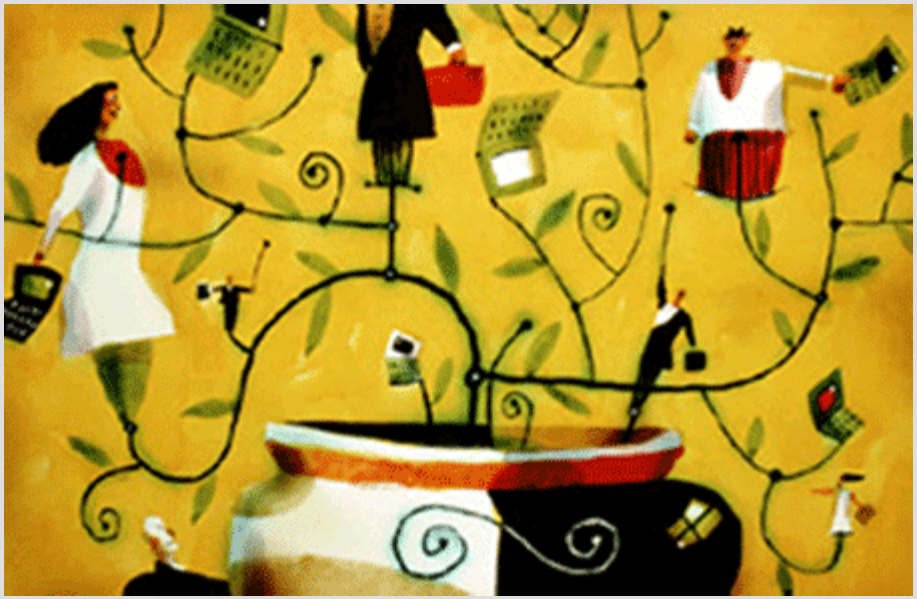
User-Centered Website Development: A Human-Computer Interaction Approach



Daniel D. McCracken
City College of New York
Rosalee J. Wolfe
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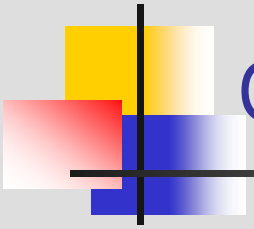
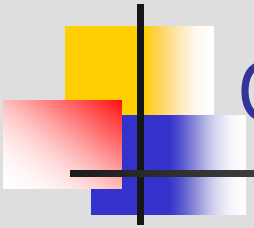
With a foreword by:
Jared M. Spool, Founding Principal,
User Interface Engineering

PowerPoint slides by Dan McCracken, with thanks to Rosalee Wolfe, S. Jane Fritz of St. Joseph's College, and Rhonda Schauer



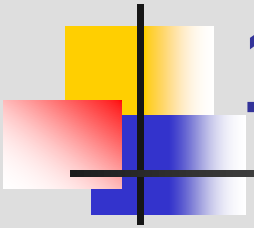
Credits

- Slides 17-21: Courtesy of Lori Smallwood.
- Slides 22, 25-26: Courtesy of Jorge Toro.
- Slides 27-30: Courtesy of Karin Christensen and Dr. Edward K. Wagner.
- Slides 31-33: Courtesy of Xerox Corporation.
- Slides 34-35: Courtesy of Erik B. Steiner.
- Slides 40-41: Courtesy of Roche.
- Slides 42-45: Courtesy of John McDonald.
- Slides 47-50: Courtesy of Phillippe van Nedervelde E-spaces n.v.



Credits, continued

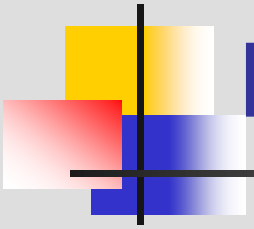
- Slides 51-54: Courtesy of the DePaul American Sign Language Project.
- Slides 55-57: Courtesy of Eyematic.



11. Multimedia

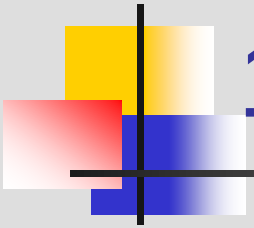
In this chapter you will learn about:

- Basic multimedia types and available file formats
- Advantages and disadvantages of using multimedia
- Technology considerations when using multimedia
- Design guidelines for using multimedia on the Web
- New developments in multimedia delivery
- And you will see many examples



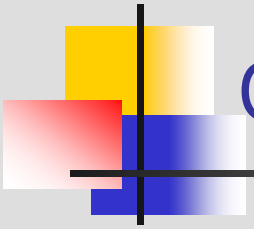
Multimedia overview

- The term *multimedia* refers to a combination of two or more media
- In this chapter we consider:
  - Audio
  - Video
  - Animation
- Other media:
  - Printed or spoken words
  - Music and other audio
  - Still images



11.2 Audio

- Can enhance a Web page with speech, music, or other sounds
- Helpful to those with vision limitations
- Non-streaming: entire file downloaded and stored on disk before playback can begin
- Streaming: data is buffered; playback begins as soon as there is enough to play without too many pauses for buffering to catch up

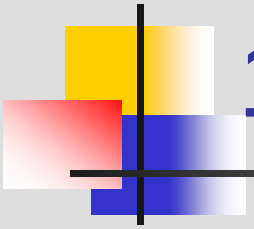


Good use of audio

- Be sure that any dialog in audio is also available as text
  - Some people prefer text
  - Needed by the deaf
- When using audio to set a mood, keep volume low
- When using audio to get attention, keep it brief
- Give users the option to turn sound off; endless loops can be extremely annoying

Audio formats for Web

Extension	Format Name	Originator	Streaming?	Additional software?
.wav	Waveform	Microsoft	No	No
.au	Sun Audio	Sun Microsystems	No	No
.aiff	Audio Interchange	Apple	No	No
.mid	Musical Instrument Digital Interface	International MIDI Association	No	No
.mp3	MPEG Audio (Layer 3)	Fraunhofer IIS-A and the ISO	Yes	No
.ra	Real Audio	Real Networks	Yes	Yes. Available: www.real.com



11.3 Video

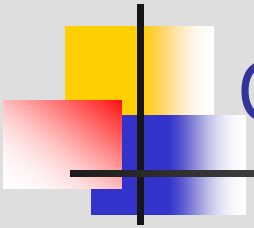
- A powerful medium, conveying:
  - Motion
  - Changing facial expressions
  - Associated audio
- Disadvantage:
  - Very slow for users with dialup connections
- Best for users with broadband connections
  - Which is approaching half of U.S. households that have Internet connection
  - Includes most company intranets

Video download times at 56Kb/sec

Description	Run time	Screen resolution	File size (MB)	Download time at 56 Kbps
Museum tour (high quality video)	7 min, 30 sec	320x180	24	1 hour, 12 min
Museum tour (medium quality video)	7 min, 30 sec	320x180	5.74	18 minutes
Museum tour (low quality video)	7 min, 30 sec	320x180	3.07	10 minutes
Speech (high quality video)	1 min, 19 sec	160x120	3.3	10 minutes
Speech (low quality video)	1 min, 19 sec	160x120	0.2	1 minute
Helmet camera video from mountain bike trail	1 min, 19 sec	170x145	9.5	30 minutes

Broadband is coming on fast

- “Some 31 percent of United States households that have Internet access have high-speed connections -- up 50 percent from a year ago, according to the Pew Internet and American Life Project. Broadband use is widely considered to be in its infancy, but the pace of adoption is considered by many industry analysts to be as fast as that of any mass-market technology in recent memory.” – New York Times, June 12, 2003

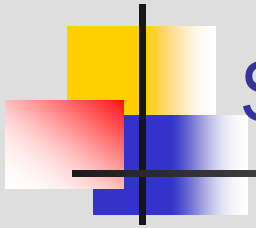


Cable modem is the leader

- “At the end of the first quarter of this year, 68 percent of households with broadband access used cable modems, compared with 31 percent with D.S.L. service, according to the Yankee Group, a market research firm.” *ibid.*

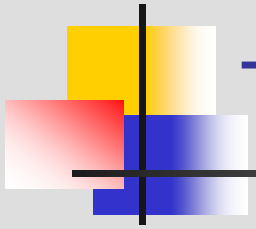
Video download times at 1.5Mbps

Description	Run time	Screen resolution	File size (MB)	Download time at 1.5Mbps
Museum tour (high quality video)	7 min, 30 sec	320x180	24	2 minutes, 40 seconds
Museum tour (medium quality video)	7 min, 30 sec	320x180	5.74	38 seconds
Museum tour (low quality video)	7 min, 30 sec	320x180	3.07	21 seconds
Speech (high quality video)	1 min, 19 sec	160x120	3.3	22 seconds
Speech (low quality video)	1 min, 19 sec	160x120	0.2	1 second
Helmet camera video from mountain bike trail	1 min, 19 sec	170x145	9.5	1 minute, 3 seconds



So: can you ignore those 56Kbps users?

