VIS 415, Advanced Graphic Design
Princeton University
185 Nassau Room 303
Tue 1:30 – 4:20 pm
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Dial +44 20 3598 2801, and you'll hear:

> At the third stroke, the time will be six forty-seven and ten seconds.
> . . . [beep] . . . [beep] . . . [beep].

It's a "speaking clock," an automated electronic announcement which provides the current time. The distinct accent belongs to Pat Simmons, a former London telephone exchange employee who spoke the time from 1963 until 1985. Simmons followed Jane Cain, the "golden voice" of the first British telephone time system starting in 1936. That first setup was a room-sized electric mechanism which produced an automated announcement from glass disc recordings of Ms. Cain's voice, reading numbers and sentence fragments. (Dialing "T-I-M" from any UK telephone at the time set this elaborate machine running.) Before this, speaking clocks were delivered live by an operator sitting in front of a clock face (or two), answering phone calls and reading out the time.

Of course what you hear *live* when you call the number above depends on exactly when you call. The voice, well that's not so live; Simmons spoke the clock only from 1963 until 1985 and this service is a software simulation run by enthusiasts at telephonesuk.co.uk. A speaking clock is clearly an anachronism, but, it also provides a crisp model for thinking around something quite contemporary—the interface.

> Whatever "lies between" is called interface, whatever allows us to link two different elements, to reconcile them, to put them into communication.

This definition was offered in 1987 by Italian critic Giancarlo Barbacetto in his introduction to *Design Interface*. In his book, Barbacetto chronicled the Olivetti typewriter corporation's early attempts in designing user controls for photocopiers, computers, typewriters, and calculators. The volume places this design task in a broad cultural and temporal context. Appearing opposite Barbacetto's introduction is a reproduction of the Rosetta Stone, offered up as a kind of original (ur-) interface, a shared surface which facilitates communication between otherwise irreconcilable languages.

An interface is inevitably a product of its culture—it's made in a specific time and place to be used in a specific time and place and design decisions reflect shared conventions, assumptions, and histories from that setting. An interface designed *now* will not necessarily work 20 years in the future.

"Well, of course," you say. But it is not only technical considerations, but cultural assumptions which might be an interface's Achilles heel. Imagine trying to explain the iPhone messages interface to someone in 1971, or even in 2004. It's a simple enough interface, but the nuance of how it can be used would be lost in its cultural distance. 30 years in the future, it might be similarly illegible.

"Interface" is an extraordinarily elastic word. Definitions from fields as diverse as chemistry, theatre, fashion, and computer science describe interface as "a shared boundary," "a contact surface," "a border condition," and "a process or active threshold." All of these definitions share a central tenet—an interface is a thing itself. Its design decisions change not only what it looks like, but also how it works. And, these interfaces have the possibility of conveying more than simply utility, they may also transmit a point of view.

Interfaces surround us, manifested in compiled code, running on silicon chips, and fronting the computer services we all use, all the time. So, we had better understand at least a little about how they are made.

The June 15, 2015 issue of *Bloomberg BusinessWeek* was given over to a single text by writer and computer programmer, Paul Ford. "Code: An Essay" presents fundamentals of programming languages and techniques for a broad audience, with depth and finesse. In its introduction, Ford offers a concise and surprisingly robust definition of a computer:

> A computer is a clock with benefits.

and continues . . .

> They all work the same, doing second-grade math, one step at a time: Tick, take a number and put it in box one. Tick, take another number, put it in box two. Tick, operate (an operation might be addition or subtraction) on those two numbers and put the resulting number in box one. Tick, check if the result is zero, and if it is, go to some other box and follow a new set of instructions. A computer's processing power is even measured by the rate of its CPU, called "clock speed."

If your computer is (already) fundamentally a clock, then clearly the telephone service you dialed at the beginning of this essay is more of an antique curiosity than a working tool. Even a regular wrist watch seems like a gentile affordance when your phone, your laptop, and every message you send through these already registers the time. And in the face of all this, the Apple Watch arrived last spring. Is it some kind of cutting edge anachronism?

Well, it does have an extremely challenging interface design problem. Its touchscreen is tiny, screen real estate is limited, batteries are finite, and fingers are not shrinking any time soon. The ways in which Watch OS software solves many of these interface design issues is instructive. The device's screen lights only when you raise your wrist to look at it. The watch's face can be almost instantly swapped out with a strong push and a swipe. The watch reveals its full range of utilities when you press the "digital crown" and this pulls up the Launcher, a kind of iOS home screen seen through a roving digital magnifying lens. From here, the watch fluidly transforms itself into an iPod, a mail reader, weather station, text messager, and so on. What is interesting is not so much what the Watch can do, but rather how what it can do is all packaged behind its familiar clock interface.

