Use of Emulation-as-a-Service-Infrastructure (EaaSI) for Preservation and Access at U of I Libraries

Emulation and Digital Preservation:

Emulation is an oft touted digital preservation strategy. However, emulator use in the professional arena is often limited to research projects or to institutions that have a great deal of resources dedicated to digital preservation and digital curation. Widespread and scalable implementation is limited as there are steep resource barriers to entry.

Emulation does have several benefits, which is why they remain part of the digital preservation toolkit. They are a good choice when the look and feel of digital content is important to retain, such as with digital artworks. They offer a user experience closer to the original use context than seeing a list of files or browsing content in a contemporary computing environment. Emulators are also useful in content appraisal. In order to determine if a collection or file is to be assessed for enduring value, curators must understand what the file content is and what it means overall; sometimes an environment to run legacy software is needed to determine what a file contains so those appraisal decisions can be made.

Emulation (indeed most digital preservation strategies) is often used in combination with other digital preservation strategies. For example, we might be able to migrate a file format to a contemporary version of the format; however, getting to that point may require an emulator to run earlier version of the software to facilitate exporting to a version. The emulator can thus act as a bridge technology even though the primary strategy used is migration.

Emulators can also help us evaluate information loss. As file formats are migrated, they are prone to information loss. If we can evaluate a file in an environment closer to its native creation environment and compare how it performs after migration, we can assess if the significant properties of the file has been retained or assess and record information loss.

History of Emulation Investigation at U of I Libraries:

In Digital Preservation Services we have had a few forays into applying emulation and/or virtual machine technologies to improve access. However, we too encountered common roadblocks of lack of resources and scalable solutions.

Present Approach:

An opportunity to engage with emulation and software preservation on a community level presented itself in Jan. 2018 through the call for proposals for the **Fostering Communities of Practice: Software Preservation and Emulation in Libraries, Archives and Museums,** or the FCoP. Institute for Library and

Museum Services [IMLS grant RE-95-17-0058-17] subproject. From a service point of view, we are interested in scaling this work to meet the needs of future born-digital collections with consideration of available resources.

Scaling Emulation and Software Preservation Infrastructure (EaaSI), a concurrent grant project under the Software Preservation Network administrative umbrella, is the emulation technology used by the FCoP cohort. EaaSI development and functionality is focused on scaling the technological framework necessary for multiple institutions to configure, share, and access software and configured environments. The FCoP cohort is "kicking the tires" and assisting in the development of EaaSI as we work through our projects.

Future Role of Emulation in Preservation and Access at the U of I Libraries:

General Approach:

Use of emulation for preservation or access will be determined through consultation with the Digital Preservation Coordinator (DPC). Please note that there are many questions which remain regarding continued support to the Emulation as a Service Infrastructure (EaaSI) via a hosted solution. It is not yet clear what access to EaaSI will be provided after the FCoP grant period ends in May 2020.

As historical emulation and virtualization efforts have illustrated, establishing emulation as a viable service model for library collections requires support external to our library as our IT services are unable to support emulation as a library service. External support via EaaSI is integral as the EaaSI platform provides services such as technological infrastructure development and maintenance, emulator maintenance and User Interface development and maintenance.

The FCoP experience also underscored the complexities beyond technical infrastructure in rendering content in an emulator. Significant time and knowledge are required to curate content for use in an emulator. Much of the curation work is still unresearched and experimental as emulators are often used to access dynamic, complex content which may be dependent upon proprietary software. Curators also need to make prudent decisions and select content judiciously for use in an emulated environment. Attendant software to render file content may need to be acquired. Thus, emulation services should still be considered to be in an experimental phase.

Using EaaSI:

Until more is known about how EaaSI as a service will function beyond the Fostering a Community of Practice project, the use of emulation will primarily be limited to use as a preservation or processing tool with access to EaaSI limited to select library faculty and staff. Training from Digital Preservation staff will be required prior to being granted access to EaaSI. Training and access will only be available once EaaSI moves out of development phase and into production. At this time, it is not yet known when this transition will occur. Thus, presently EaaSI use is limited to Digital Preservation staff.

Emulation for Access Pilot:

In order to implement using EaaSI as a tool for researcher access – both within a reading room scenario and especially if considering allowing researchers direct Web access to EaaSI, a project piloting wider use of EaaSI at the U of I Libraries is required. Work completed through the FCoP Project allowed the

DPC to create a stronger framework for using emulation. A second-round pilot project will test this framework and assist in process and implementation refinement.

Pilot Project Planning:

With so many present unknowns, emulation as an access solution will generally be considered as a last resort. It will be considered only after a pilot project plan is established that clearly defines areas of responsibility, establishes clear and consistent lines of communication, provides requisite background information about the collections and/or files, allows for necessary rescoping and flexibility through the project working phase depending upon results encountered in implementing emulation, establishes methods for documenting key information about the files and the emulated environment, allows for other approaches to preserving important aspects of a file which may be represented in ways other than direct rendering of a file through emulation, such as extracting metadata, or migrating features to another digital content format as appropriate. Overall, a curator must demonstrate strong commitment to the project as there is shared responsibility and engagement required between curatorial and digital preservation staff. This may also be demonstrated through willingness to provide resources for software and other tool acquisition, or support of additional staffing.

Document Version History

Date	Version	Author	Change Notes
2019-12-06	.1	Popp, Tracy	Initial draft
2020-04-24	1	Popp, Tracy	Draft submitted as part of FCoP final documentation.