- Of course not
  - Broadband penetration will never be 100%
  - It may level off rather below that
  - Those people number in the tens of millions; you can't ignore them
- But don't ignore the cable modem folks either
  - They definitely can download your video
  - Downloading the RealPlayer over a cable modem takes a couple of minutes
- And that's not the end: the visionaries are pushing for FFTH (Fiber To The Home), at 100Mbps



Tips for recording video

- Use a tripod
  - You get a much better image
  - The reduction of motion improves compression
- Use a neutral background
  - Better visually, and also improves compression
- Get in close to your subject

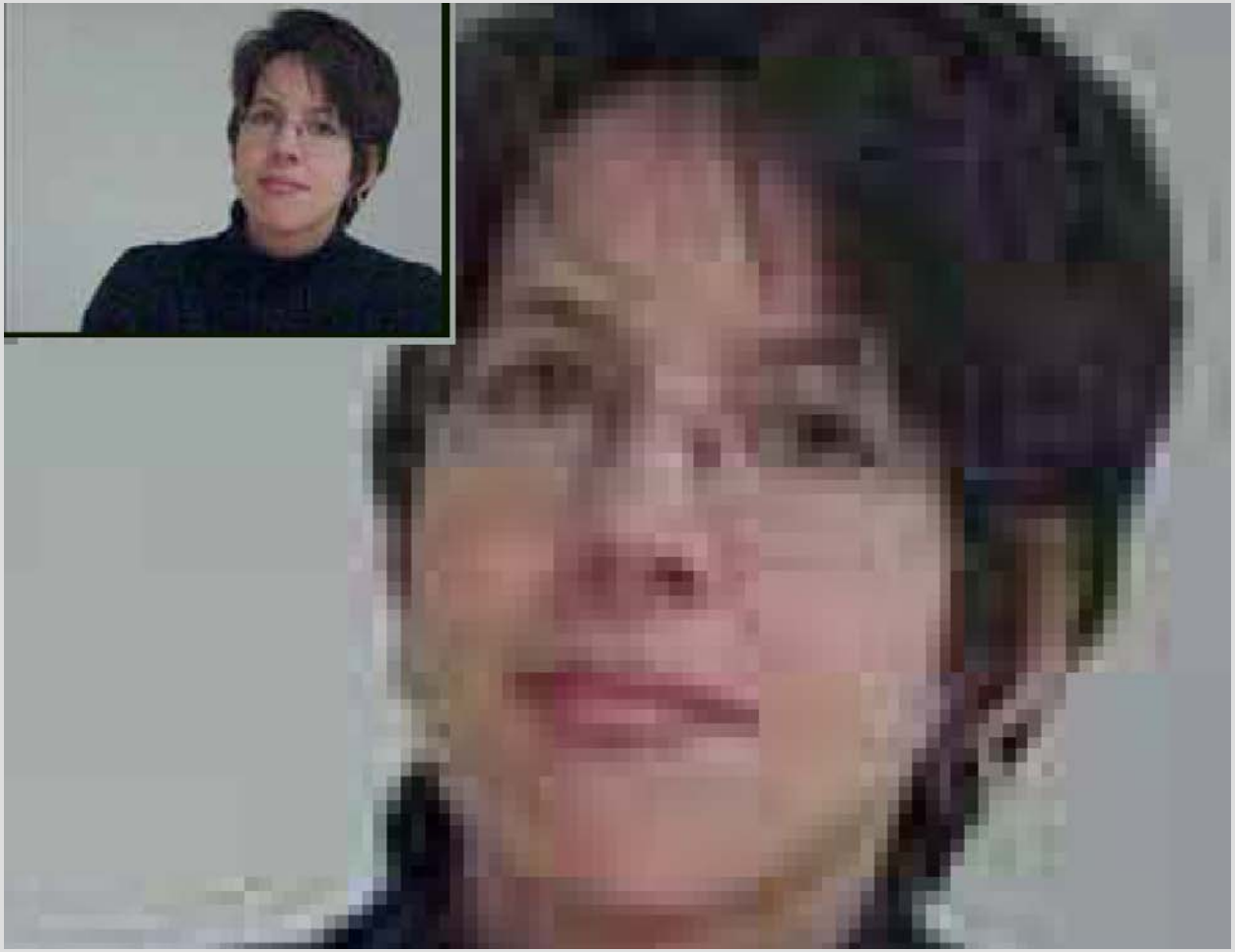
Medium shot

Close up shot

Extreme close-up – the best

Close-up shots retain more facial detail

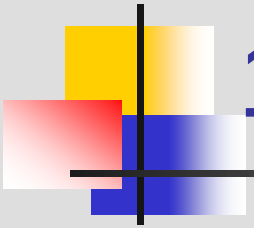
Close-up shot, magnified to show detail



Text on a Web page is easier to read than a caption on a video

Video formats for the Web

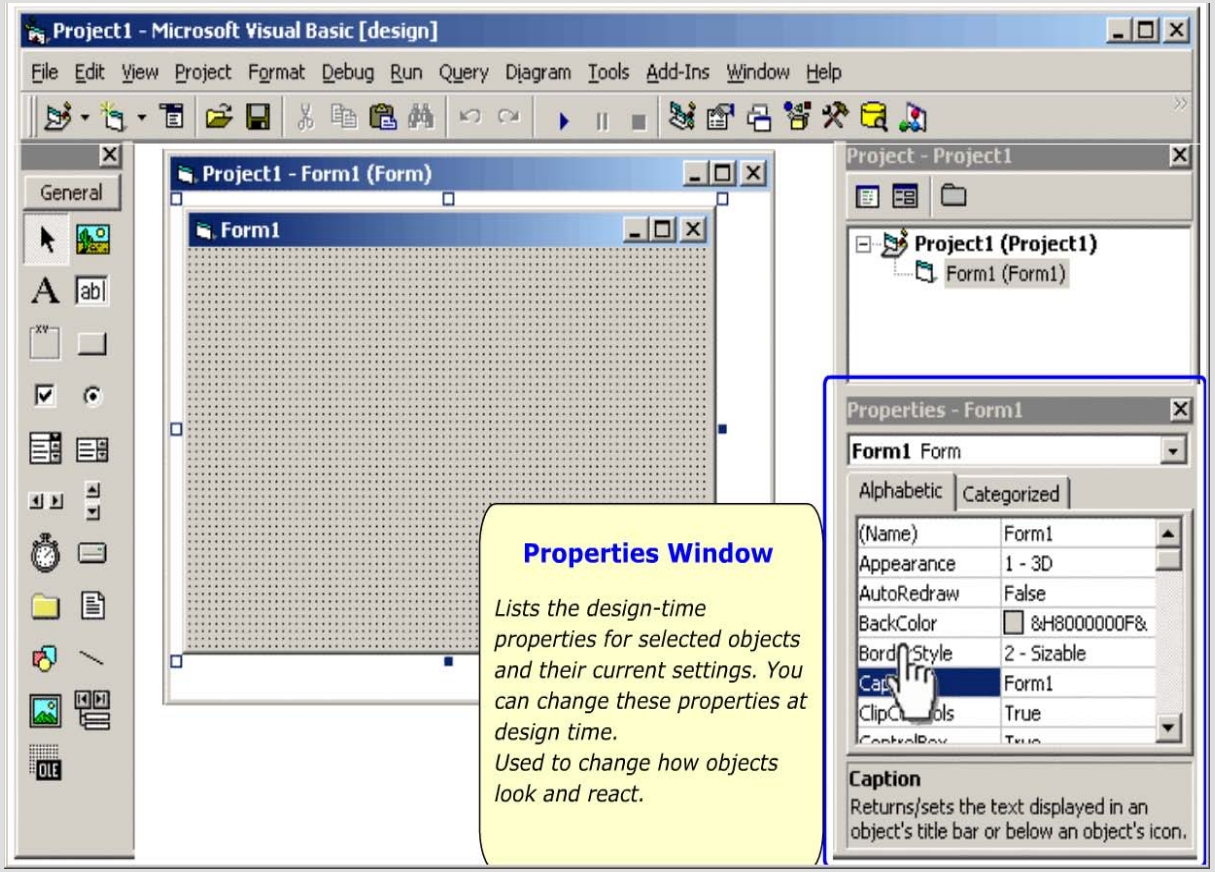
Name	File extension	Originator	Additional codec?	Streaming?	Additional player?
Audio-Video Interlaced	.avi	Microsoft	Yes	No	No
QuickTime	.mov .qt	Apple	Yes	Configurable	No
MPEG Video (MPEG-4)	.mpg	Motion Picture Expert Group	No	No	No
Real Video	.ram .rm	RealNetworks	No	Yes – requires server software	Yes



