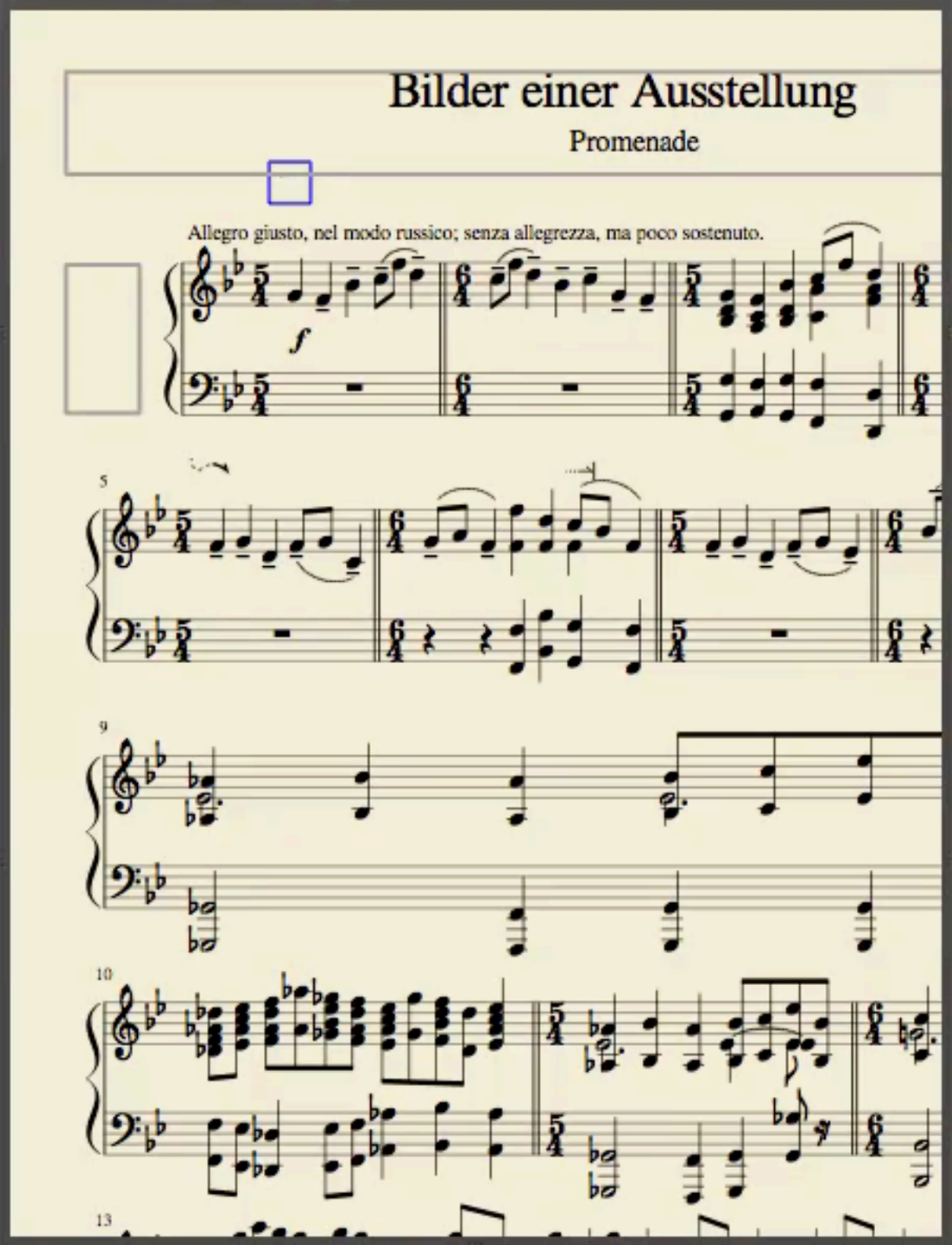


Promenade_Example*



Objekt-Inspektor

SpatializationSymbol

Farbe:

Sichtbar

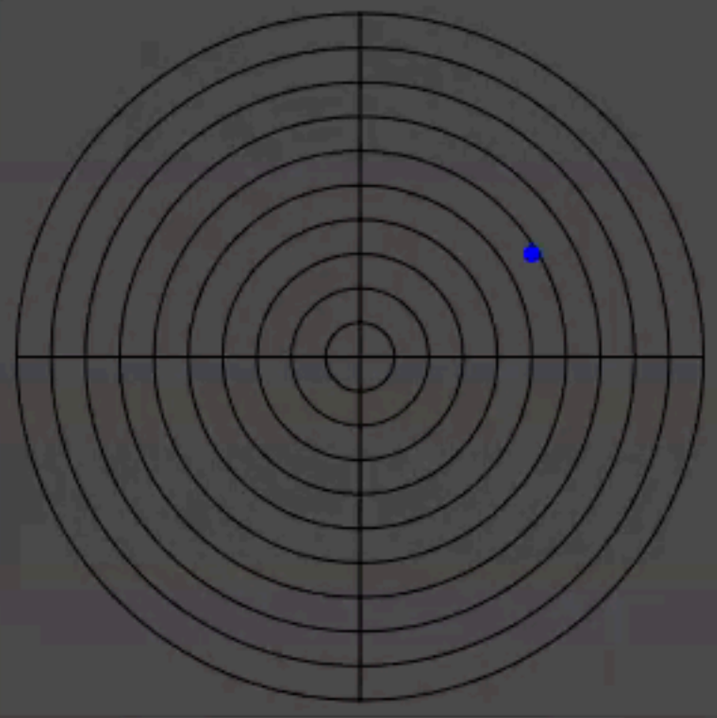
Offset X: 0.14sp

Offset Y: -5.61sp

Position

Position: 50 30

Radar



Takt: 2 Schlag: 3.000

MuseScore Datei Bearbeiten Einfügen Noten Darstellung Format Ansicht Plugins Hilfe (0:51)

R.59040f4 Nightly Build of MuseScore-SSMN: Promenade_Example

100% Page View

Concert Pitch

Paletten

- Vorschlagnoten
- Schlüssel
- Tonartvorzeichen
- Taktart
- Taktstriche
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- Notenköpfe
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- Fall/Doit
- Text
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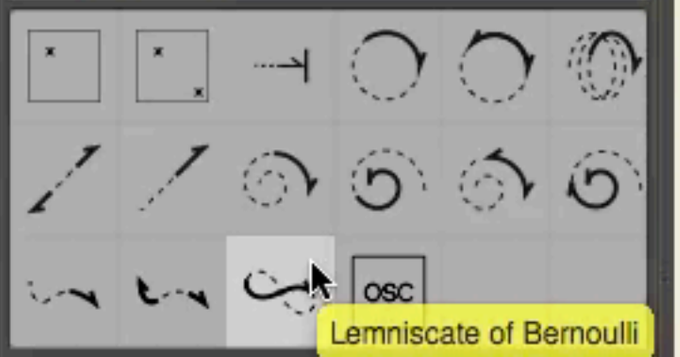


Promenade_Example*

Bilder einer Ausstellung

Promenade

Allegro giusto, nel modo russico; senza allegrezza, ma poco sostenuto.

Objekt-Inspektor

Sichtbar

Offset X: 0.38sp

Offset Y: -5.33sp

Slinky

Start Center: 0 70

End Center: 50 0

Radius: 50

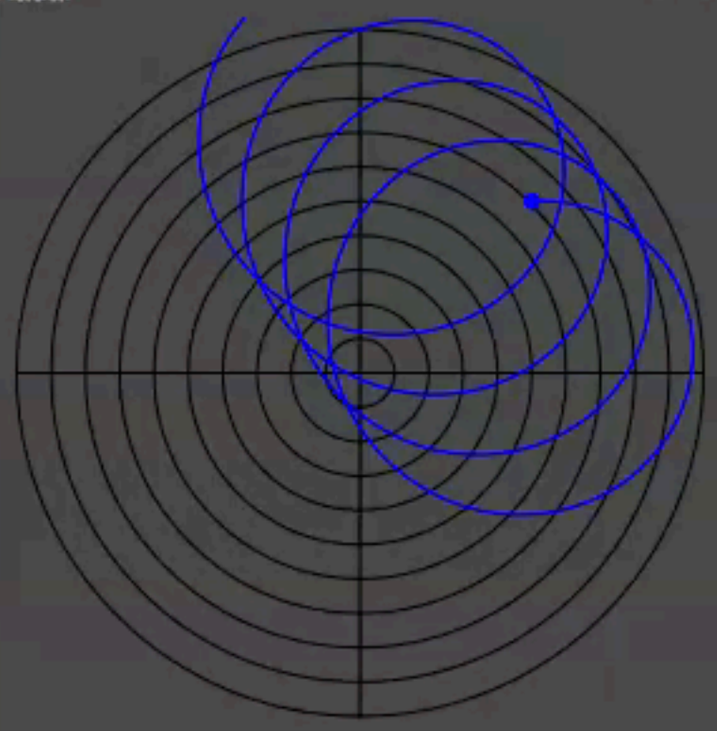
Direction: Anticlockwise

Rotations: 4

Start Angle: 0°

End Angle: 0°

Radar



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MuseScore Datei Bearbeiten Einfügen Noten Darstellung Format Ansicht Plugins Hilfe (0:51)

