Chapter - 4

Digitization of Music
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Music has a history as old as human civilization. As seen earlier it has become an integral part of human life. It has grown in size, all its forms and has transcended geographical barriers to spread world wide.

Humans expressed their ideas, thoughts, emotions and feelings through verbal and non-verbal communication. The verbal communication is done through sound however; the non-verbal communication is made through gesticulation, sign language, text and pictures. Because of the need to preserve these expressions over a longer duration, these forms of expression manifested into a physical medium viz. print and non print media like books, serials, drawings, paintings, music scores, LP records, Cassettes, audio-visual tapes, etc.

Fascination and need to store and preserve the generated ideas recorded into physical medium for posterity led to the development of techniques and skills for storing, organizing, retrieving and making the material available as and when required. Evolution and application of these techniques to libraries has changed the field of libraries and information centers.

Every realm of life today has been touched and influenced upon by technology and the field of libraries and information centres too have been benefited immensely by the advent of Information Technology.

4.1 Digitization

One of the desirable outcomes of technological developments is digitization or digitalization. Digitization is a process by which the data (in whatsoever form it
may be) is converted into digital form (electronic form) which could be handled using electronic devices like computers and data processing machines.

In words of Paul Conway digitization is

*the process of translating the object or idea into a numerical code. The baseline of digital technology is a coding system with only two numbers i.e. '0's and '1's.*

(1)

The process of converting analogue data or print data into binary formats involves various steps viz.

a. Scanning

b. Cropping

c. OCR

d. Making data compatible for access on Internet

The infrastructural set up of scanners and computers is essential for it. Software viz. Greenstone, Dspace which are specially designed for this purpose are available.

4.2 Advantages of Digitization

Amongst several advantages of digitization, some of the most noteworthy are:

- Space required for storage of material is saved
- Easy and faster access to any type of material
- Barriers of space and time in accessing the information are overcome
- Creation of multiple copies has become easier
- Preservation for posterity is facilitated
Music, which is a part and parcel of our life, has also witnessed changes caused due to technological impact. The invention of gramophone records facilitated the duplication of music in an easy way and also enabled its transcending of the geographical borders. The journey from this point onwards towards digital mode of recording and its duplication made music accessible with relative ease. Compression technologies have enabled storage of large amount and high quality of music storage in less and less digital space. Access to music also has become truly global. Easy access to music for download from the Internet on to desktops, Ipods, mobile phones and other portable devices are a brute testimony to this. Thus, it can be said that as the technologies of duplication and distribution bloomed in the last century, consumerism bloomed too and music rapidly adapted to the culture of copy. Music in the form of sound data has two dimensions especially from the perspectives of the creator i.e. performer and the receiver i.e. the music enthusiast. Definitely there is a difference in music and music delivery. (2)

There are few conventional and well established modes of music delivery:

- Live concerts – during the very early days, this was the only way to spread music from generator to the recipient (i.e. performer to the listener of music). The number of recipients thus, was limited due to the limitations of physical space. In absence of a recording facility at the concert, the music rendered remained embedded in the hearts and minds of the audience which faded with time

- Pre recorded music and its distribution by the music companies through media and channels viz.
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- LP records
- Audio cassettes
- CDs, DVDs, and other digital media
- Online availability of music on Internet many times free of cost

The delivery of music in this form eliminated the early limitations of space and time and actually facilitated the access to it on as and when basis. However, the dependence on playback device made the accessibility restricted to a set of people having an access to the playback device. Even today, there are innumerable examples of music enthusiasts being in possession of large number of gramophone records and are not able to listen to them due to non availability of a playback system.

- Broadcasting through media like Radio & Television facilitated the surmounting of geographical limitations and the expensive playback devices. Thus, the number of recipients virtually became unlimited. Recording facilities enabled the re-telecast of the programmes as and when desired / required

The digitization of music and its output also has had various evolutionary phases i.e.

- Availability of digitized music through CDs, DVDs, Internet, Media Clips
- High density compression technology facilitated the storage of large amount of music data in smaller digital storage space. MP3 / MP4 and related compression technologies made the music portable through
playback devices like CD Walkmans, iPods, USB Devices, mobile phones, etc.

- These developments in storage and playing media led to ubiquitous music whereby music lovers could enjoy music in cars, trains, air planes, ships, etc. while traveling anywhere

- Availability of music data on Internet became possible only due to digitization of music. Due to this awareness about availability of music data through powerful search engines and its download, mostly free, enabled wide distribution of the music data without any barriers of space and time

The following table outlines the historical perspective of the various storage media and their features. This table lists the media, their storage capacity and the period during which they were popular and prevalent.

<table>
<thead>
<tr>
<th>Media</th>
<th>Type and recording capacity in minutes</th>
<th>Year of existence</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wax cylinder</td>
<td>2-4 minutes. Wax or similar material</td>
<td>1888 - 1929</td>
</tr>
<tr>
<td>Records with wide groove</td>
<td>(Shellac, other material) Diameter 5.5&quot; to 16&quot; (transcription records). Speeds 78.26rpm (actually 72-82). Or 60 - 130rpm before 1930</td>
<td>1890 - 1960</td>
</tr>
<tr>
<td>Records with narrow groove</td>
<td>Vinyl, diameter 7&quot; for 45rpm, 10 or 12&quot; rpm 33 1/3rpm. Narrower groove</td>
<td>1949 - today</td>
</tr>
<tr>
<td>Recording wire</td>
<td>Magnetized wire, usually 15-30 min, one way</td>
<td>1945 - 1955</td>
</tr>
<tr>
<td>Magnetic tapes</td>
<td>1/4&quot;-2 Width, 3-10 ½ spools. Speeds 1 7/8, 3 ¾, 7/8, 15 and 30 IPS (inches per minute) (or 4.75, 9.5, 19 and 38 cm/sec)</td>
<td>1945 - today</td>
</tr>
<tr>
<td>Stereo 4-track cartridge</td>
<td>1.4&quot; wide, 3.75 IPS</td>
<td>1962 - 1970</td>
</tr>
<tr>
<td>Compact cassette</td>
<td>1 7/8 IPS, hard box</td>
<td>1965 - today</td>
</tr>
<tr>
<td>Micro cassette / Mini Cassette</td>
<td>2-4 cm cassettes, 1 7/8-3.75</td>
<td>1977, today</td>
</tr>
</tbody>
</table>
4.3 Reasons for Music Digitization

Following are some of the compelling reasons for initiating digitization of music for not only archival but dissemination purposes

- Easy availability of digitization machines of high resolution at market at affordable costs for audio data
- Easy availability and affordability of mass storage digital media
- Availability of a host of softwares viz. SONY Sound Forge, Cakewalk, Vinyl Studio, etc.
- Unavailability of analog machines especially the playback and duplicating machines for audio visual media
- Unfamiliarity with analog techniques
- Huge maintenance issues of the analog machines

4.4 Advantages of Digitization of Music

Apart of the compelling reasons of digitization in general as listed above, some of the major benefits of music digitization are

<table>
<thead>
<tr>
<th>Stereo 8-track cartridge</th>
<th>1.4&quot; width, 3.75 IPS,</th>
<th>1965 - 1975</th>
</tr>
</thead>
<tbody>
<tr>
<td>Optical or magnetic recording of sound in movies film</td>
<td>Audio band in 8, 16, 35 mm films</td>
<td>1918, 1950 (optical), 1950-today (magnetic)</td>
</tr>
<tr>
<td>Magnetic tapes for digital recording</td>
<td>PCM-F1, DAT, VIDEO PCM, ADAT, high8 8 track</td>
<td>1985, today</td>
</tr>
</tbody>
</table>

Table 13: Showing the popular music storage media in chronological order (3)
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- Ease of access to the choice of music due to non-sequential access provided by the digital medium
- Multiplicity of choice of music available
- Full autonomy in access to music
- Reduced risk of damages to physical material including possible damages arising out of repetitive use (as in the case of cassettes and gramophone records)
- Easy management of material in digital form as compared to its physical equivalent
- Reduced requirement of storage space
- Boundless possibilities of hosting a large repository of music in the form of Music Stations for access through multiple channels including Internet and mobile phones
- Innovative channels of music delivery through telephone and mobile coupled with launch exciting services like Ring Back Tones (RBT) / Customized Caller Tunes, Music Stations have been possible only because of digitization of music
- All these make music more affordable now since the market reach is global and distribution channels can ensure Direct-to-home (DTH) delivery through Internet

Along with the advantages of music digitization the disadvantages identified are listed below:
a. Too much ease of duplication triggering innumerable copyright and Intellectual Property Rights (IPR) issues, threatening the very existence of music producing companies and affecting their whole economics

b. Use of Proprietary standards resulting into the problem of compatibility of the downloaded music data rendering it non-usable on standard playback devices

c. Downloading the web-based music in digital form is cumbersome, painstaking and time consuming on low speed Internet connections

d. Due to digitization it is now easy to filter, store, rearrange, remix and to make mess out of music. This is contradictory to the creation of music which is a rather tough task. As it is rightly pointed out “with digitization, music went from being a noun, to a verb ---.”(4)

e. Durability of variety of physical media storing digitized music is still unknown

4.5 Music Digitization Process

There are several documented processes of music digitization. The process of music digitization does not confine only to conversion of music in analog form to its digital equivalent. It includes the conversion of music in other forms viz. sheet music on paper, sheet music on microforms, etc. Conversion of the metadata pertaining to the music being digitized is an essential component of the music digitization process. It also encompasses the deployment of sound engineering and technology which involves improving of the quality of sound being recorded.

There are patents awarded for music digitization. However, these processes differ from each other based on the purpose or the resultant output desired e.g. the
process of music digitization for a music library archiving its in-house collection will be different from the process deployed by a music company for access through mobile phones. In view of the substantial diversities on the processes of music digitization, the researcher describes below a generic process:

a. Reading and conversion

This is the main process in which the physical material of analogue data is read and converted into digitized form. The essential infrastructure for this will be:

i. An analog machine to playback analog music recording

ii. Analog to digital conversion machine

iii. Digital storage machine

b. Documentation - Database of digitized file is created together with the corresponding metadata where they will be stored and documented adequately for easy retrieval as and when required

c. Storage of file – Selection of useful part with proper adaptations

- Rearrangement of tracks

- Storage on mass storage media

The entire process of music digitization is both elaborate and requires good investment of resources including time.

The author provides below a flow chart of the entire process of music digitization in its generic form.
Selection of material

Recording of Material's Properties in a Database

Is the material problematic? 

YES: Preparation / stabilization of the material

NO: Reproduction and Digitization machines adjustments

A/D Conversion

Is the quality satisfactory? (Quality control)

YES: Storage in high resolution

Does it consist of more than one part?

YES: Separation of parts

NO: Recording of Metadata in D.B. part?

Conversion to other formats

Storage in digital media

Recording of media in D.B.s

Safe-keeping of digital media and original material

Preparation for promotion - Copyright ©

Promotion - Exploitation

Figure 1: Music Digitization Process (5)
4.6 Digitization of music and role of music library in that context

Music libraries foremost and basic function is to preserve the musical heritage for posterity. Musical heritage consists of print music and sound recordings.

Digitization of music in context of libraries is the digitization of sheet music and sound recordings.

Many leading libraries have undertaken the projects to digitize their collections of music material (List of such projects is enclosed in Appendix No 9), mainly of the sheet music in their possession. Digitization of sound data has been considered slowly due to the complexities and the costs involved in the same. The example worth mentioning is of Indiana University, USA. The Indiana University has undertaken the project of digitizing their collection of sound records. Here the University has taken help of the IBM for digitization of sound records. The goal here was to put the converted music onto the web. Sometimes digitization of scores is a very cumbersome process. The large and odd size of the scores and their heavy use by performing artists seem to be challenge in digitization process.