[Pause, 30 seconds]

Standing more or less alone on a train platform in the small Swiss town of St. Margarethen one morning this spring around 6:00 am, I noticed two station clocks in my line of sight. These clocks were the iconic Swiss Railway Clocks designed by Hans Hilfiker in 1944. It's a graphically concise clock face with no numbers, only bold black strokes marking hours, smaller (still bold) strokes for minutes, and two workman-like arms for the hours and minutes. Seconds, however, are registered by a bright red lollipop of a hand. Its distinctive form was added in 1953 based on the shape of an engineer's signalling disk used to indicate when a train is clear to depart the station. The resulting clock face design is austere, specific, and exaggeratedly functional. It is so particular that Apple even "borrowed" it for the clock app on iPad before being sued by the Swiss railways and eventually settling on a $22.4M licensing fee. (The offending interface was removed in iOS 7.)

Staring at the two clocks through my morning fog, I noticed that they were perfectly synchronized. I suppose, this shouldn't be surprising, particularly in a train station (and a Swiss train station no less) where inaccurate clocks would have definite consequences on how passengers get where they are going. But as I stood staring at the clock close to me and the one across the tracks on another platform, I noticed something surprising. Each time the second hands reached the top, they paused in a decidedly long click. After which, the two continued again to sweep around the face.

The pause, it turns out, allows the clocks to synchronize with one another via an electrical signal passed from a master clock. The second hand stops for ~1.5 seconds to receive and process the signal, leaving only 58.5 seconds to complete the rest of its journey. For the remainder of that minute, the clock is telling a small lie, displaying seconds which are actually not quite seconds.

These clocks, linked and synchronized by radio, implement an accurate and consistent clock system for the railroads. You can be sure that standing on a rural train platform in St. Margarethen or the central station in Zürich, the clock you are looking at tells the same time, and that the engineer driving the train which connects the two also reads the same time.

But what the clock looks like is essential for this to work. Hilfiker's clock face design is typically "Swiss," with minimal articulation, extreme contrast, and clearly rendered functional distinctions that suggest precision, efficiency, simplicity. The bright red second hand can be seen from a distance so you can easily scan that these clocks are in sync. Even the once-a-minute pause, while functional, also *communicates* accuracy.

As I stood looking at Hilfiker's clock that morning (and the blank stare of its graphics looking back), I was using a carefully orchestrated interface—an interface between me and the train yet to arrive, coordinating our communication and assuring me that if I trust it, I'll get where I'm going. In the end, I did.

April 19, 2015 6:02 AM, St. Margethen, Switzerland

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Class Schedule

September 22	Introduction Lecture — "I-n-t-e-r-f-a-c-e" Exercise — What time is it?
September 29	Assignment 1 Lecture — "Zapotecs & Pulsars" Exercise — A clock, *now* . . . Reading — *From Sundials to Atomic Clocks*, James Jespersen and Jane Fitz-Randolph
October 6	Assignment 1 continues Student presentations begin Lecture — "Olivetti's Interfaces" Exercise — 20 Questions Reading — *Design Interface*, Gianni Barbacetto, "By Design," Alice Rawsthorne
October 13	Assignment 2 Student presentations end Lecture — "Bruno Munari, c.1962" Demonstration — Swatch, @internet time, and Ivrea Exercise — Reading a wave Reading — "The Tetracone," "What is this X Hour?," Bruno Munari, "Reading a Wave," Italo Calvino
October 20	Assignment 2 Lecture — "Press Start to Begin (on the Metrocard AVM)" Exercise — Please swipe your card . . . Demonstration — *12 o'clocks,* John Maeda, Reactive Books Reading — *Designing Interactions*, Bill Moggridge, *The Interface Experience*, Kimon Keramidas
October 27	Field trip, New York City Reading — "Material design," Google inc., "I am a Handle," Rob Giampietro, *A Primer of Visual Literacy*, Donis A. Dondis
November 3	Fall break, no class
November 10	Assignment 2 continues Project review, in-class critique Lecture — "Hans Hilfiker and the Swiss Railway Clock" Demonstration — Bloom, Karel Martens' clocks, Halmos Reading — "Einstein's Clocks: The Place of Time," Peter Gallison
November 17	Assignment 3 Guest lecture — "Ten Minutes after Ten o'Clock," Stuart Bailey Reading — "A Note on the Time," Dexter Sinister, "University of Reading," Stuart Bailey
November 24	Assignment 3 continues Lecture — "You Will (past predictions for future interfaces)"

	Demonstration — Macintosh debut keynote Reading — *Human Interface Guidelines (WatchOS)*, Apple Computer, "Spatial Data Management," Muriel Cooper, Richard Bolt, Nicholas Negroponte
December 1	Assignment 3 continues Project review, in-class critique Lecture — "Eno, Bloom, and The Clock of the Long Now" Demonstration — Christian Marclay, *The Clock* Reading — "Code: An Essay," Paul Ford
December 8	Assignment 3 continues Individual meetings and class discussion Lecture — "Put that there.*" Reading — *In the Beginning was the Command Line*, Neal Stephenson
December 15	Assignment 3 ends Final review of all work from the semester with visiting critics
January 4	Final portfolio due at 1:30 pm