R.59040f4 Nightly Build of MuseScore-SSMN: Promenade_Example

100% Page View

Concert Pitch

Paletten

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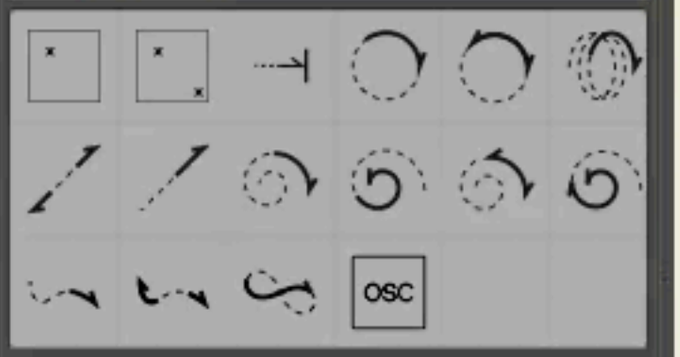


Promenade_Example*

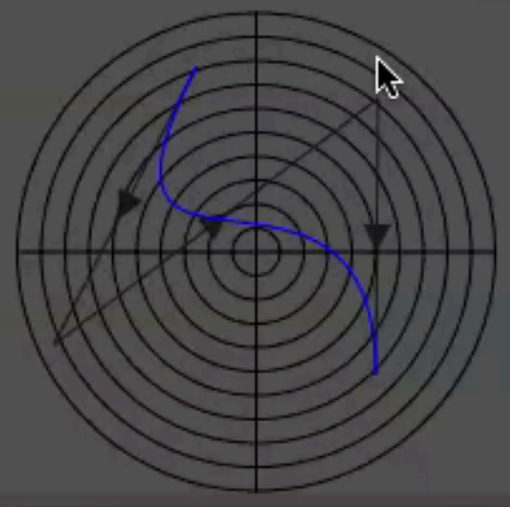
Bilder einer Ausstellung

Promenade

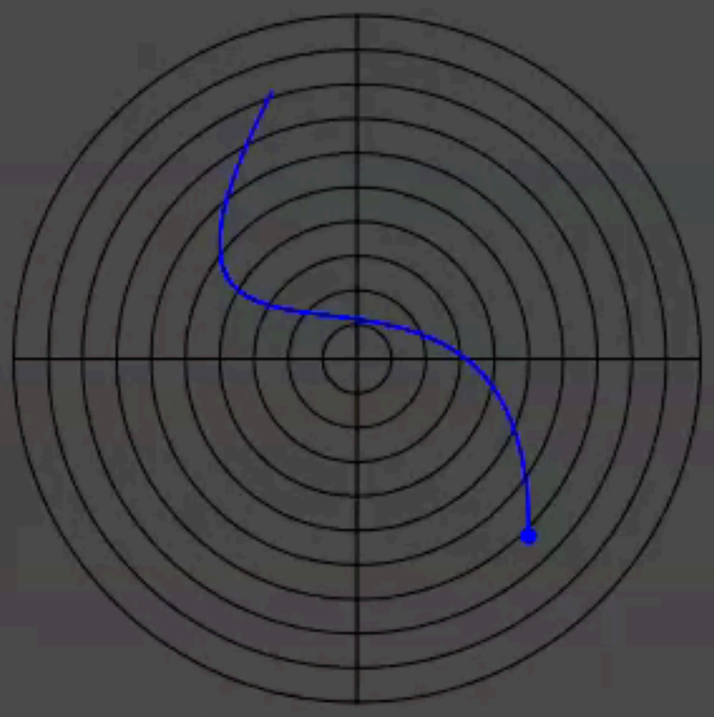
Allegro giusto, nel modo russico; senza allegrezza, ma poco sostenuto.

Objekt-Inspektor

Control point 1	-85	-39
Control point 2	51	64
End	50	-52



Radar



Takt: 2 Schlag: 3.000

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SSMN-RENDERING-ENGINE

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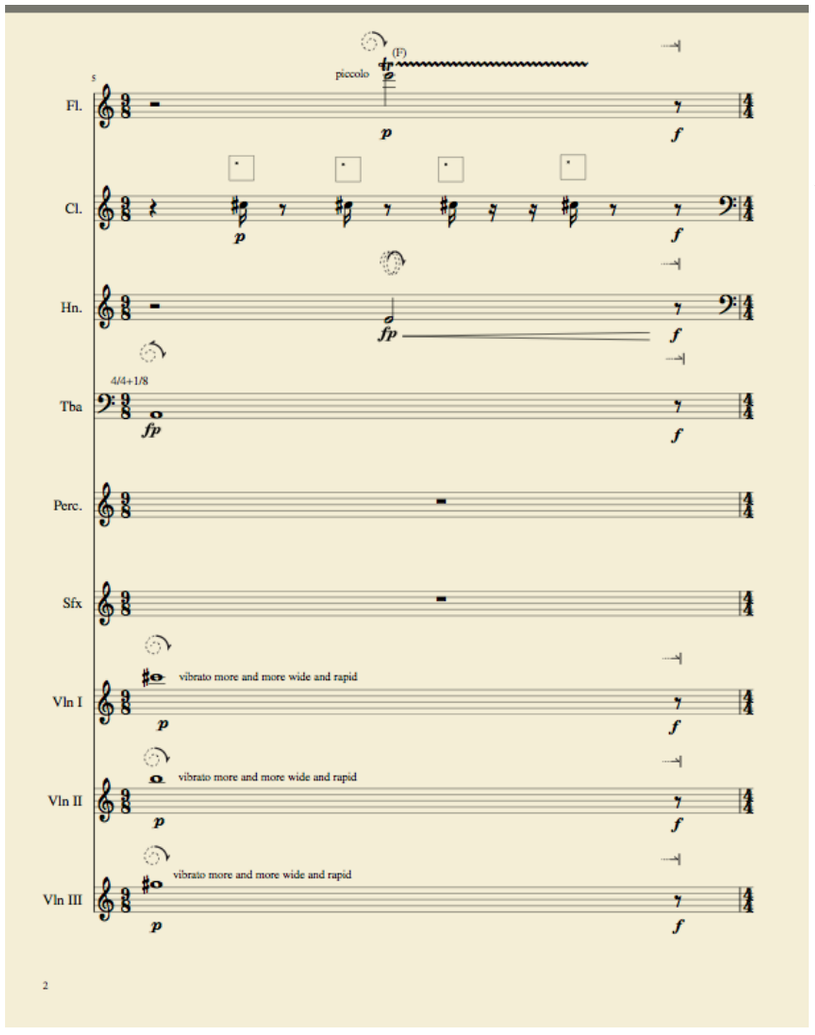
MuseScoreSSMN



Client

??

Taxonomie

2. **Descriptors of sound sources** (2D/3D)

a. Types of sound sources

i. Sound points (M)

1. Physical sound source – root sound (acoustical)

•		– Label (Name)

2. Projected audio signal* (PA)

⁂		– Label (Name)

* Microphone signal, audio files, streamed audio

ii. Groups

Definition: A group is a collection of sound points with common spatial features. A group is defined by a circular perimeter wherein the single elements can be found. Position and movement of single elements within the perimeter can be defined in the same way as single points.

1. Physical sound sources

⁂		– Label (name of group) – *Number of sources* – *Diameter* – ~~xyz~~*(1)* or ~~pod~~*(1)* (coordinates of point 1) – ~~xyz~~*(n)* or ~~pod~~*(n)* (coordinates of point n)

2. Projected audio signal

⁂		– Label (name of group) – *Number of sources* – *Diameter* – ~~xyz~~*(1)* or ~~pod~~*(1)* (coordinates of point 1) – ~~xyz~~*(n)* or ~~pod~~*(n)* (coordinates of point n)

iii. Planes

Definition: A plane is a homogenous sound spread out in space – often a stereo sound field (ex. motorway)

1. Projected audio signal

	– Label (Name) – *Number of sources*

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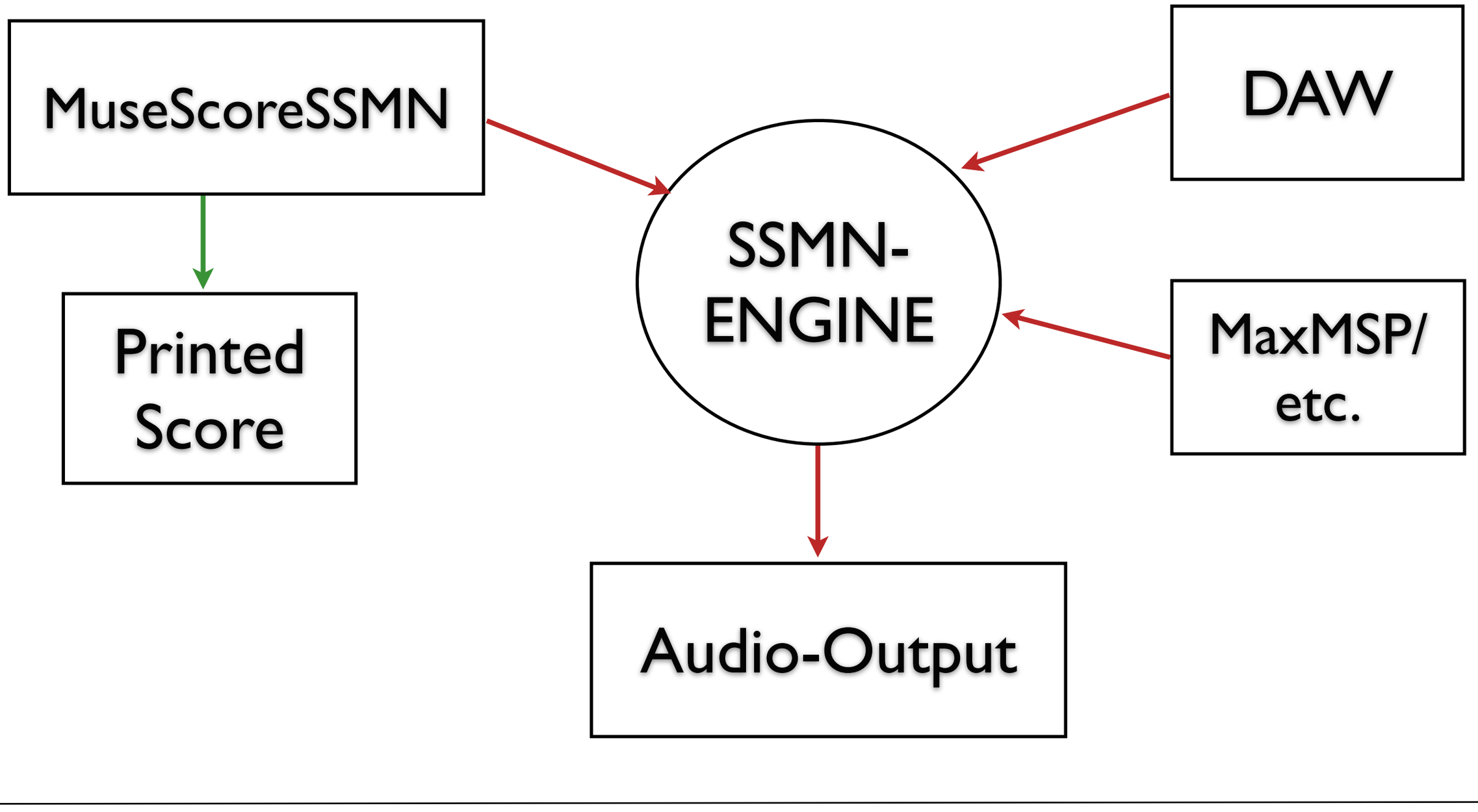