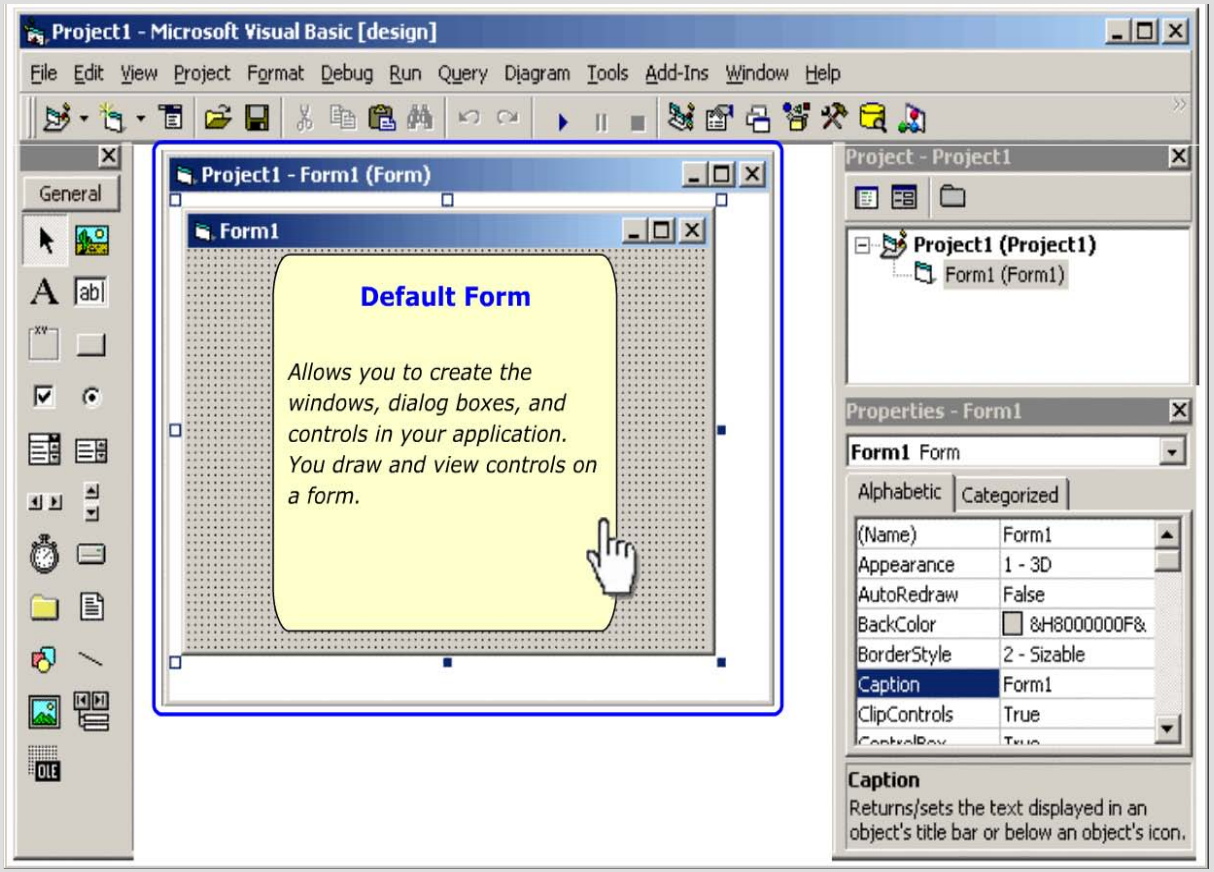
11.4 Animation

- Definition: synthetic apparent motion created through artificial means
- Can sometimes be stored more compactly than video, speeding downloads
- Offers a richer set of interactions than video
- An attention-getter
- Good for demonstrating transitions and for explaining complex systems

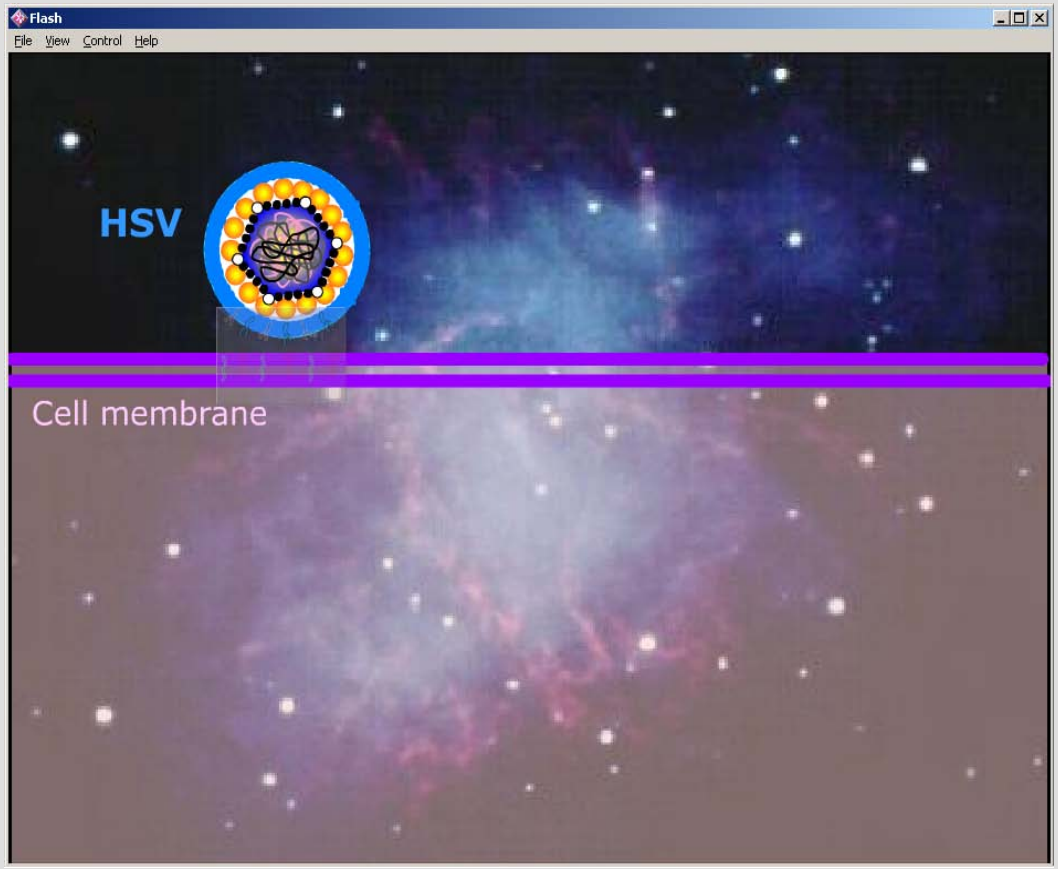
Using animation to focus attention, 1



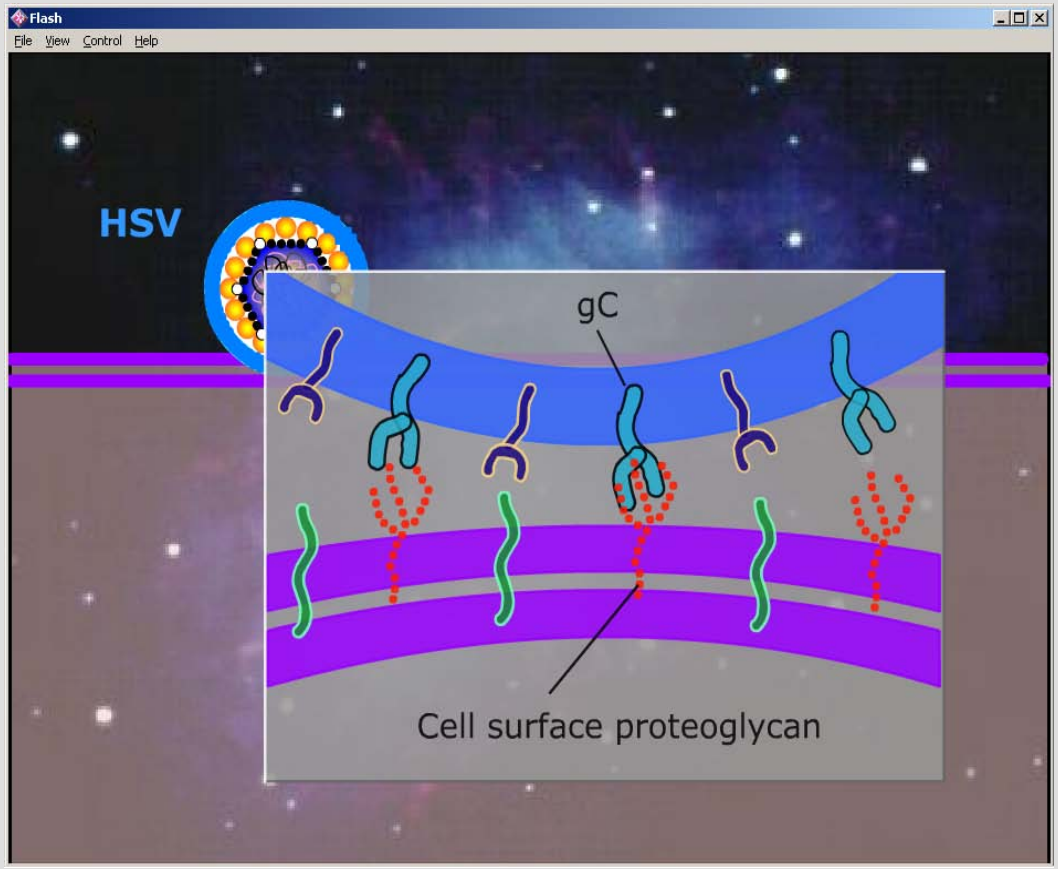
Using animation to focus attention, 2



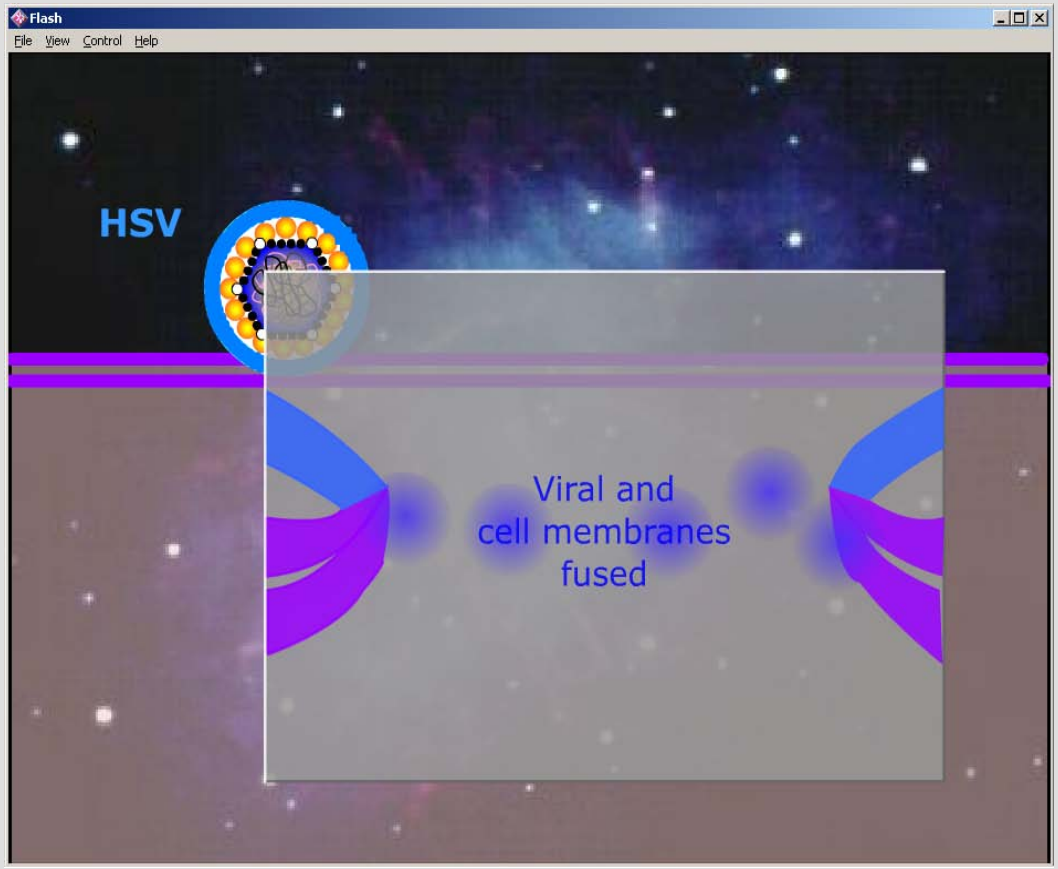
Animation shows how a virus attacks a human cell, 1



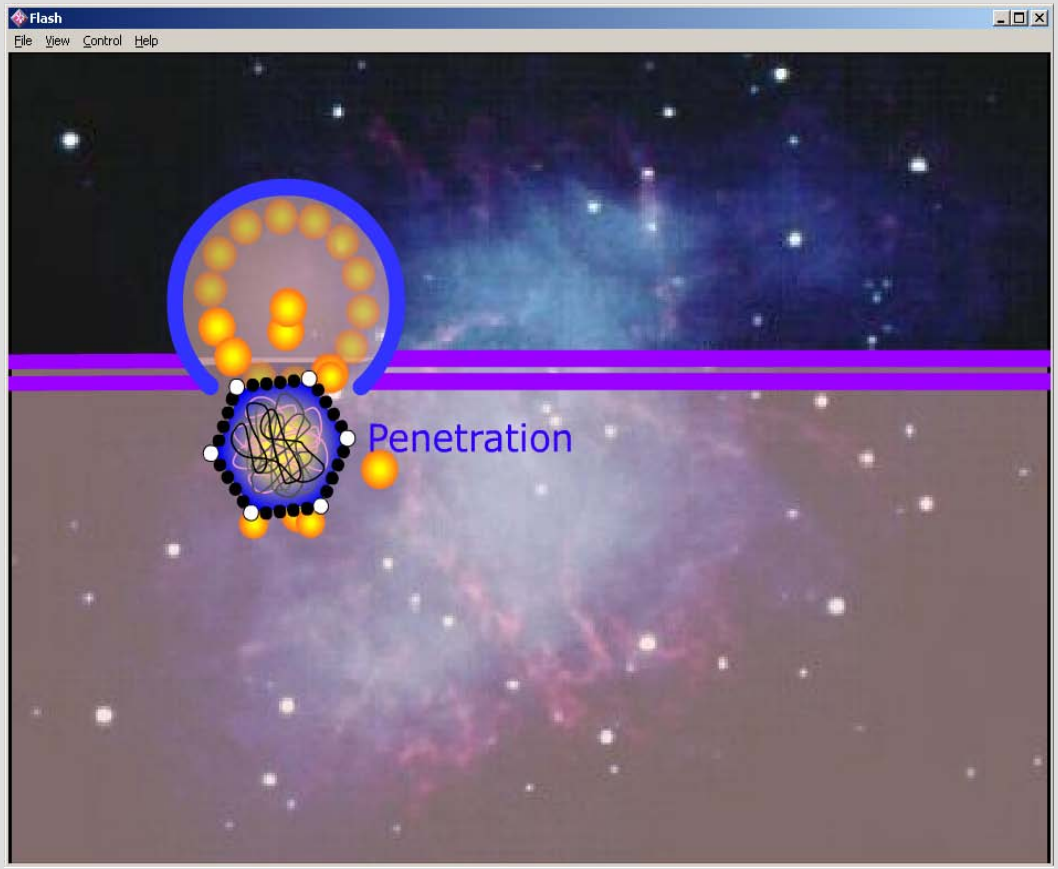
Animation shows how a virus attacks a human cell, 2



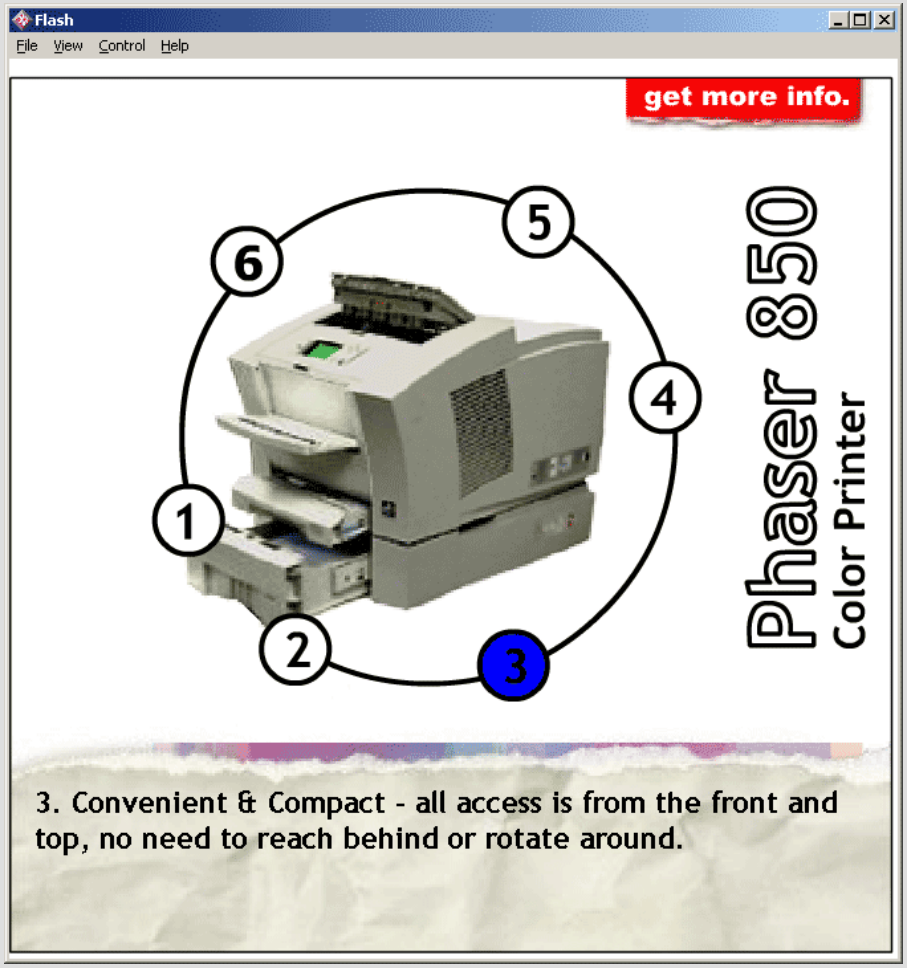
Animation shows how a virus attacks a human cell, 3



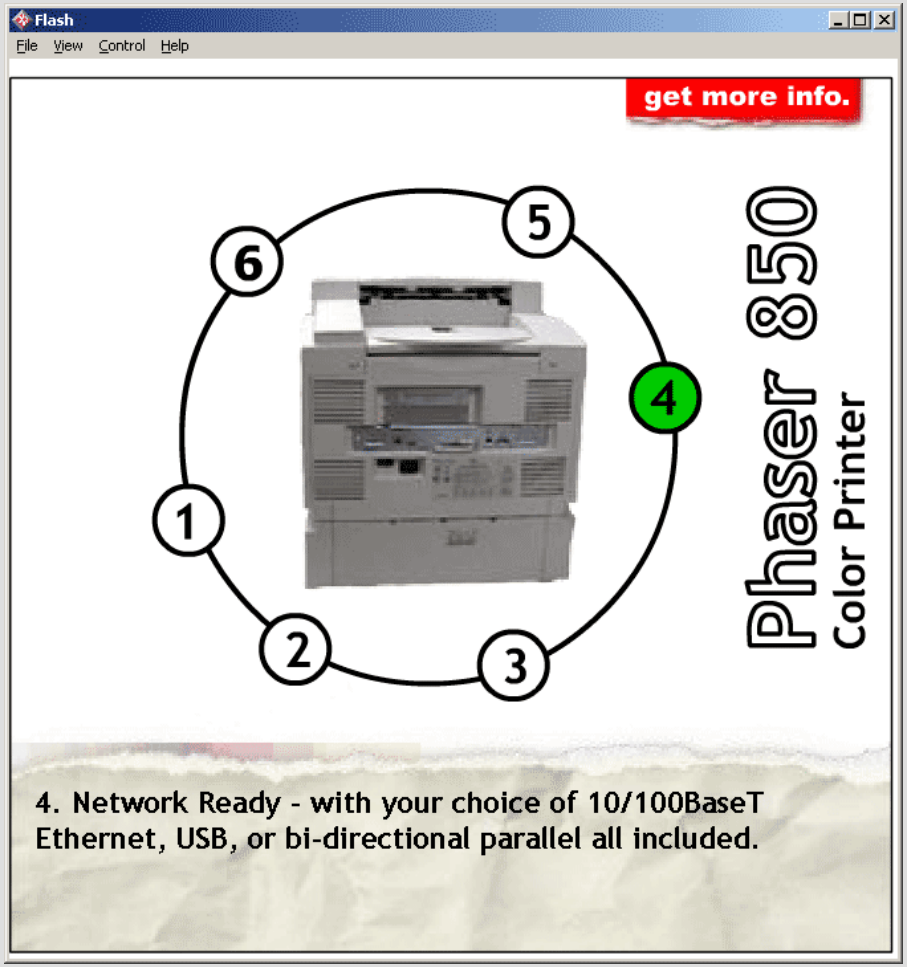
Animation shows how a virus attacks a human cell, 4



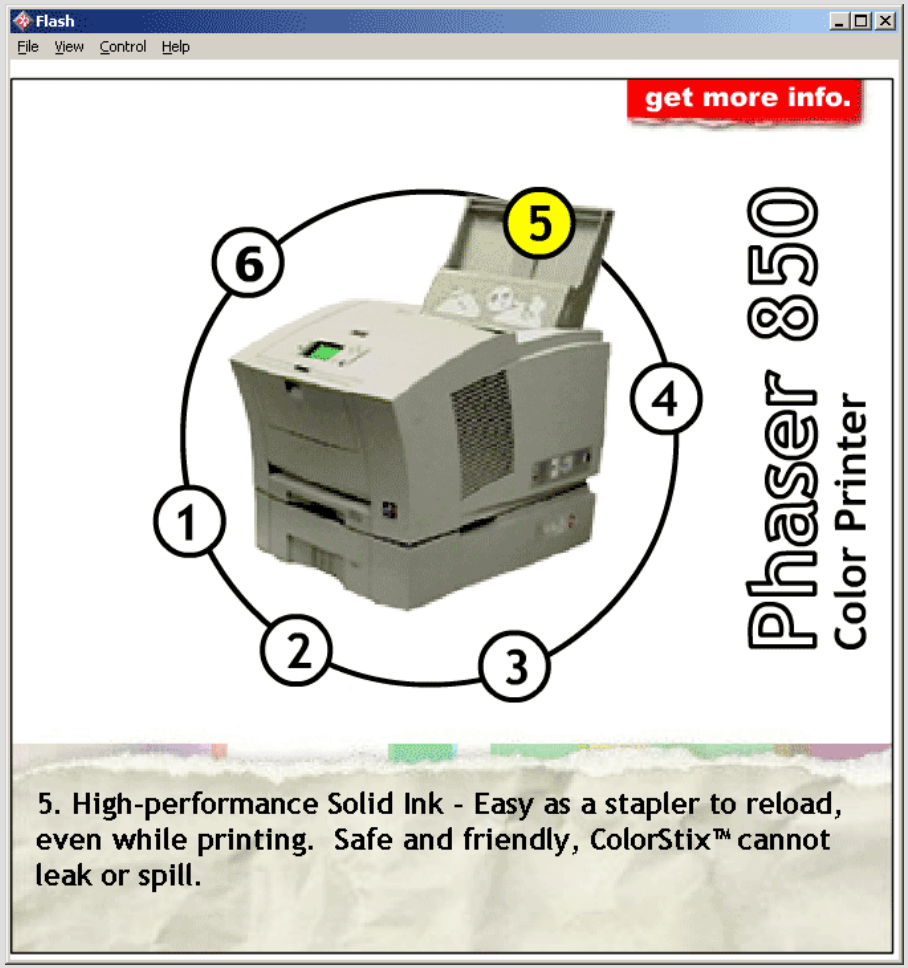
Animation showing operation of a Xerox Phaser 850® network color printer, 1



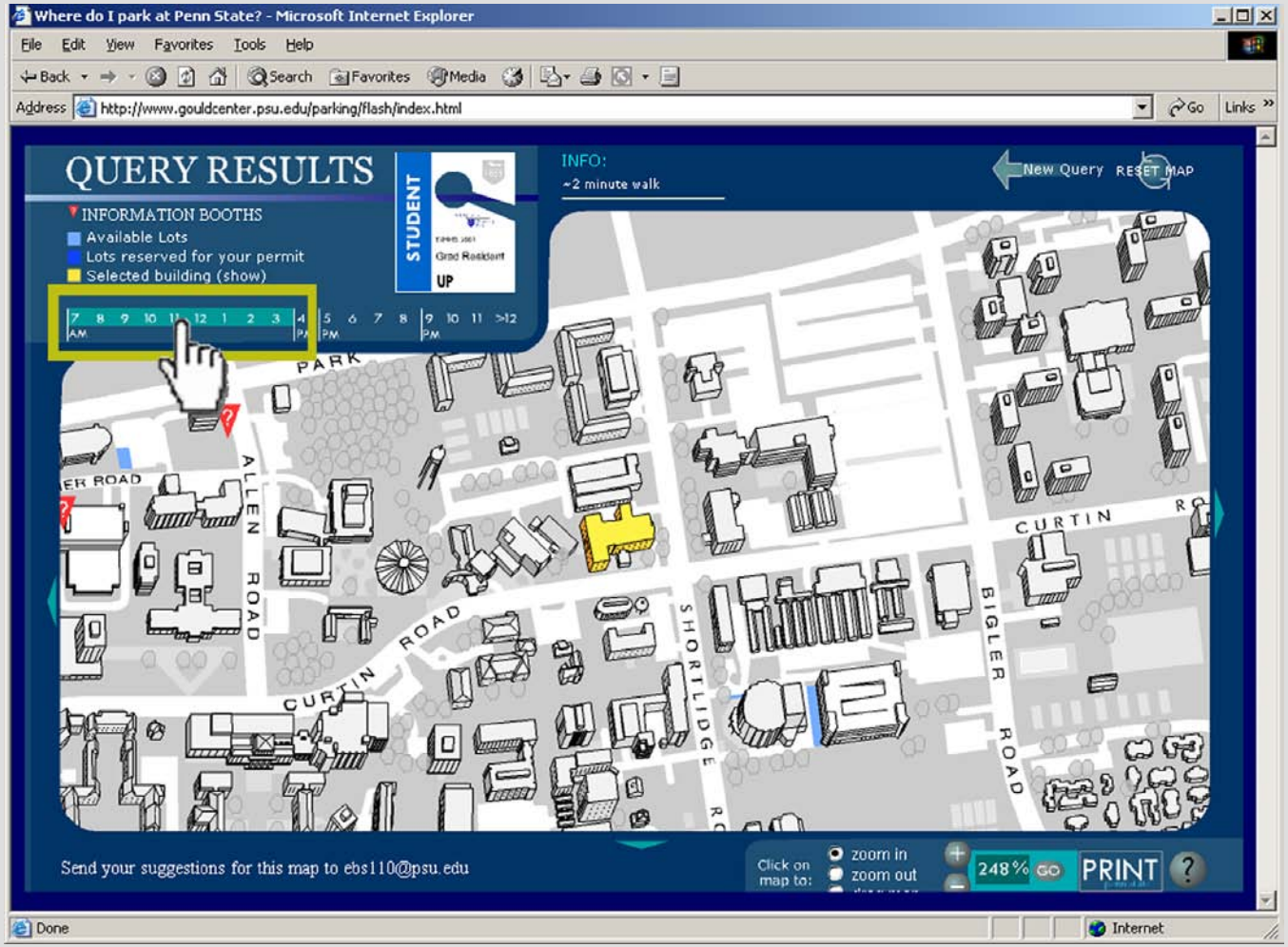
Animation showing operation of a Xerox Phaser 850® network color printer, 2



