REALM PROJECT
REopening Archives, Libraries, and Museums

oc.lc/realm-project
#REALMproject
Carol Frost
CEO, Pacific Library Partnership
Executive Director, Peninsula Library System
REALM Project, Operations Working Group

Sharon Streams
REALM Project Director, OCLC
WebJunction Director, OCLC
<table>
<thead>
<tr>
<th><strong>IMLS</strong></th>
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</thead>
<tbody>
<tr>
<td>- Project funder</td>
<td></td>
</tr>
<tr>
<td>- Consult on project goals and activities</td>
<td></td>
</tr>
<tr>
<td>- Convenes steering committee and working groups</td>
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<table>
<thead>
<tr>
<th><strong>Battelle</strong></th>
<th></th>
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<tbody>
<tr>
<td>- Conduct scientific literature reviews</td>
<td></td>
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<tr>
<td>- Conduct laboratory research</td>
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<table>
<thead>
<tr>
<th><strong>OCLC</strong></th>
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</thead>
<tbody>
<tr>
<td>- Lead and manage execution of project deliverables</td>
<td></td>
</tr>
<tr>
<td>- Collect, synthesize stakeholder input to inform decisions</td>
<td></td>
</tr>
<tr>
<td>- Publish and distribute research and information to the field</td>
<td></td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Library, archives, and museum stakeholders</strong></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>- Executive Project Steering Committee</td>
<td></td>
</tr>
<tr>
<td>- 3 Working Groups: Scientific, Operations, and Communications</td>
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</tr>
</tbody>
</table>
**PHASE 1**

MAY – AUGUST 2020

Preparing for reopened libraries:
Research on high-priority materials and workflows

**PHASE 2**

JUNE – OCTOBER 2020

Additional research to support operations of libraries, archives, and museums

**PHASE 3**

OCTOBER 2020 – SEPTEMBER 2021

Monitor, update, and communicate
Project activities

• Review and summarize SARS-CoV-2 research
• Gather input from practitioners and subject experts
• Design, execute, iterate laboratory testing
• Develop communications, toolkit resources
• Distribute project information and resources
• Ongoing discussions with libraries, archives, museums
REALM is...

providing data that helps us better understand the virus. You can use that data to inform your practices and policies.

REALM is not...

making recommendations. Every institution is different and will need to develop policies that work for their local context.
Urgency + complexity + uncertainty

Transmission
Surfaces
Airborne

Science
Test results
Complex, cumulating picture. Many variables

Decisions
Answers
One contribution to the decision-making process
STATUS OF COVID-19 RESEARCH
Known unknowns

- How much virus an infected person “sheds”
- Whether people are getting infected by touching objects
- How much (or little) virus is needed to cause infection
How the virus spreads

Most likely / dominant
• Direct contact between people
• Droplets passed between people

Possibly
• Aerosol particles
• Contaminated objects (*fomites*)
• Other body fluids, excretions

Photo by Blake Cheek on Unsplash
Environmental conditions are a factor

- Temperature
- Relative humidity
- Air quality
- Air flow
Prevention and decontamination tactics

• Social distancing
• Hand washing and toilet hygiene
• Masks/PPE
• Fresh air and open spaces
• Surface cleaners and disinfectants*
• UV light treatment*
Research question

How long does the virus remain active on materials commonly found in libraries, archives, and museums?