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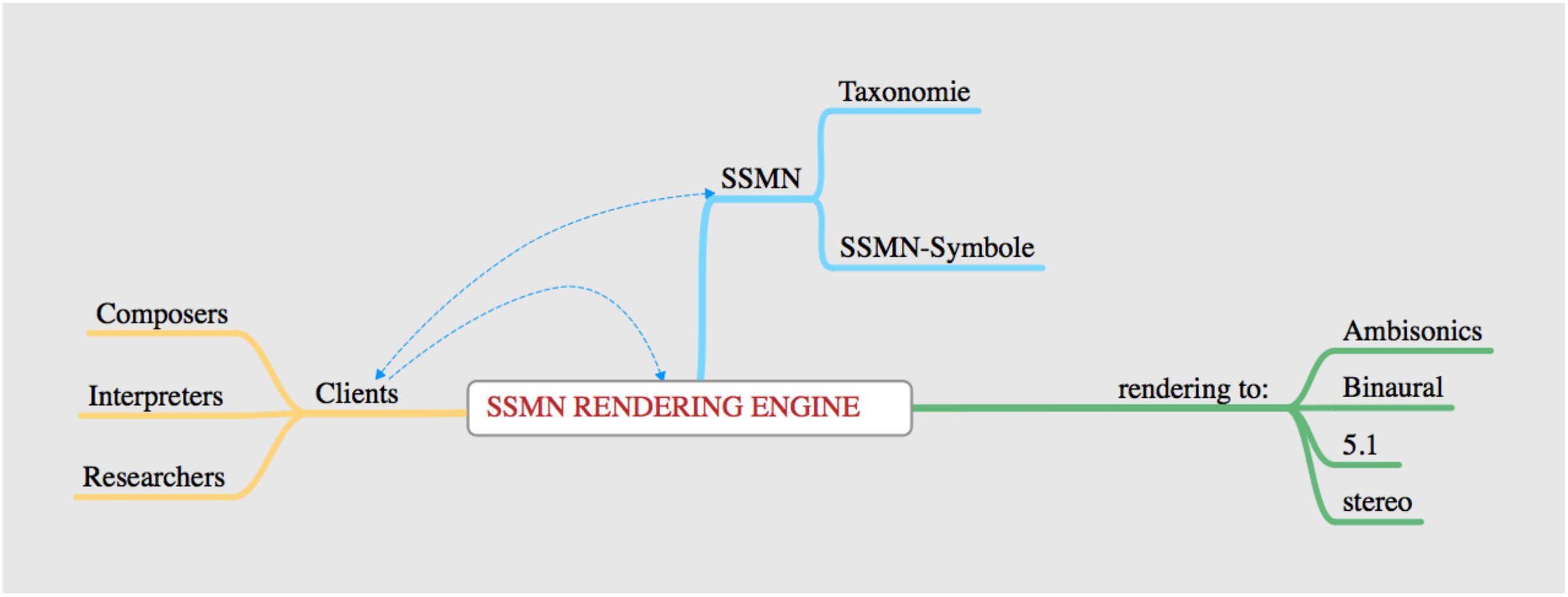

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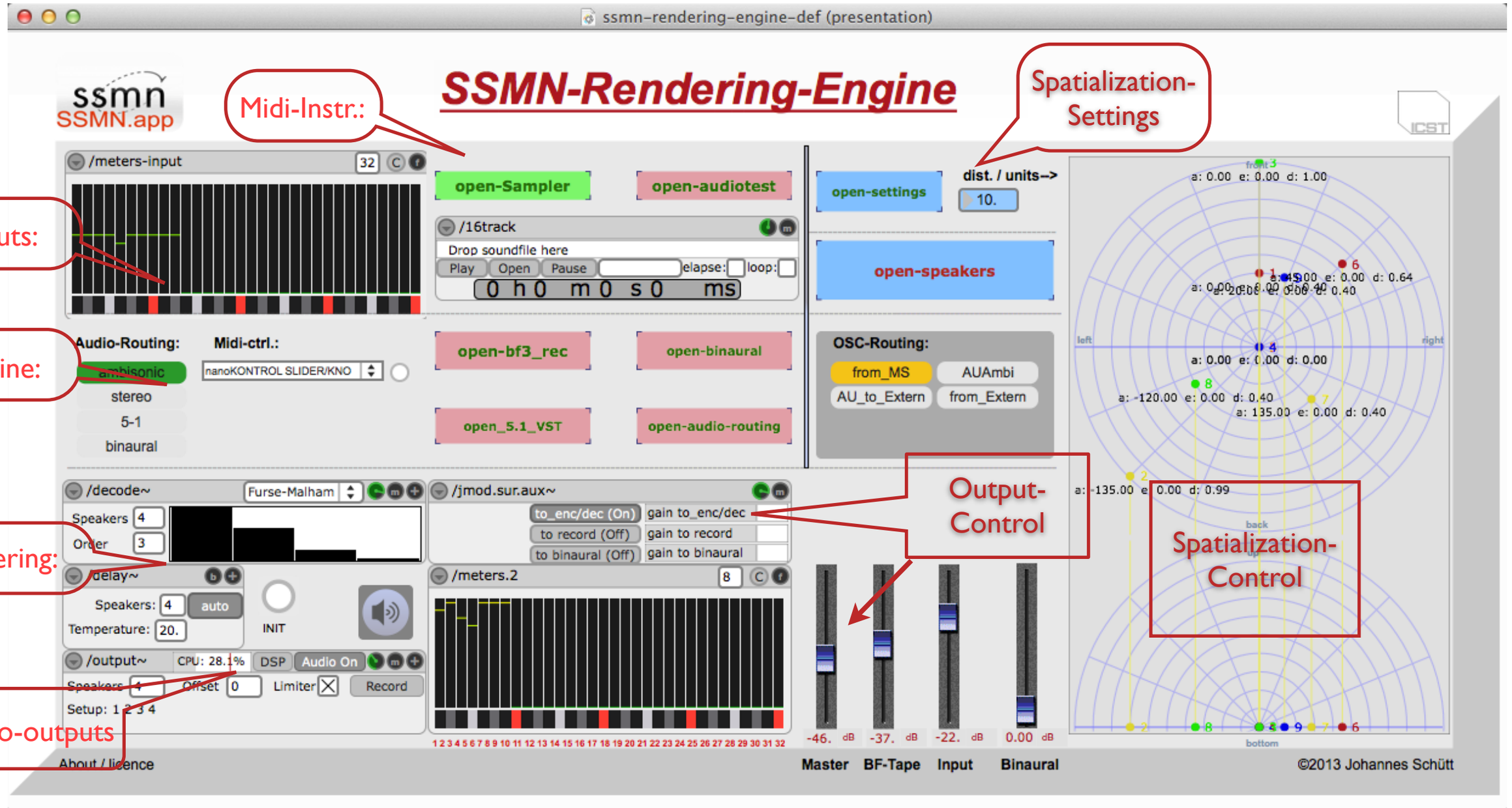

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SSMN - User-Cases:

MuseScoreSSMN and the SSMN - Engine.app

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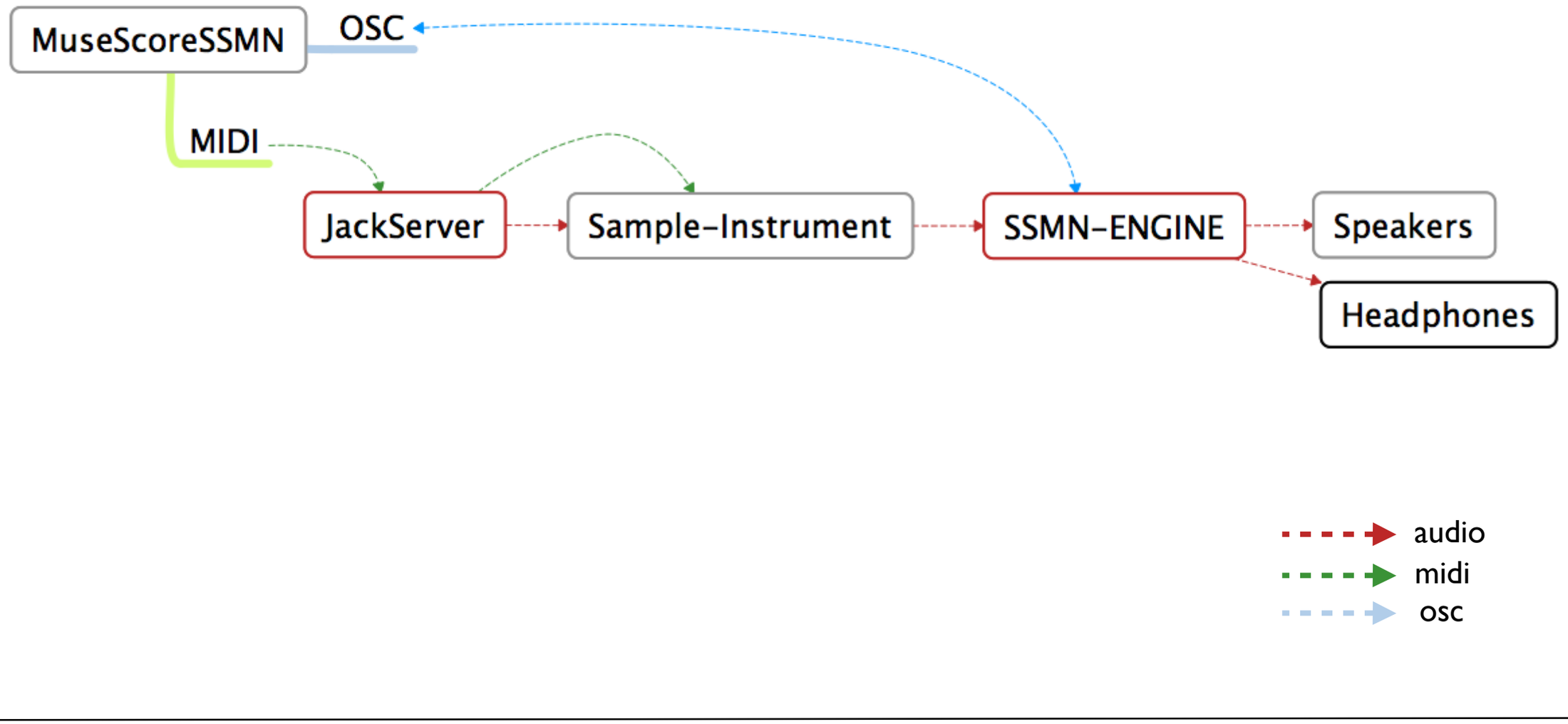
Workflow I



