

[MUSIC PLAYING]

NARRATOR: Building 20 was built as a temporary facility in 1943. Soon it will pass into history, but this legendary structure-- MIT's Magical Incubator-- won't be forgotten. During World War II it was built to house the radiation laboratory, and it's here that MIT engineers refined the development of radar and helped win the war. Since then, an amazing assortment of laboratories, organizations, student groups, and offices has taken shelter under its wings.

Many of these groups led to important and groundbreaking developments. Over the decades, Building 20 has been home to the Research Laboratory for Electronics, the Laboratory for Nuclear Science, the Acoustics Laboratory, the Department of Linguistics and Philosophy, the Undergraduate Research Opportunities Program, the Integrated Studies Program, the Solar Electric Vehicle Team, ROTC, the Tech Model Railroad Club, and many others. On March 26th and 27th, 1998, we celebrated the remarkable story of MIT's Magical Incubator.

Over 250 well-wishers came to remember the accomplishments of those in Building 20, reconnect with friends, and pay their last respects.

PENFIELD: First of all, I'll take the opportunity to let you all know that the tradition of student hacks is still alive and well at MIT. As we walk out and take a look at Building 20 later this morning, you'll see on the facade of Building 20 a big sign that looks like a large scale property office sign that says, deactivated.

KYHL: Well you know, I saw Building 20 built. I was working at the radiation lab in Building 22, which is now where Building 26 now is, and so I watched them put up Building 20. And you know those time lapse photographs they make of construction of skyscrapers? Well Building 20 went up like that-- almost like that-- in real time.

There would be people starting nails in the floorboards, and behind them would be a man with a big mallet who would drive the nails in one blow, and then behind him would be a man with some wooden posts to put up for the second floor. It was quite amazing.

PENFIELD: Ladies and gentleman, I'm pleased to welcome you to the commemoration of MIT's Building 20, the Magical Incubator. And let me start off by saying a word or two about why it is that we're here. If MIT's Building 20 was an ordinary building, there'd be no need for a gathering like this. But we all know that Building 20 is definitely not an ordinary building.

What it says is that "the construction of the building is of wood frame, and it's carried by a floating concrete slab approximately eight inches below. The life of said building to be for the duration of the war and six months thereafter."

[LAUGHTER]

You know that if you want to run a wire from one room to another, you don't call Physical Plant, you don't plunk down \$1,000 to call an electrician and the carpenter. Instead, you get out a power drill or a screwdriver and you jam it through the wall, and you string the wire, and you take care of things right away. And you do it in one afternoon rather than waiting six months for a purchase order to come through.

KYHL: They tried to build the E wing in the middle of the winter. One day, they came over with a steam shovel and a truck to excavate where the concrete pad for the building. But the ground was frozen solid, and all that steam shovel could do was scrape the ground. So they took off for lunch, and after lunch they came back with a wrecking ball in the truck, and they tied the wrecking ball to the bucket of the steam shovel, and they would lift it and drop it on the ground.

So the next day they came over with the air compressor and the jackhammers, and that did it, and they excavated the ground for the pad. The next day, they came over with the reinforcing rods and laid all of those out, and were going to pour the concrete the next morning. And that night they had a blizzard, so they waited until spring.

NARRATOR: But there was more to the building than just the temporary nature. As we all know, Building 20 had a way of casting a spell-- a magical spell-- over those of us who worked in it. It's an uncanny, magical power to bring out the best in everybody. It's hard to describe this to people who have actually never had an office or lab in the building.

To us in this room, we know better about Building 20. It was a special friend. The reminiscences that we've received from all of you speak to that in a very special way. We've been collecting these. They're reproduced-- most of them are reproduced in the packet that you received. And if you read them, they constitute nothing less than love letters to the building. Yes, love letters to a building. Doesn't that seem strange? How can you explain that to your more rational friends and colleagues?

STAELIN: I had only a very brief experience in Building 20. I arrived as a sophomore, I believe in the fall of 1957. Lou Smullin was my faculty advisor, and he improvised what we now call an undergraduate research opportunity. Although there was no money, there was a lot of excitement. It was still only a few years after Radiation Laboratory, so a lot of the momentum of that activity was still going forward. And I moved in as a 10, 12 hour a week student into 20 B 003 A.

I remember it well. It's the corner of the building on the first floor, not far from here, that's closest to Central Square. That was the microwave section, and there was a lot of excitement in there. Herman Haus had just finished his PhD thesis and had moved across the hall joining the faculty, and Abe Bers, still a graduate student, was working on cross-trapped klystrons. So I was going to help Abe and work for Professor Smullin, which I did.

And he started me right out fearlessly. He said, well, now, you ought to design some vacuum feed throughs. And I knew nothing about the shop war vacuum or feed throughs, but he said, don't worry, I'll show you. And he taught me a lot in a very short period of time, and I learned a lot from the shop people, too. And I think that was one of the characteristics of the place. Everybody was a teacher.

PENFIELD: We're here to help each other through the grieving process that comes from the realization that this building, being declared temporary, is actually not immortal. That it will soon be gone. And it's proper to do this with a healthy dose of nostalgia, but not sadness. And with gratitude for the life of our dear friend, the building, and the many ways in which it's influence our lives.

SAAD: You have to remember that the work that went on in Building 20 was pertinent to all of the work that was going on in the Radiation Laboratory. You should understand that they chose the name Radiation Laboratory in hopes of confusing the enemy. I wasn't told what it was all about until my clearances came through.

One of the first temporary structures for the Radiation Laboratory was Building 20, which went up in 1942. That's Building 20 right there, and this is Building 22, and that's Building 24. And that's my favorite building, the swimming pool. We were exposed, fortunately, to brilliant guidance and leadership. I would say that the Radiation Laboratory was perhaps one of the great and successful experiments in combining industry, government, and technology.

And I thought you might be interested in seeing what the labs looked like in Building 20. It's clear they were somewhat basic. They were even primitive. But what was lacking in facilities was more than made up for in talent. The laboratory was characterized by Compton as the greatest cooperative research establishment in the history of the world. And somebody else said that the lab ran hotter than other labs.

Its staff included about one fifth of the nation's physicists, and was the largest laboratory of its kind in the world. Its researches, begun as a gamble, had in four years made obsolete nearly all other radars, and its sets played a major part in smashing submarine warfare, shooting down German planes and V1s, guiding the bombers over the beaches of Normandy, controlling our attack planes in the big push to the Rhine, and leading the Eighth Air Force bombers in all their missions through overcast in summer and winter from November 1943 onward.

And among the 3,000 members of the Rad Lab there were nine Nobel Prize winners. And I just picked out one of my slides to show you some of them. This was Robbie. He was the he was the technical director, you might say, of the laboratory. This was Carol Montgomery. His wife also worked there. This was Ed Purcell, and Ed was also a Nobel Prize winner. There's Dickey, and that's Yonkers, and there are others there. And that's Nathan Marcovitz. The reason I point him out is because I taught him how to swim in the pool.

KIANG: I believe that the role of Building 20 as a incubator is really the right word, because people got together and shared ideas and words without really worrying about who you were or where you came from. And I think that's the secret.

PENFIELD: One of the things that contributed to the spirit of the Radiation Lab was the fact that they had excess talent in all sorts of different areas, and in fact the crew there produced two self-written operettas during that period that had to do-- one was entitled *Defend Ammonium* and I happen to have the-- hey, don't laugh. I'm not making this up. Here it is. *Defend Ammonium: A Monumental Musical Drama in Two Acts*, and its chorus starts off, "We are the scientists of the great Radiation Laboratory," and it goes on from there.

WEISS: I have a different view of Building 20 than people who had Rad Lab experience. I looked at it as a place which was actually ideal to do physics. And the reasons are following. It was at the ideas were able to dominate. There was an inspired leadership of that laboratory, [INAUDIBLE] and [INAUDIBLE] Stratton, Wiesner, later on the Peter Wolf. Henry Zimmerman was very important in our lives, and Al Hill.

That's the machine shop, and that lived right there. And in fact, it is a very good machine. Eventually got put in the dungeons of the building next door, and failed in some regard because it had no light. I'm telling you that now-- you still have a machine shop there, but Building 21 was better. Well, that's John Keefe in machine shop, but they're making a magnet. There was a glass shop which doesn't exist anymore, but in you'll see that plays a role in all of this. And that was right there.

There was a chemistry lab and a place to do out gassing of materials. This was part of Louis Smullin's place. You had a first class tube lab there. And in fact, was used by a lot of people. High class vacuum work was done there. And that was all in this area here. There were vacuum furnaces-- you could do hydrogen braising. There was instrument rooms, and you didn't have to buy stuff. There was a legacy of junk that you could use to build. It was amazing.

And then is-- and this was not true in the beginning-- an anechoic chamber, an RF free room, I hope you may see some of these. There was the LNS machine shop, which is-- people will be talking about LNS later, and there was an electronics design and assembly facility here. The next slide shows a very important thing which is not often thought about anymore, and that's the-- somebody mentioned it this morning-- the Collins Cryostat.

There's Sam right there, a crusty Tennessean. And he has built this thing that makes liquid helium available to everybody, which was actually critical. And what you're seeing here is Jerrold Zacharias and John MacLean with a torpedo tube kind of thing that [? Carey ?] [? Eisinger ?], who's in the room, and Dean Edmonds played with as kids. That thing was a precision measurement device for looking at atoms in vacuum. And you didn't have to worry about the terrible problems of solid state, of things correcting because they're near you, you could do physics in the pristine state of something you read about the textbook. Absolutely marvellous. And those machines were the predecessors of something which then grew out of that, which became atomic clocks.

KYHL: It was a place where a microwave astronomy started. Bob Dickey had invented the microwave radiometer, and his crew-- including me, and Bob Barringer and Art [? Vane ?]-- had been down in Florida doing measurements on water vapor absorption. And we came back up here and sat up on the roof of Building 20, and turn the radiometer toward the sun and measured its microwave temperature. And that was the beginning of the microwave astronomy, and all of the microwave radio sources and the rest of it.

ROSS: And then all the sudden, blam, there was this huge explosion. And it turned out-- oh, and I said wow, what's that? And he came around and was standing beside my seat at my desk, and all upset because his experiment hadn't worked. And was waiving around-- and out of the corner of my eye, I can see here was a great big 45 automatic being waived right next to my ear.

And so I jumped up and I said, what was that? Tell me if you're going to do that again. And he was so agitated that I just took off. He was making a very high speed to switch for turning off high current electric circuits in an instant, and the idea was he was using blasting caps. And on the roof of the Building 20 was left over a whole bunch of lead bricks. But he used the mass of all those lead bricks to give him this test thing. Well, when I was so upset and distracted by this they very soon moved me out, and that was end of my Building 20 occupancy.

MORROW: The Project Meteor people needed an antenna on top of the roof, but there was no place to fasten it down on the roof because there was none of the timber showing through. There was just a tar and gravel roof. So they decided the wind might blow it over. So they went to the people that had the lead bricks. There were always nuclear people working in Building 20.

They absconded with about four lead bricks and put them on the wood structure. One fine day the wind came up. The antenna tipped over, and in so doing one of the lead bricks lifted off the surface up into the air and then fell off the structure, and fell onto the roof. Now, in the war, to save material, they did not do the roof with wood planking. They just laid some kind of thick composition board over the roof and then put tar gravel on top of that. The lead brick went straight through the roof, and it also went straight through Bob Kingston's apparatus and smashed the glass work into a million pieces all over the floor.

A tremendous interactive thing. Kingstong was furious, his thesis work set back. But in those days there was a glass blowing shop in RLE, and the glass blowers built new glass for Kingston. And his work proceeded to produce a thesis in due course with hardly any delay at all. And in the meantime, everybody knew all about the high vacuum spectrograph because they all crowded around to find out exactly what was going on with that particular research group.

PENFIELD: We're having a contest, by the way, for the most dots. And so far we have a couple of people who have five dots. That is, they've occupied space in Building 20 for parts of five different decades-- the '40s, '50s, '60s, '70s, and '80s and '90s.

LETTVIN: One of the problems, you see, in modern research, is whether you can persuade the authorities at NIH, NSF, and so forth to let you take a chance. Sometimes it's very difficult to defend chances. That freedom to be able to walk barefoot through the fields of the mind, that was something that was so central to Building 20, and to RLE at the time, and to-- it was astonishing.

There is a curious aspect about buildings where there has been dedicated work. You might almost say it's far better than a monastery. It's more like a temple. You know, where there's been dedicated work and where the scars and marks on the walls all have meaning. All the artifacts that are left aside somehow or another have meaning.

There is, as it were, a passing on not of a tradition, but of a vague memory that somehow or another is very rich.

KIANG: People don't usually think about Building 20 as contributing a great deal to health research, but it was while Walter headed that group that a group of clinicians from the Massachusetts Eye and Ear Infirmary came and wanted to have help in setting up a basic research laboratory. And they approached Doctor Killian at that time, who was president of MIT, and he searched all through MIT and found Walter Rosenblith was one of the few people that had any interest at all in the biological sciences.

And I happened to be there at that time, and I was selected as the first person to head the Eden Peabody laboratory at the Massachusetts Eye and Ear Infirmary. And over many decades Walter had this connection with the clinicians in medicine and eventually out of that, I believe, he got the idea that MIT could be a place where engineers, and doctors, and scientists could work together.

ELIAS: The building induced people to communicate with one another. And one mechanism for communication between most of the communication engineering and communication science groups was a shared interest in speech. Lunch in Building 20 was delivered through a literal hole in the wall. There was a hole in the wall along the hall, and a couple of nice old ladies behind it who made up sandwiches. And there was a line of people waiting for sandwiches at lunchtime.

And once a week the linguists, psychologists, neurophysiologists, and communications engineers got their sandwiches and went across the hall to a conference room, and had the speech lunch. And the speech lunch was a great institution. It kept everybody informed about what everybody else was doing, and what was most interesting, and what they had done recently.

HALLE: To my mind buildings are rather like shoes. One thinks of not wearing shoes mainly when they don't fit. When the shoe fits, you wear them, and with hardly any conscious thought, and wouldn't dream of being without them. Building 20 fit many of us perfectly. It kept us dry and warm in winter, except on those occasions when the windows fill out because they hadn't been re-puttied since 1943.

It was because of its being relatively undesirable that Building 20 could function as an incubator for new development. We know that research is risky-- that new ideas usually are wrong-- but without trying them out, one cannot tell the few really good ones from the many that are less good. As we bid goodbye to the building that for many of us was home for decades, there have been numerous attempts to put into words the essential qualities of the building.

My own suggestion is that in spite of its rather un-prepossessing exterior, Building 20 was an incredible luxury. It was like money-- lots and lots of money in the bank-- that was not immediately needed, and could be invested in projects without guaranteed payoff. And as we now look back, half a century later, on the record of these investments we see that quite a few of them were successful and grew into major scientific enterprises.

STAELIN: And during the time of troubles in the Vietnam era, there were a group of students who undertook to burn it down and set a large bonfire next to the Air Force ROTC section. But unfortunately, after they left, they had not appreciated the building's built of asbestos despite its being wood. And it's an incredibly durable building, as its existence here today testifies-- durable in more ways than one.

KOTOK: The building was sort of always too hot or too cold. It was never just right. Like much of the Institute. the heat was regulated by the calendar not by thermostats. So here we have a warm spring day and it's hot as hell in here because we don't do air conditioning at this time of year.

PRATT: The wonderful thing about Building 20 was that the space was-- in this case, in the 1980s-- was sort of so cheap that the Institute could afford to give just a bunch of undergraduate freshman, in this case, some space in order to reconstruct this junk computer hardware and have a whole lot of fun fixing it up and getting software, both from other people on our own, running on it.

KOTOK: We needed to put in a new power panel, and so you may remember that the power in Building 20 ran in knob and tube wiring up along the ceiling. And there was 120 volts-- the 122 [INAUDIBLE] three phase on one side of the line, and there was 400 cycle stuff like that we never really used. But anyway, so we decided to do it right, and we got a nice panel, and we installed it and wired it up to the 208.

And some years later, someone decided that this knob and tube wiring must not meet code or something, and so they decided to redo wiring. The Institute electricians came in and looked at this panel and said, it doesn't seem to be on our drawings. Well, better add it. Somehow we missed it. So they added it and reconnected it when they redid the wiring.

I can show you, through the wonders of the web here, the video that's on the TMRC website of this train. So here you are driving your own train down the tracks of the Model Railroad Club. So this, of course, is all the layout in Building 20 as it existed.

WORDEN: My first experience was, oh my god, what is this place? And we're walking down the corridor, and that incredible smell of masonite-- that's what I remember. And I realized that if I go into shipping dock and drive up wing-- what's the wing over there by the parking guy? C-- and then did a seven point turn to get around the corner to come down the main wing, past Gil's lab, and then that nice big space where the food machines are, I could cruise right by there. I didn't even have to slow down. I got really good at it. One time I knocked the garbage barrel over. But I got down there, and then I could get in the lab. And this became a practice. I became so quick at it, it was just like a parking garage.

REDWINE: One of the nice aspects of Building 20 was, it sort of has forced us to interact with a lot of different people doing different things. And some of the things one learns have to do with academic and technology affairs, but also you learn a lot of other things as well. One of the stories, which Peter Demos tells me probably is true, has to do with a couple of the members of the laboratory for nuclear science who have had their offices on the same corridor as the ROTC.

And apparently, they were at the end of the corridor, and most of the corridor had the offices of the various officers of different services. And these officers had their shingle out, pointing out perpendicular from the wall-- Captain So-and-So, Colonel So-and-So, et cetera. And so there are these two LNS folks down at the end of the line and they decided apparently, well, we better put our shingles out, too. And so they did.

The shingles didn't last very long because apparently some members of the corridor found it a little bit offensive. Because what they did was, at the end of this long line of official looking shingles, their two said Burma and Shave.

MOSES: Now, I got tell you, no provost in their right mind would shut down Building 20. 200,000 square feet on a campus where, if you wanted an extra 500 square feet, probably take you a couple of years to get through the system. So to find 200,000 square feet in which to put all the residents of Building 20-- no mean trick. How did we get to this point? Well, we've been talking about it for 50 years, for sure.

KIANG: Well, I can remember when I was about to leave for the Eye and Ear Infirmary to start that lab, one of the considerations was that Building 20 was going to be torn down. The was, I think, 1957. And I was quite sad to hear that, but then I noticed that they were installing 20 year gutters.

MOSES: So I'm going to talk to you not about past, but I'm going to make a transition to this dinner tonight where we talk about the future of this area. So in any case, given my name I thought maybe we'd do something biblical about this, and with the help of the planning office we have constructed a biblical story. So here goes. Ta da!

Okay, Genesis and Exodus-- one of the many mysteries in the Bible. What happened to all the tribes? You know, it's around 700 BC. Do There were 10 lost tribes, so here is location of the various tribes Building 20. Thank you very much.

[MUSIC PLAYING]

There are many distinguished guests here, and so many that to recognize all of you would be impossible. But there's one lady to whom you will, I know, wish to extend your warmest greetings. Would you please join me in greeting our own Kay Stratton?

[APPLAUSE]

Bob has made the new complex for computer information and intelligence sciences one of the key priorities of his deanship, and he has put in major portion of his time working on what should go into the complex and raising the funds to make it a reality.

BROWN: So what I'd like you to do is think about what will be on the site of Building 20 in the year 2002. Imagine a modern complex composed of two to three integrated buildings welded together to form a seamless environment. It's taken a number of champions to carry us this far, and I think none have been more pivotal than Chuck Vest, president of MIT.

VEST: We're not here this evening to talk about a building so much as we are to talk about the people-- the people who made and continue to make MIT truly great. One of those people is Ray Stata Ray simply epitomizes to me what MIT is all about. It's about educating young people very deeply, especially in engineering and science. About preparing them to become leaders in many dimensions.

We're all very, very deeply grateful to Ray and Maria Stata, and I wish very much that it would have been possible for Maria to be with us this evening, because I've come to understand that Maria really understands this place very well. The next magic incubator will bear their name and will bear their spirit. We could not be more fortunate in having them as friends. