Recordare

MusicXML 2.0: Advances in Music Preparation and Distribution

Michael Good

Recordare LLC

Los Altos, California, USA

good@recordare.com

Outline

- ◆ **Introduction to MusicXML**

- ◆ **What's new in MusicXML 2.0**

- ◆ **MusicXML 2.0 and Requirements for a Music-editorial Data Format**

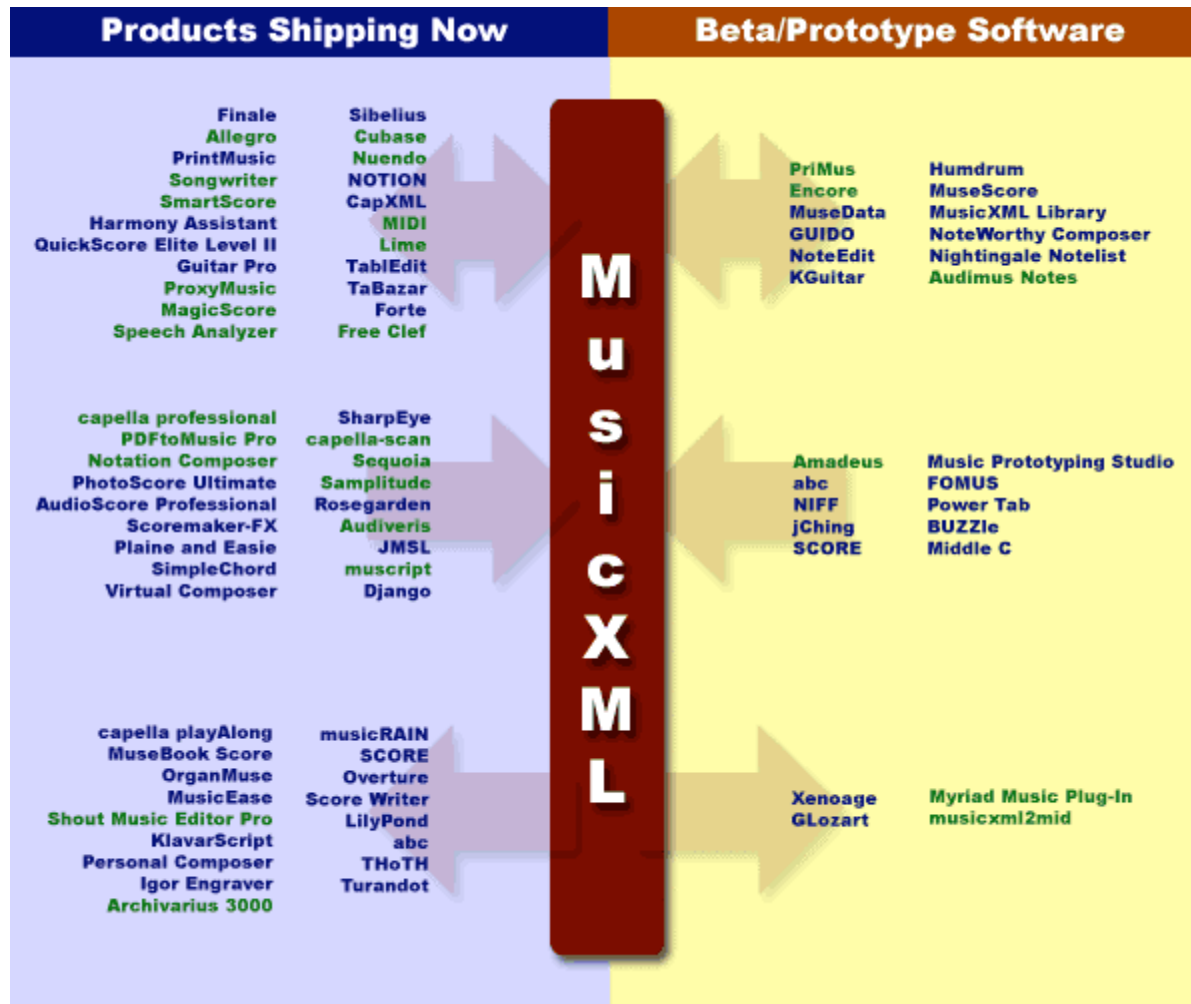 - ■ Content requirements
  - ■ Further questions - MusicXML ecosystem

What is MusicXML?