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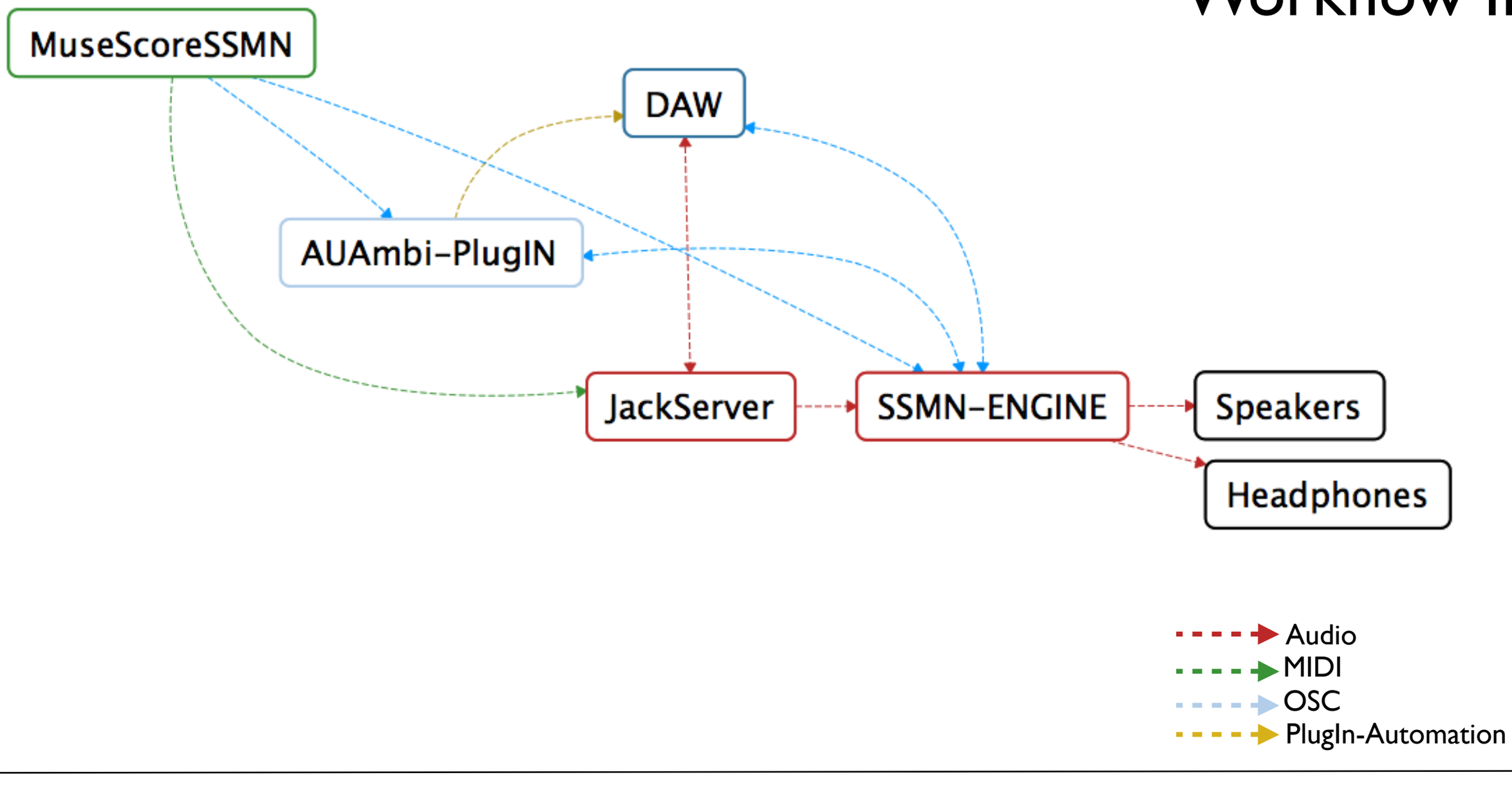
Workflow II



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Workflow Ex. I

MS-MIDI

Workflow Ex. I

MS-DP-8

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Example I

TanzHaus Film

Example II

URWERK Film

Vincent Gilliot