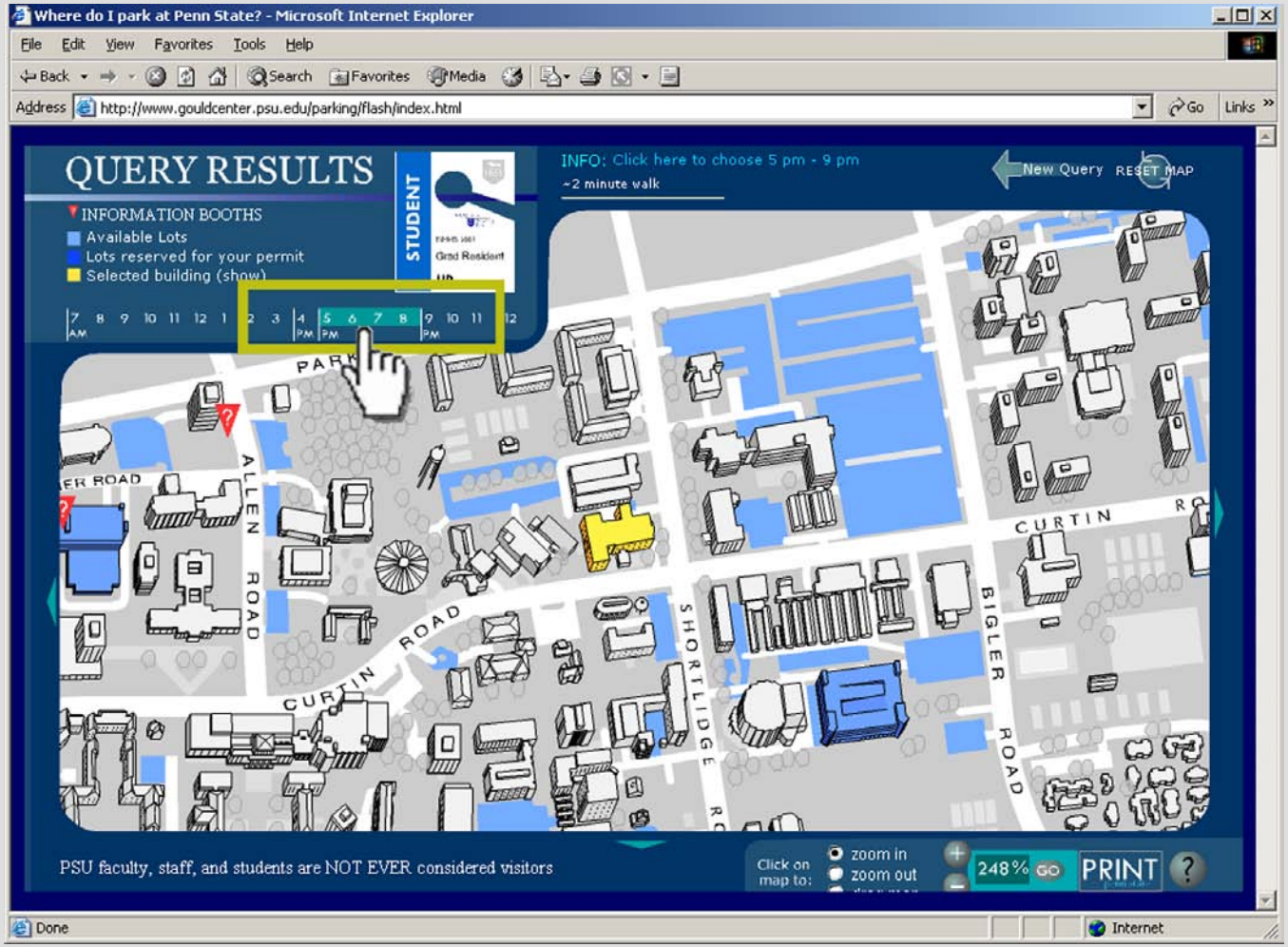
Animation showing operation of a Xerox Phaser 850® network color printer, 3

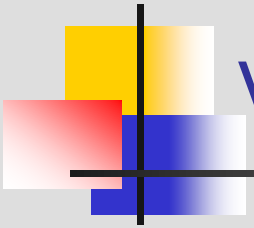


Animation can explain complex systems



Such as university parking regulations





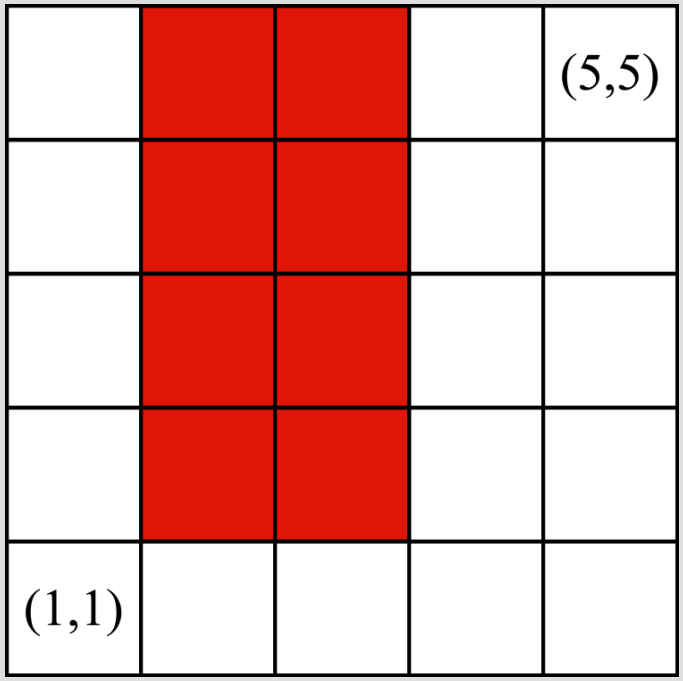
Vector-based vs. pixel-based formats

- Pixel-based format gives the information for every pixel; like a bitmap
- Vector-based format lists the shapes, with mathematical descriptions of lines and curves
- Vector-based format can be very much more compact, saving storage and speeding downloads
- Vector-based format can also improve appearance
- Vector-based format permits much better results when images sizes are changed
- But: vector-based format doesn’t display automatically in a browser; user must have or download a player

A frame from an animation, both formats; first frame

0	1	1	0	0
0	1	1	0	0
0	1	1	0	0
0	1	1	0	0
0	0	0	0	0

Pixel-based representation



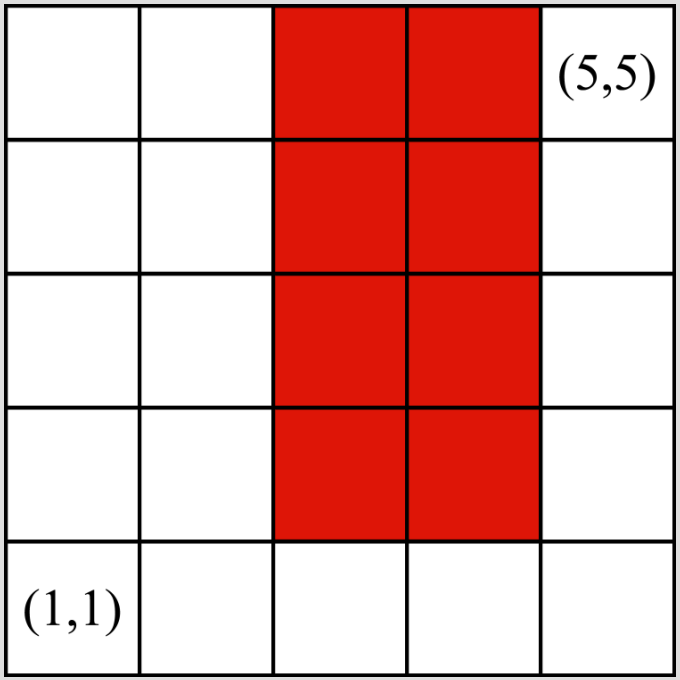
(2,3)
(3,2)
(4,5)
(2,5)

Vector-based representation

A frame from an animation, both formats; second frame

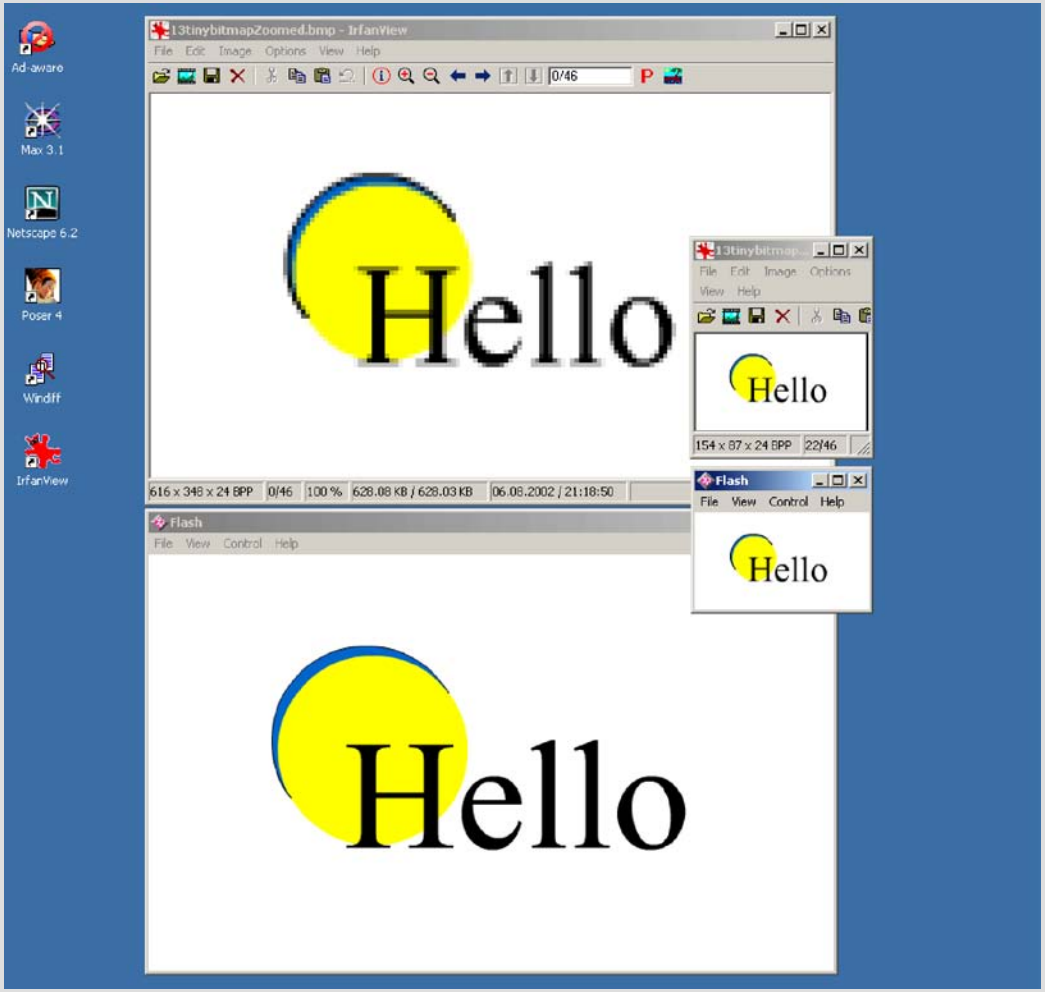
0	0	1	1	0
0	0	1	1	0
0	0	1	1	0
0	0	1	1	0
0	0	0	0	0

Pixel-based representation

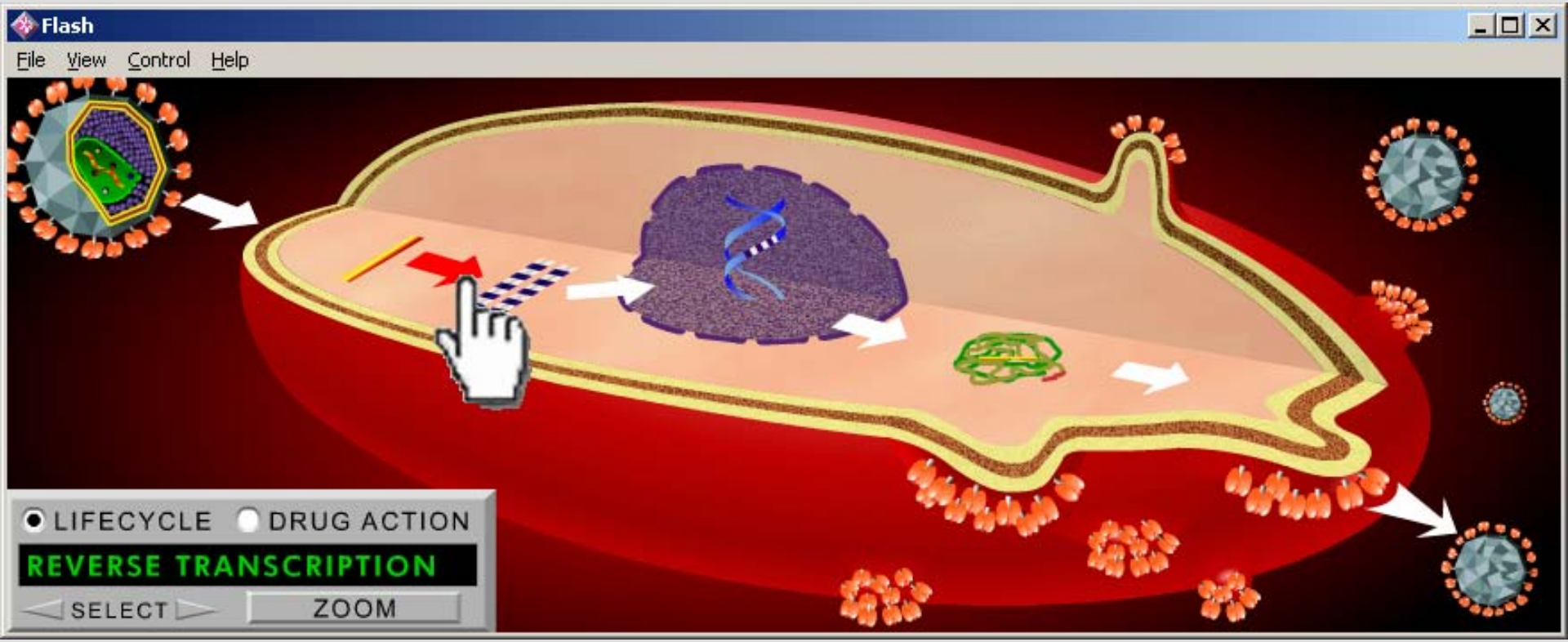


Vector-based representation

Comparing pixel-based (top) and vector-based formats

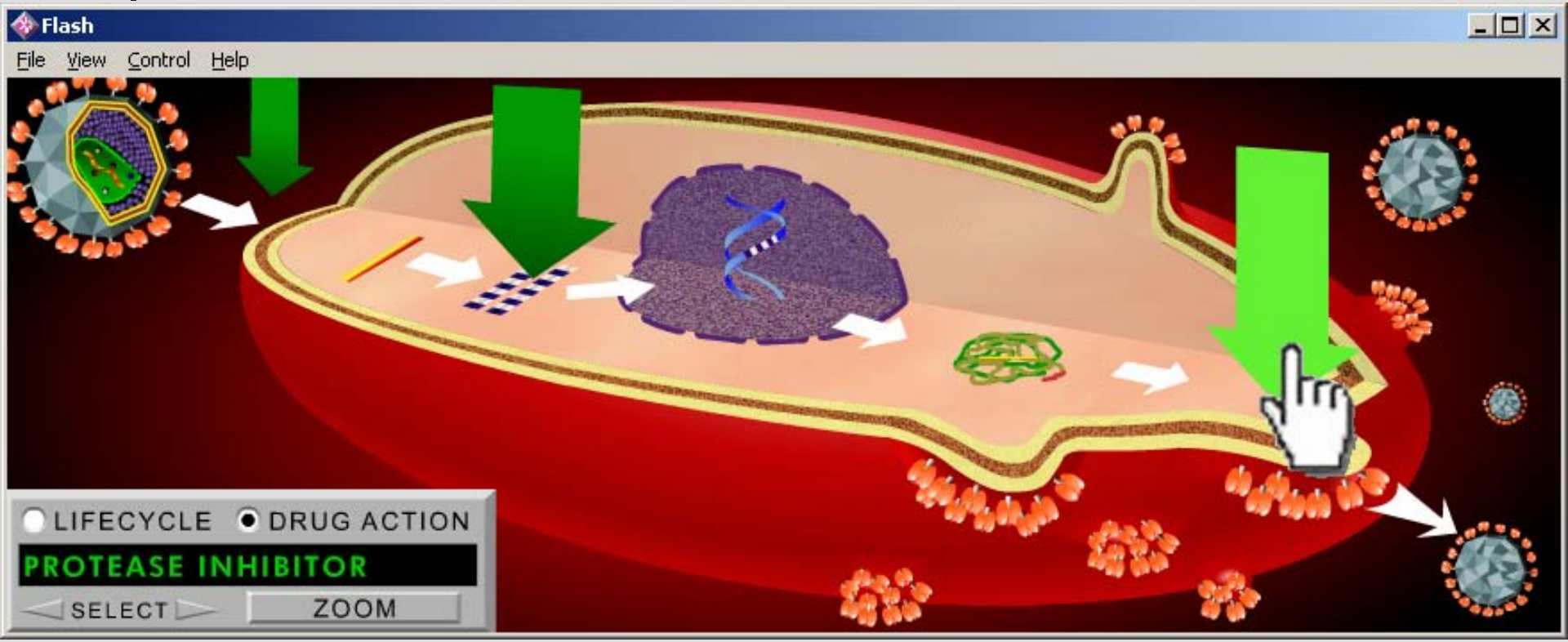


Animation depicting HIV infection and possible drug action, 1

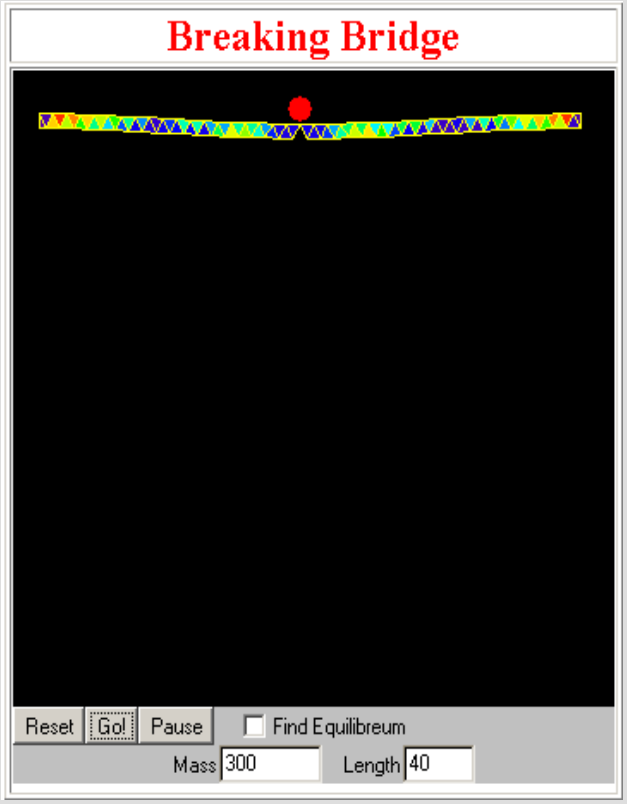


Note buttons giving user control of animation

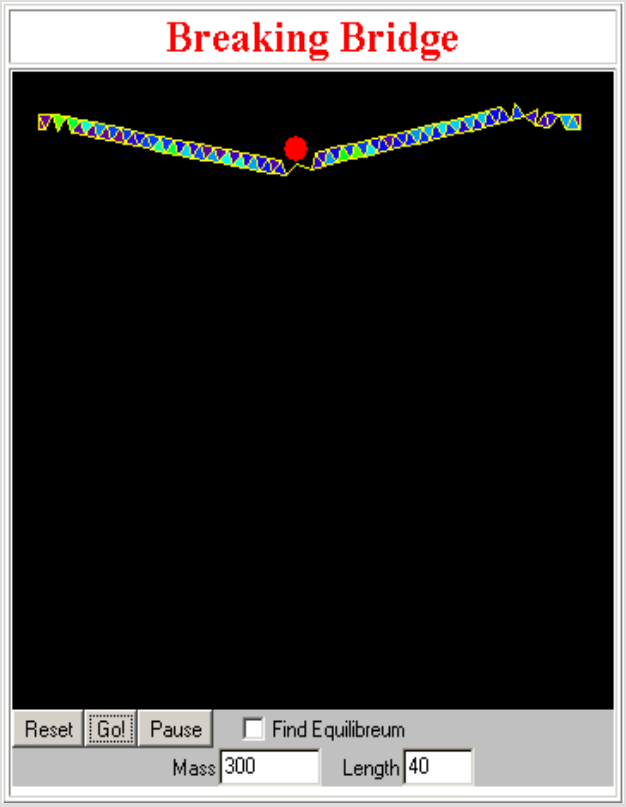
Animation depicting HIV infection and possible drug action, 2



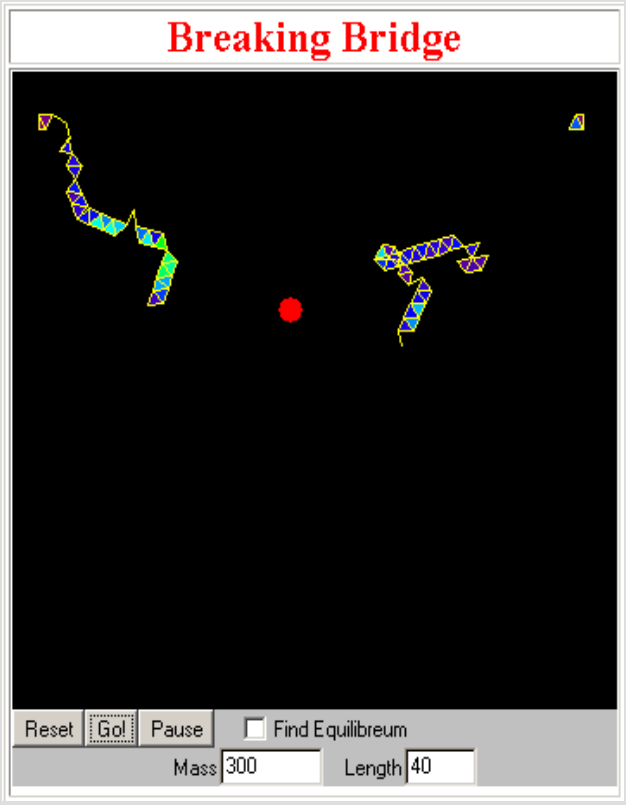
Java applet simulating structural failure, 1



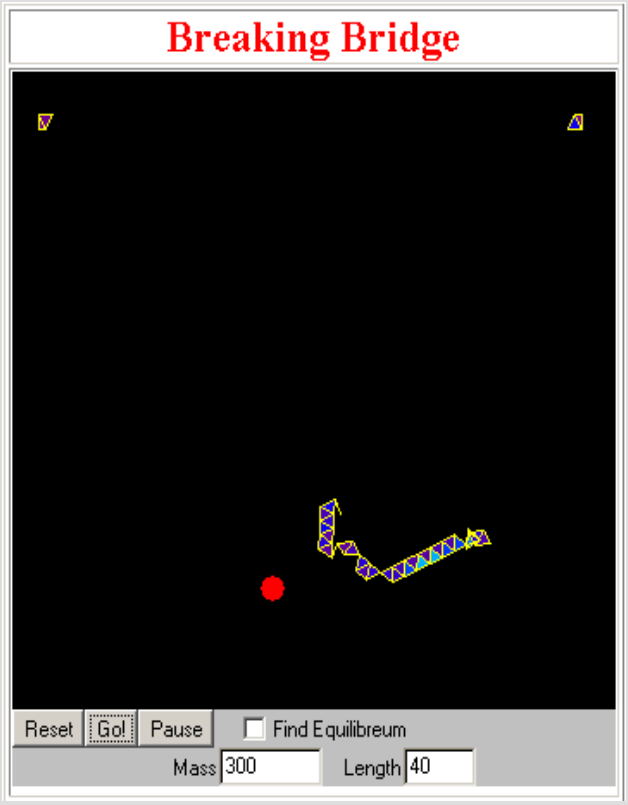
Java applet simulating structural failure, 2



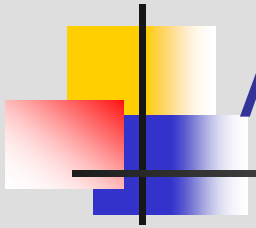
Java applet simulating structural failure, 3



Java applet simulating structural failure, 4



11.5 Future Developments: 3D Animation



- Provides more information and flexibility than the 2D animation we have seen
- Many formats; the open standard is Virtual Reality Markup Language (VRML)