- The first standard computer format for common Western music notation
- Covers 17th century onwards
- Available via a royalty-free license
- Supported by over 80 applications, including Finale, Sibelius, capella, Cubase, and music scanners
- Useful for music display, performance, retrieval, and analysis applications
- Based on industry standard XML technology

MusicXML in 2006

MusicXML in 2007

Products Shipping Now		MusicXML	Beta/Prototype Software	
Finale	Sibelius		PriMus	Humdrum
Allegro	Cubase		Encore	MuseScore
PrintMusic	Nuendo		MuseData	MusicXML Library
Songwriter	NOTION		GUIDO	NoteWorthy Composer
SmartScore	CapXML		NoteEdit	Nightingale Notelist
Harmony Assistant	MIDI		KGuitar	Audimus Notes
QuickScore Elite Level II	Lime			
Guitar Pro	TablEdit			
ProxyMusic	TaBazar			
MagicScore	Forte			
Speech Analyzer	Free Clef			
capella professional	SharpEye		Amadeus	Music Prototyping Studio
PDFtoMusic Pro	capella-scan		abc	FOMUS
Notation Composer	Sequoia		NIFF	Power Tab
PhotoScore Ultimate	Samplitude		jChing	BUZZle
AudioScore Professional	Rosegarden		SCORE	Middle C
Scoremaker-FX	Audiveris			
Plaine and Easie	JMSL			
SimpleChord	muscript			
Virtual Composer	Django			
capella playAlong	musicRAIN		Xenoage	Myriad Music Plug-In
MuseBook Score	SCORE		GLozart	musicxml2mid
OrganMuse	Overture			
MusicEase	Score Writer			
Shout Music Editor Pro	LilyPond			
KlavarScript	abc			
Personal Composer	THoTH			
Igor Engraver	Turandot			
Archivarius 3000				

MusicXML Software Advances in 2007

- Finale 2008 and Sibelius 5.1 read MusicXML 2.0 files
- Dolet 4 for Finale writes MusicXML 2.0 files
- PDFtoMusic Pro allows conversion from legacy notation programs
- Notation Composer provides better conversion from MIDI files
- Cubase, Nuendo, Sequoia, and Samplitude add sequencer support
- PriMus, Encore, and Amadeus converter add beta support

What's New in MusicXML 2.0

◈ Standard compressed zip format

◈ A single file can now contain images, audio, bibliographic data, and multiple variants - all linked together

◈ Official IANA registered MIME media types

◈ 95 new features, including

- Better combination of music, text, and graphics
- New formatting features for both music and text
- Many features requested at Mainz last year

MusicXML 2.0 Goals

- Become the sheet music equivalent of MP3 files
- File sizes 20x smaller on average than uncompressed MusicXML files
- Become the format of choice for distributing digital sheet music with the widest use in music applications
- Provide new musical opportunities for performers and conductors
- Continued improvement in interchange for music preparation and publishing

MusicXML 2.0 Requirements Analysis

- Examples 1 – 4 set in Finale 2008 and exported to MusicXML 2.0

- Example 3 set so that MusicXML formatting data comes close to original manuscript

- MusicXML 2.0 files hand-edited to add features specific to editorial requirements

- Example 5 out of scope
  - Separate music repertoires require separate music formats

- Presentation covers Examples 1 and 3, editorial data from Example 4, plus further requirements

Example 1 – Bach

Bach Example:
Clef encoding


```
<clef number="1">
  <sign>G</sign>
  <line>2</line>
</clef>
<clef number="2">
  <sign>C</sign>
  <line>1</line>
</clef>
```