4.7 Indian Scene

India has a very rich musical heritage. The Indian music is as old as vedic period. Samveda is supposed to be the originator of Indian music. Since its inception Indian Music has developed in leaps and bounds. The main categories of Indian Music are North Indian and Carnatac Music.
North Indian Music has also further developed like- Pure Classical, Semi Classical, Devotional Music, Sufi Music, Lyrics, Folk Music, Film Music, Light Music and so on - multiple permutations and combinations crop up here:

Such a vast heritage of Indian music is preserved not through well-established library system of Music Libraries. Few libraries of Arts Institute or some examples of music collections at some university libraries, collections at personal levels do exist. But an integrated effort from library point of view does not exist in our country. Mr. Sisir Kumar Mukherjee highlights this also.

_We, in this developing country, remain contented with this boastful development of a Bibliographic Saga, but we can hardly claim any achievement in the sphere of the Music Library Movement, the concept, having no foothold on this culturally affluent land of music heritage._ (6)

Indian music differs from the western music in various aspects. The first and foremost striking aspect it that it is not both print and published one. That's why the performance is totally artist based.

Preservation of music here is mainly through Oral Tradition and Gurukul system of music teaching. This was very strong and rigid in old days. Today it is not a strong as previous one but it still exists in principle. Efforts for preservation through well established library system should be initialized.

Indian music also has witnessed the delivery of music like that of western one.

Performance in concert, Radio Broadcasts, Audio Cassettes, Audio Cassettes, CDs, DVDs, and others. Efforts for digitization of music in India have been started. Few sites have been dedicated to Indian Classical Music (in digitized form), Indian film music, Lyrics and folk music but still an organized effort in this direction is need of the time.
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All India Radio (AIR) has established its archives at New Delhi in 1995 and this archive is bringing out CDs of programmes of well known artists broadcasted through Radio. Some of these CDs have been very well received in the market by people at large because now, they can listen to the stalwarts / doyens of India Classical Music viz. Baba Allauddin Khan, Pt. Pannalal Ghosh who existed when the recording capabilities were limited to few and AIR was one of them.

Television in India has widest reach through its well know medium called Doordarshan (DD). The digitizations of its recordings and their archival are of recent origin and have started in 2003. While on a visit to both the All India Radio (Akashwani) archives and DD archives, the researcher observed that although the digitization projects are in place at both these organizations, with procurement and installation of the equipment required for the same, however, much is still desired to be done in the form of a well organized plan to carryout the same. It was also observed that formal documents on digitization process or archival policy were not available. This leaves a good scope for pushing for a organized effort in this direction.

In the private sector, noteworthy efforts are seen in the form of Soundbuzz (7) which an initiative hosted in Singapore where Indian music companies viz. Tips, BMG Crescendo, EMI-Virgin, Times Music, Archies Music and Lahari have contributed to more than 72,000 songs in Hindi, Tamil, Kannada, Telugu and other Indian languages.

Music companies like HMV have already launched innovative services like Hamara CD where the music enthusiast can make a conscious choice of music tracks wanted by him / her and thus can order for a customized CD on their
website. This is a classic example of technology providing avenues for innovative services transcending geographical boundaries.

### 4.8 Conclusion

Considering the world trend, digitization in general and of music in particular is a challenging task. New technological innovation shall continue to take place. Policies will have to be laid down on what is to be preserved, how to preserve and to what extent digitization will be of help to it because in the words of Abby Smith as quoted by John Shephard in Preservation *digitization is not preservation - at least not yet.* (8)

Radio and Television in India i.e. Akashwani and DD have setup their archives and has initiated the respective projects of digitizing its recordings.

In India private initiatives in this direction primarily led by music companies are also coming up speedily.

Digitization of music has lead to launch of innovative services. It has also made possible the convergence technologies to deliver music through communication channels like phone and mobile.

### References