- H-Anim is the standard for human animation using avatars (see Slide 51)
- A key technology: after an initial download, movement is specified by giving only the changes

Tour of the Munich Airport Center, in interactive 3D, 1

Tour of the Munich Airport Center, in interactive 3D, 2

Tour of the Munich Airport Center, in interactive 3D, 3

Tour of the Munich Airport Center, in interactive 3D, 4

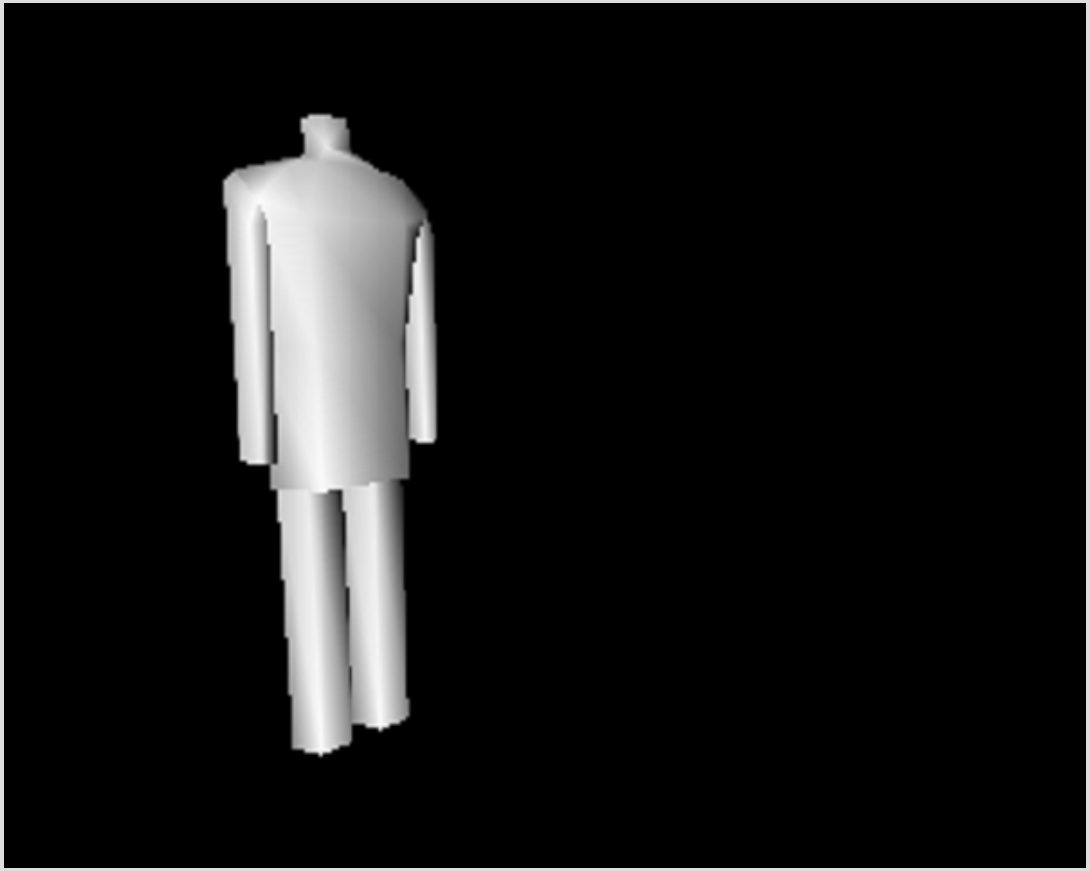
An avatar

Level of detail, 1

Level of detail, 2

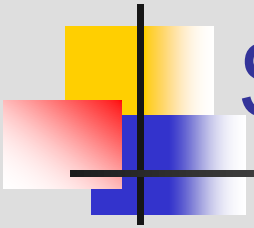
Level of detail, 3

Successive refinement, 1



Successive refinement, 2

Successive refinement, 3



Summary

In this chapter you learned about:

- Basic multimedia types and available file formats
  - Audio
  - Video
  - 2D animation
  - 3D animation
- The strengths and limitations of each
- Technology considerations when using multimedia
- Design guidelines for using multimedia on the Web
- New developments in multimedia delivery