Bach Example:
Linking variants


```
<bookmark id="Bar2NoSlurs"/>
<link xlink:href="bach-2.xml#Bar2Slurs"/>
```



```
<bookmark id="Bar2Slurs"/>
<link xlink:href="bach-1.xml#Bar2NoSlurs"/>
```
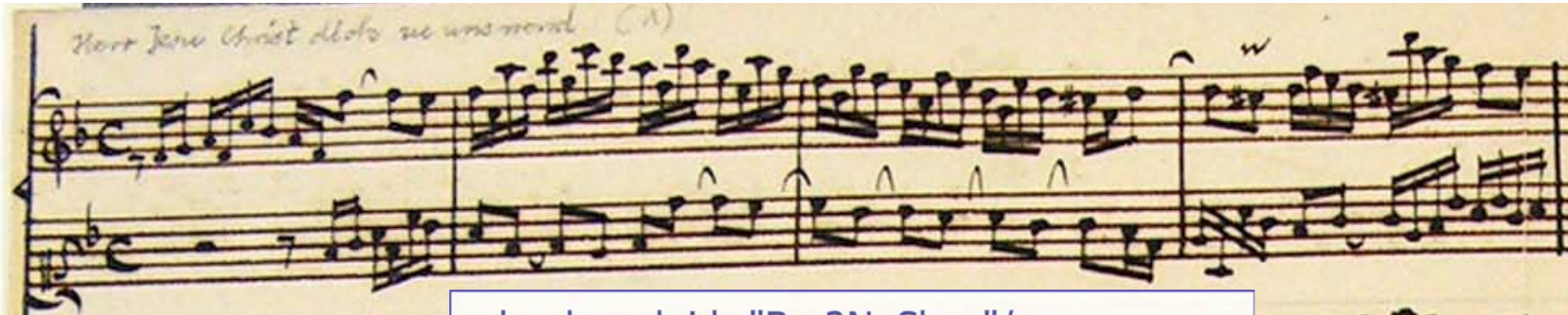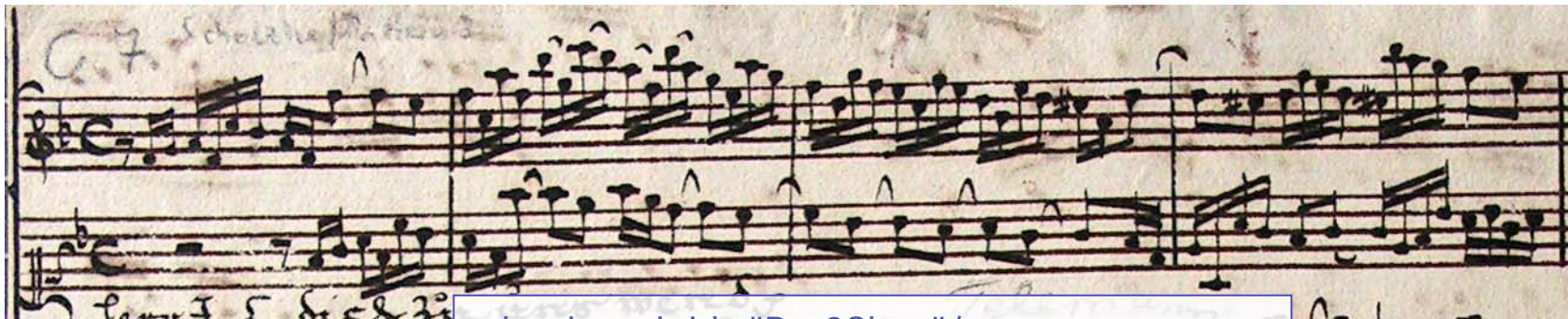
MusicXML 2.0 .mxl format for variants / multimedia

- Variants, images, audio, bibliographic data, etc. can all be stored and linked within a single zip file
- META-INF/container.xml points to root MusicXML file
- Editable using industry-standard tools like XMLSpy:
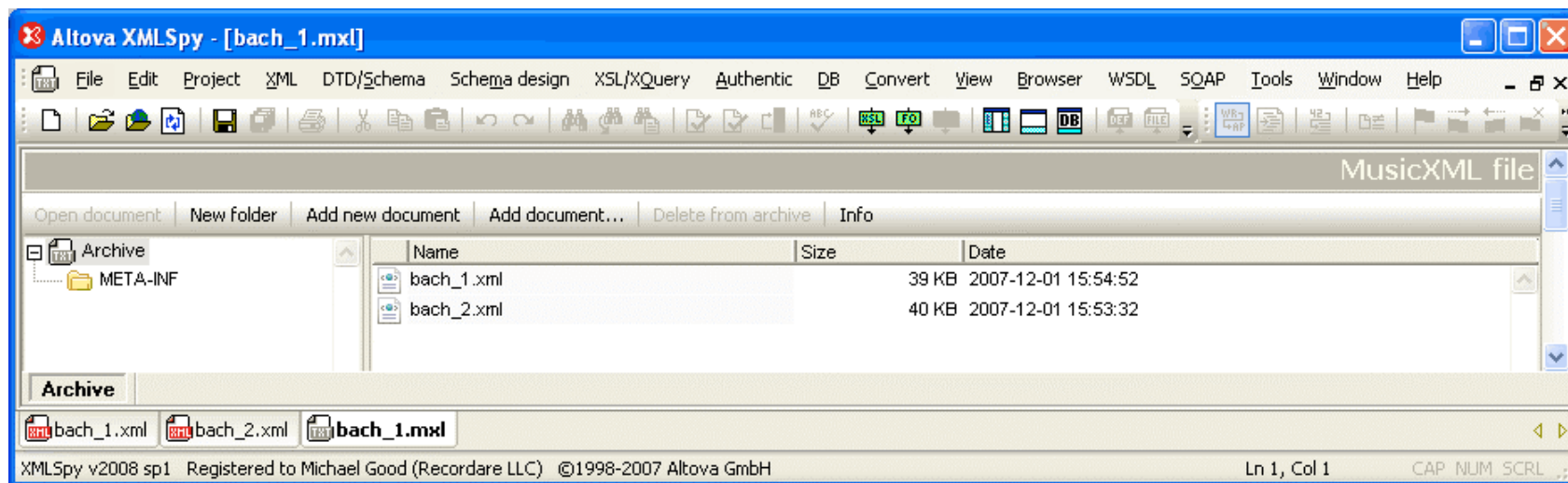
Example 1 container.xml file

```xml
<?xml version="1.0" encoding="UTF-8"?>
<container>
    <rootfiles>
        <rootfile full-path="bach_1.xml"/>
    </rootfiles>
</container>
```

Example 3 - Beethoven

Beethoven Example with Finale Overlay

Formatting Data Associated with Musical Data

```
<measure number="2" width="212">
  <note default-x="34">
```



```
<scaling>
  <millimeters>9.966</millimeters>
  <tenths>40</tenths>
</scaling>
```

```
<credit page="1">
  <credit-words default-x="1188" default-y="920"
    font-size="12" font-weight="bold"
    justify="right" line-through="1"
    valign="top">L. v. Beethoven</credit-words>
</credit>
```

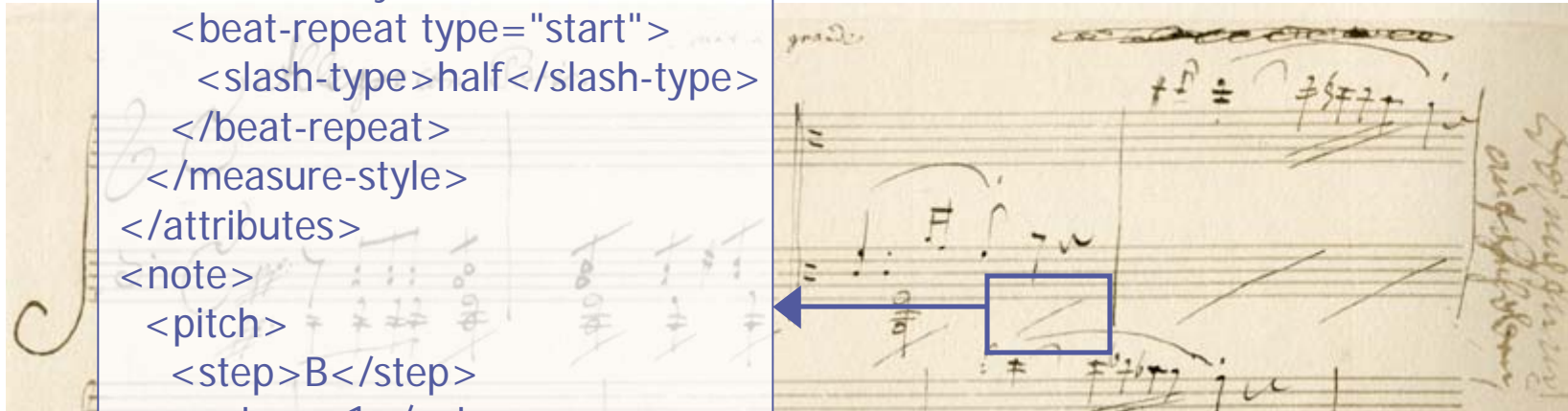# Beethoven Example: Dynamics
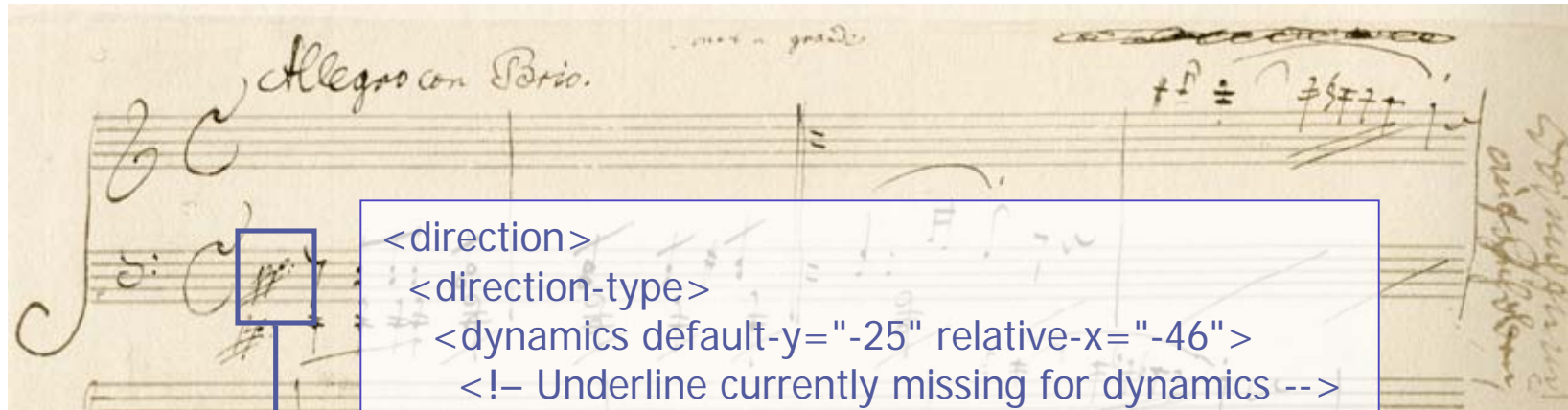
```
<direction>
 <direction-type>
  <dynamics default-y="-25" relative-x="-46">
   <!– Underline currently missing for dynamics -->
   <?editorial underline="2"?>
   <pp/>
   <other-dynamics>:</other-dynamics>
  </dynamics>
 </direction-type>
 <staff>2</staff>
</direction>
```

Beethoven Example: Note repetition
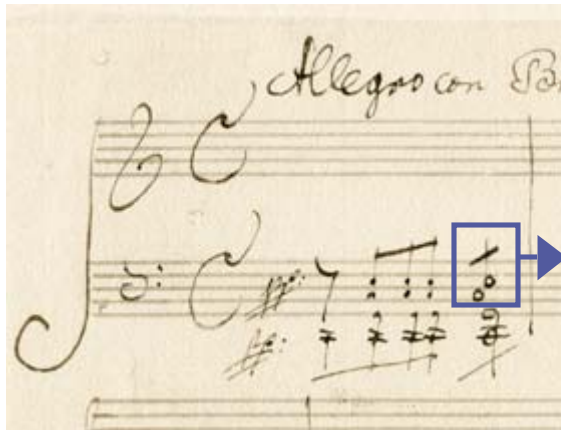

```
<note default-x="265">          <backup>
  <cue/>                          <duration>8</duration>
  <pitch>                       </backup>
    <step>C</step>              <note print-object="no">
    <octave>3</octave>           <pitch>
  </pitch>                         <step>C</step>
  <duration>8</duration>          <octave>3</octave>
  <type                         </pitch>
   size="full">half</type>      <duration>2</duration>
  <notations>                   <type>eighth</type>
   <ornaments>                 </note>
     <tremolo>1</tremolo>
   </ornaments>
  </notations>
</note>
```
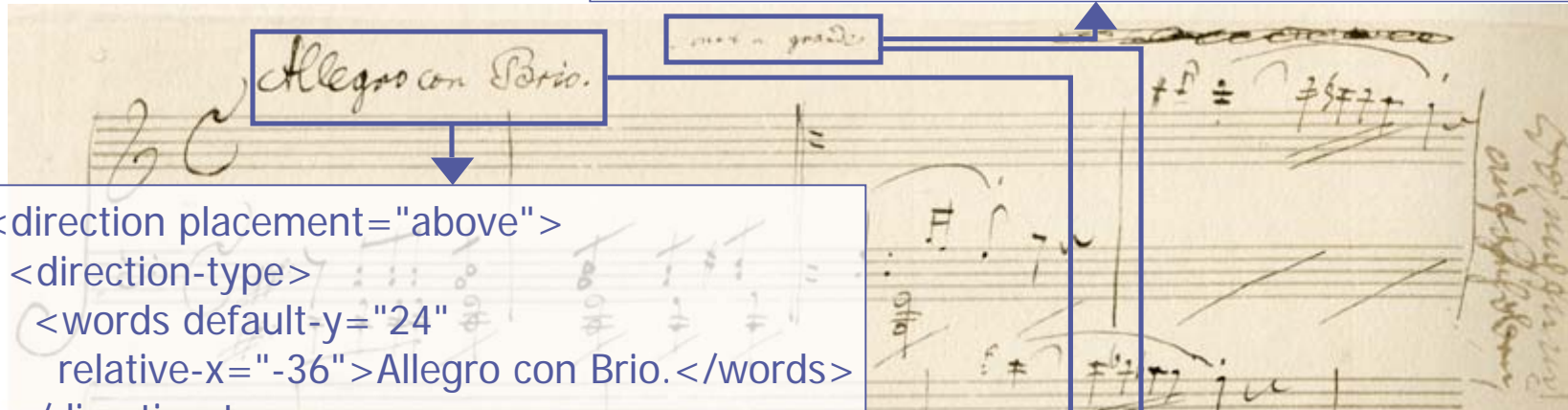
Beethoven Example: Beat repetition

```
<attributes>
  <measure-style number="2">
    <beat-repeat type="start">
      <slash-type>half</slash-type>
    </beat-repeat>
  </measure-style>
</attributes>
<note>
  <pitch>
    <step>B</step>
    <octave>1</octave>
  </pitch>
  <duration>2</duration>
  <voice>2</voice>
  <type>eighth</type>
  <staff>2</staff>
</note>
```

Beethoven Example: Titles

```
<credit page="1">
  <credit-words default-x="708" default-y="921"
    font-size="12" font-weight="bold" justify="center"
    valign="top">Sonata grande</credit-words>
</credit>
```
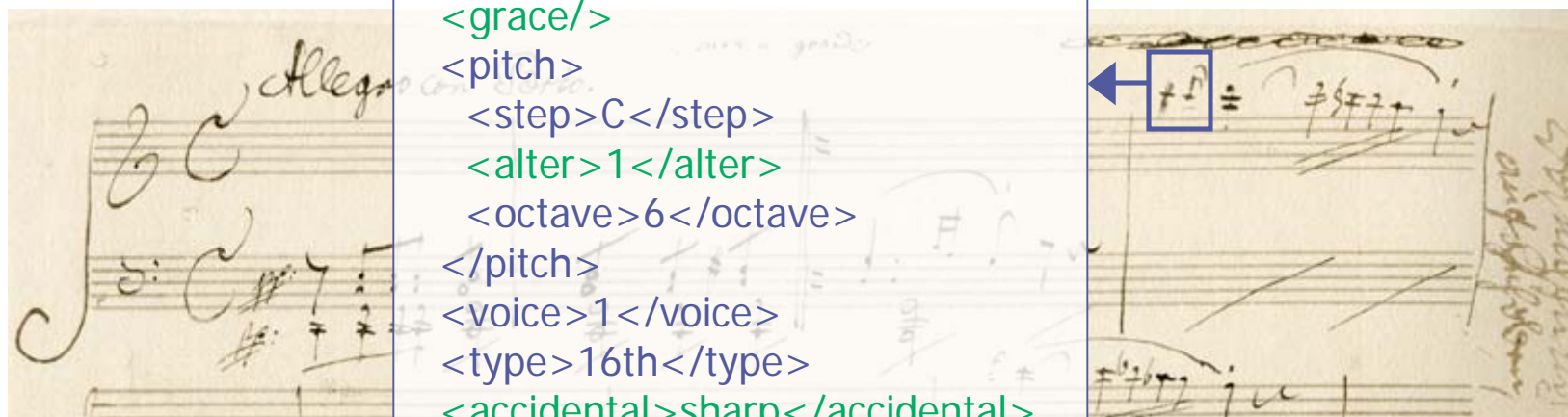
```
<direction placement="above">
  <direction-type>
    <words default-y="24"
      relative-x="-36">Allegro con Brio.</words>
  </direction-type>
  <staff>1</staff>
</direction>
```
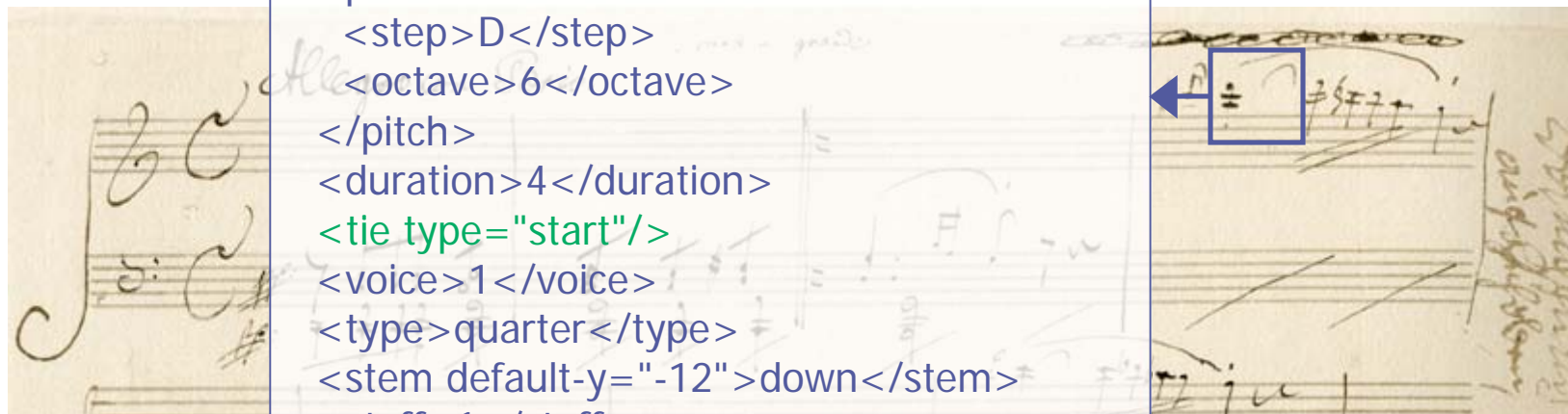
```
<work>
  <work-title>Sonata grande</work-title>
</work>
<movement-title>Allegro con Brio</movement-title>
```

Beethoven Example:
Rotated text

```xml
<direction>
 <direction-type>
  <words default-y="-27" relative-x="27"
   rotation="90" xml:lang="de">Dämpfung
aufgehoben</words>
 </direction-type>
</direction>
```

Beethoven Example: Accidental, grace note


```
<note default-x="42">
  <grace/>
  <pitch>
    <step>C</step>
    <alter>1</alter>
    <octave>6</octave>
  </pitch>
  <voice>1</voice>
  <type>16th</type>
  <accidental>sharp</accidental>
  <stem default-y="42">up</stem>
  <staff>1</staff>
</note>
```

Beethoven Example:
Slurs and ties

```xml
<note default-x="64">
  <pitch>
    <step>D</step>
    <octave>6</octave>
  </pitch>
  <duration>4</duration>
  <tie type="start"/>
  <voice>1</voice>
  <type>quarter</type>
  <stem default-y="-12">down</stem>
  <staff>1</staff>
  <notations>
    <tied type="start"/>
    <slur bezier-x="32" bezier-y="21"
      default-x="6" default-y="35" number="1"
      placement="above" type="start"/>
  </notations>
</note>
```
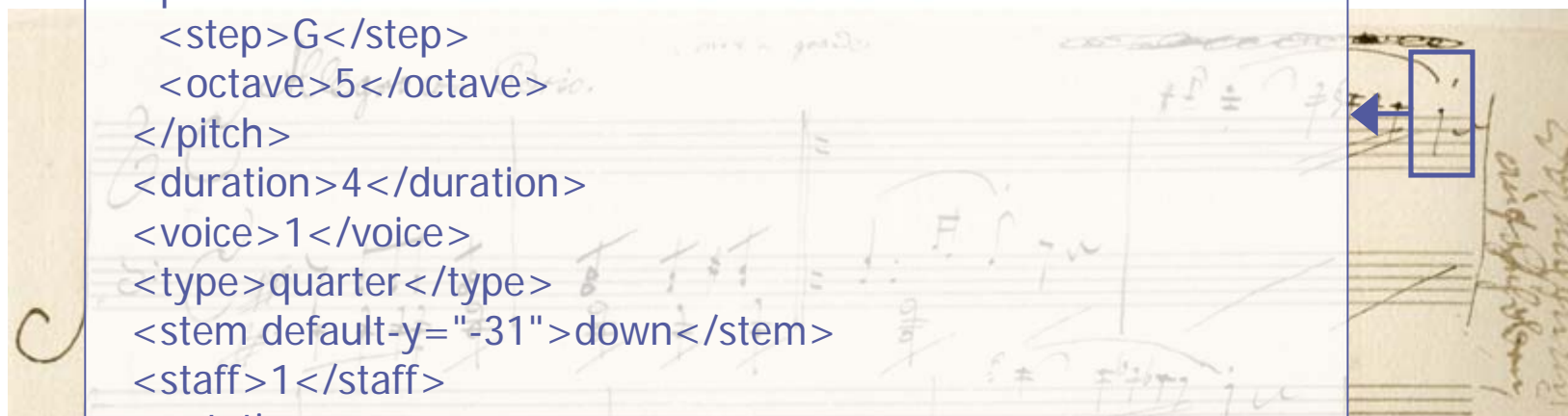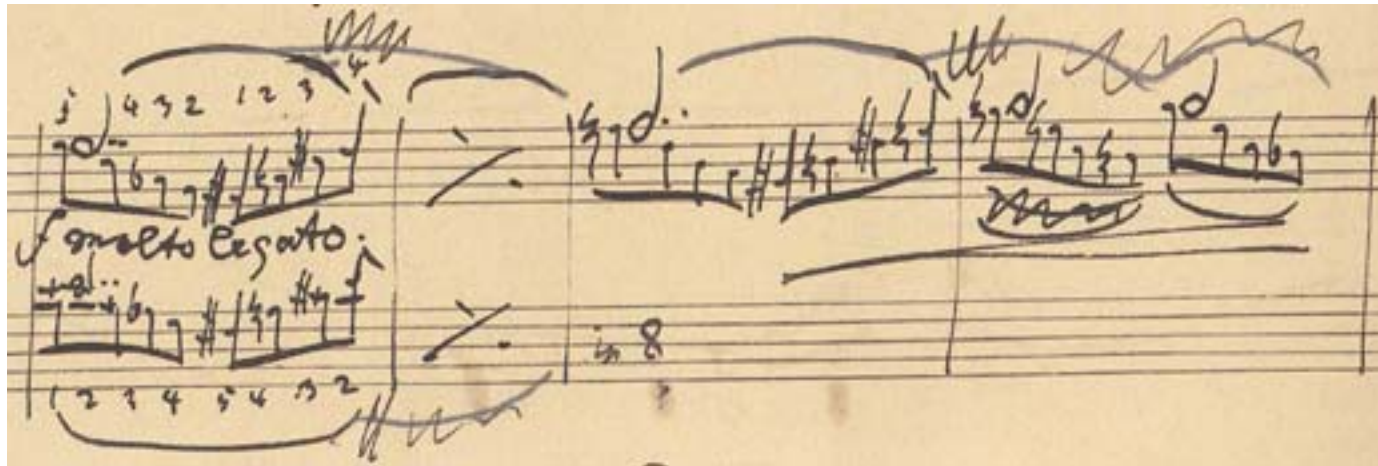
Beethoven Example: Stroke, end of slur

```
<note default-x="218">
  <pitch>
    <step>G</step>
    <octave>5</octave>
  </pitch>
  <duration>4</duration>
  <voice>1</voice>
  <type>quarter</type>
  <stem default-y="-31">down</stem>
  <staff>1</staff>
  <notations>
    <slur bezier-x="-29" bezier-y="25" default-x="6" default-y="23"
      number="1" type="stop"/>
    <articulations>
      <spiccato default-y="20" placement="above" relative-x="10"/>
    </articulations>
  </notations>
</note>
```
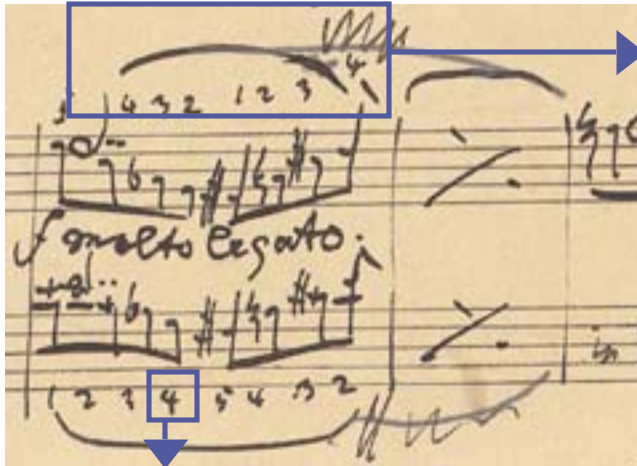
Example 4 - Brahms