Active…viable…infectious…“alive”
Testing: TCID50 cell-based assay

• Cut each material into 5 rectangular coupons
• Apply drops of infectious virus via “fake spit”
• Put test coupons into chamber, stacked or unstacked
  – Held at standard office temperature, humidity; no outside light or airflow
• At each preselected timepoint, measure quantity of virus on coupons
  – Below limit of quantitation (LOQ): only record presence/absence of virus
  – Below limit of detection (LOD): do not see virus on any coupon
Test 1 Unstacked library materials

- Hardback Book Cover
- Paperback Book Cover
- Plain Paper Pages
- Plastic Protective Cover
- DVD Case

LOQ: 1,000,000
LOD: 10

Viable SARS-CoV-2 Log10
Stacked books

Photos courtesy of Battelle
Test 4 Stacked library materials

Innoculum

Viable SARS-CoV-2 Log$_{10}$

Hardcover Book Cover
Softcover Book Cover
Plastic Protective Cover
DVD Case
Foam
LOQ

LOQ
LOD
How long the virus survives on commonly used library, archive, and museum materials

- Item tested in a **stacked** configuration.
- Item tested in an **unstacked** configuration.
- Item showed **trace amount** of virus after testing.
- Item was **above LOQ** after testing.

### Stacked vs unstacked comparison

<table>
<thead>
<tr>
<th>ITEM / MATERIAL*</th>
<th>DAYS OF VIRUS SURVIVAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>DVD case</td>
<td></td>
</tr>
<tr>
<td>Unstacked</td>
<td>1</td>
</tr>
<tr>
<td>Stacked</td>
<td>6</td>
</tr>
<tr>
<td>Softback book cover</td>
<td></td>
</tr>
<tr>
<td>Unstacked</td>
<td>1</td>
</tr>
<tr>
<td>Stacked</td>
<td>6</td>
</tr>
<tr>
<td>Hardback book cover</td>
<td></td>
</tr>
<tr>
<td>Unstacked</td>
<td>1</td>
</tr>
<tr>
<td>Stacked</td>
<td>6</td>
</tr>
<tr>
<td>Plastic protective cover</td>
<td></td>
</tr>
<tr>
<td>Unstacked</td>
<td>3</td>
</tr>
<tr>
<td>Stacked</td>
<td>6</td>
</tr>
</tbody>
</table>
### How long the virus survives on commonly used library, archive, and museum materials

<table>
<thead>
<tr>
<th>Item / Material*</th>
<th>Days of Virus Survival</th>
</tr>
</thead>
<tbody>
<tr>
<td>DVD case</td>
<td>6</td>
</tr>
<tr>
<td>Softback book cover</td>
<td>6</td>
</tr>
<tr>
<td>Hardback book cover</td>
<td>6</td>
</tr>
<tr>
<td>Archival folders</td>
<td>6</td>
</tr>
<tr>
<td>Plain paper pages</td>
<td>3</td>
</tr>
<tr>
<td>Plastic protective cover</td>
<td>6</td>
</tr>
<tr>
<td>Braille paper</td>
<td>4</td>
</tr>
<tr>
<td>Glossy pages</td>
<td>4</td>
</tr>
<tr>
<td>Children’s board book</td>
<td>4</td>
</tr>
<tr>
<td>Magazine pages</td>
<td>4</td>
</tr>
<tr>
<td>DVD disc</td>
<td>5</td>
</tr>
<tr>
<td>Storage bag</td>
<td>5</td>
</tr>
<tr>
<td>Storage container</td>
<td>5</td>
</tr>
<tr>
<td>Plexiglass</td>
<td>5</td>
</tr>
<tr>
<td>USB cassette</td>
<td>5</td>
</tr>
<tr>
<td>Storage foam</td>
<td>6</td>
</tr>
<tr>
<td>Leather book cover</td>
<td>8</td>
</tr>
<tr>
<td>Synthetic leather</td>
<td>8</td>
</tr>
</tbody>
</table>

*Item tested in a **stacked** configuration.

*Item tested in an **unstacked** configuration.

*Item showed **trace amount** of virus after testing.

*Item was **above LOQ** after testing.
As part of the REALM research, Battelle is conducting natural attenuation studies to provide information on how long the virus may survive on materials common to archives, libraries, and museums. The studies are conducted by applying the 2019 novel coronavirus (SARS-CoV-2) virus to five materials (per test) set at standard room temperature (22°C to 24°C) and relative humidity conditions (40% to 60%). Below are the results of tests completed to date.

- Explore a complete list of completed research test results for the REALM project
- See supporting documentation for REALM research
- Revisit the scientific literature on SARS-CoV-2
- Get answers to frequently asked questions about research results

Supporting documentation

Documentation for this project will be published as it becomes available. All REALM project materials are published under a Creative Commons Attribution-NonCommercial-ShareAlike 4.0 license.

**Systematic literature review Phase 2**

October 2020

Upcoming Phase 1 review with new research on SARS-CoV-2 published between mid-May and mid-August 2020 on how the virus spreads, how long it remains on materials, and effectiveness of various prevention and decontamination materials.

**Systematic literature review Phase 1**

June 2020

Detailed literature review exploring the scientific research on SARS-CoV-2 published through mid-May 2020.

Preliminary literature review Phase 1

June 3, 2020

The information helps set the context for the laboratory research that is being conducted during the REALM project.

Test 1 Results

<table>
<thead>
<tr>
<th>Item</th>
<th>Test Kit</th>
<th>Sensitivity</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>Test 1</td>
<td>Virus A</td>
<td>High</td>
<td>Positive</td>
</tr>
<tr>
<td>Test 2</td>
<td>Virus B</td>
<td>Medium</td>
<td>Negative</td>
</tr>
</tbody>
</table>

Test 2 Results

<table>
<thead>
<tr>
<th>Item</th>
<th>Test Kit</th>
<th>Sensitivity</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>Test 3</td>
<td>Virus C</td>
<td>Low</td>
<td>Positive</td>
</tr>
<tr>
<td>Test 4</td>
<td>Virus D</td>
<td>Very Low</td>
<td>Negative</td>
</tr>
</tbody>
</table>

Test 3 Results

<table>
<thead>
<tr>
<th>Item</th>
<th>Test Kit</th>
<th>Sensitivity</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>Test 5</td>
<td>Virus E</td>
<td>Extra Low</td>
<td>Positive</td>
</tr>
<tr>
<td>Test 6</td>
<td>Virus F</td>
<td>No Sensitivity</td>
<td>Negative</td>
</tr>
</tbody>
</table>

Test 4 Results

<table>
<thead>
<tr>
<th>Item</th>
<th>Test Kit</th>
<th>Sensitivity</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>Test 7</td>
<td>Virus G</td>
<td>Normal</td>
<td>Positive</td>
</tr>
<tr>
<td>Test 8</td>
<td>Virus H</td>
<td>High</td>
<td>Negative</td>
</tr>
</tbody>
</table>

Test 5 Results

<table>
<thead>
<tr>
<th>Item</th>
<th>Test Kit</th>
<th>Sensitivity</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>Test 9</td>
<td>Virus I</td>
<td>Medium</td>
<td>Positive</td>
</tr>
<tr>
<td>Test 10</td>
<td>Virus J</td>
<td>Low</td>
<td>Negative</td>
</tr>
</tbody>
</table>
Test 6 – hard surfaces

- Marble (*flooring, counters*)
- Powder-coated steel (*lockers, shelving, book trucks, exhibit elements*)
- Laminate (*countertops*)
- Brass (*fixtures, railings*)
- Glass (*windows, display cases*)

**Time points:** 0, 2, 4, 6, and 8 days

Findings to be released next month
The “known unknowns”

1. We don’t know how many virus cells an infected person will have on a surface.
2. We don’t know how many virus cells you can pick up from a surface.
3. We don’t know how many virus cells are needed to cause infection.

About REALM

REALM is a research project led by UC Irvine and the University of California, Los Angeles (UCLA), in collaboration with the University of Southern California and the University of California, San Diego. The project is supported by the Foundation for蛮Mandarin Chinese Studies and the National Science Foundation. REALM aims to provide a better understanding of the transmission and prevention of COVID-19 and to develop effective strategies to control the spread of the virus.

What we know about COVID-19

Because SARS-CoV-2 is still emerging, knowledge about it is still evolving. For more information about COVID-19 and prevention and control measures, please refer to the Center for Disease Control’s guidelines.

How the virus spreads

Direct transmission: Virus-containing droplets are expelled from an infected person and enter the mucous membranes or the respiratory tract of another person. This transmission occurs through respiratory secretions, such as coughing, sneezing, and speaking. Infection can also occur when an individual inhales droplets expelled from an infected person.

Indirect transmission: Virus-contaminated surfaces can serve as a vector for transmission. The virus can be transferred from a contaminated surface to a person’s hands, which can then contact the mucous membranes of the nose, mouth, or eyes. This form of transmission is particularly important in closed environments, where the virus can remain viable for extended periods.

Survival of the virus on surfaces

The virus can survive on surfaces for varying periods, depending on the type of surface and environmental conditions. Surfaces made of materials such as nylon, plastic, and metal can retain the virus for longer periods compared to surfaces made of other materials.

The testing process

The testing process involves collecting a sample of saliva, nose swab, or throat swab to test for the presence of the virus. The samples are then processed in a laboratory to detect the presence of the virus. The test results are reported to the laboratory, and the results are used to inform public health decisions and guide interventions.

We invite you to join us in the REALM project and contribute to this important area of research. Thank you for your support and contributions.
HOW CAN I USE THESE RESULTS?
When making decisions about policies...

- Stay informed of federal, state, and local guidelines
- Check CDC guidelines on PPE and hygiene practices
- Consider if your collection/resources can be sanitized without damage
- If quarantining, consider REALM results for the lifespan of the virus on relevant materials
- Ask your peer institutions for their policies
- Inform internal and external stakeholders of your policies
**TOOLKIT ITEM: CHECKLIST**

**REALM PROJECT - nclibraryproject**

**CHECKLIST**

**Considerations for COVID-19 decision-making in libraries, archives, and museums**

While working toward resuming operations and services to the public, many factors and resources (national, state, local) should inform your local decision-making. This list of considerations offers a starting point and includes links to guides and additional information.

**STAY INFORMED**
- Understand your current local COVID-19 situation and consult with local and state health departments. View the CDC’s list of State & Territorial Health Department Websites.
- Monitor federal, state, and local guidelines and data as conditions change. View the CDC’s COVID Data Tracker. Be prepared to be flexible and update policies and procedures as new information about COVID-19 becomes available.

**PERSON-TO-PERSON TRANSMISSION**
- Familiarize yourself with personal hygiene practices outlined in the CDC’s guide on How to Protect Yourself and Others.

**OBJECT-TO-PERSON TRANSMISSION**
- Determine whether it is appropriate to quarantine or clean an object. Refer to the NIDDK’s guide on Disinfecting Books and Other Collections for detailed considerations. If it is feasible to clean the object, consider quarantine.
- If cleaning: disrupt the object with an EPA-recommended cleaning agent.

**COMMUNICATE**
- Establish a list of internal and external stakeholders and develop messaging for the different groups. Stakeholder examples include board, administration, staff, and public.
- Determine how changes will be communicated to stakeholders.
- Communicate changes to staff and provide training on new policies and procedures.
- Set an expectation that updates and revisions will be shared as more is learned about COVID-19.

**Resources**
- www.cdc.gov/getReady/healthcare/health-departments.html
For more information

- New website: oclc.org/realm
- Updated FAQ
- REALM question in-box
- Mailing list (10,000+ subscribers)
This document synthesizes various studies and data; however, the scientific understanding regarding COVID-19 is continuously evolving. This material is being provided for informational purposes only, and readers are encouraged to review federal, state, tribal, territorial, and local guidance. The authors, sponsors, and researchers are not liable for any damages resulting from use, misuse, or reliance upon this information, or any errors or omissions herein.

Questions?

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