Brahms Example:
Editorial data, fingering

```
<notations>
 <level>1</level>
 <slur number="1"
  bezier-x="63" bezier-y="27"
  default-x="19" default-y="26"
  placement="above" type="start"/>
</notations>
<notations>
 <level reference="yes">2 (pencil)</level>
 <slur number="2"
  bezier-x="90" bezier-y="26"
  default-x="19" default-y="26"
  placement="above" type="start"/>
</notations>
```

```
<notations>
 <technical>
  <fingering default-y="-53"
   placement="below">4</fingering>
 </technical>
</notations>
```

MusicXML Ecosystem

- Supported by over 80 applications, including:
  - Major commercial scorewriters (Finale, Sibelius, capella)
  - Major academic formats (MuseData, Humdrum)
  - Legacy formats (PDF from other scorewriters, MIDI)
- MusicXML 2.0 is defined with a DTD
- W3C XML Schema version under investigation
- Published under perpetual royalty-free license
- Active community participation in format development
- Pervasive use in commercial music preparation
- Increasing use in academic music research

For More Information

- www.musicxml.org/xml.html
- Site includes
    - Specification (MusicXML DTD)
    - Tutorial
    - Example files
    - Links to MusicXML software
    - Publications list at www.musicxml.org/xml/publications.html
- MusicXML questions?
    - Mailing list signup: www.musicxml.org/lists#MusicXML
    - E-mail to info@recordare.com

Conclusions

◆ MusicXML is the only standard format for high-fidelity encoding of common Western music notation

◆ Compressed MusicXML 2.0 .mxl files meet the needs for multiple variants and multimedia in a single document

◆ Use specialized formats to fill particular needs for early music and bibliographic information

◆ Version 2.0 fills the gaps for music-editorial applications raised at the Mainz conference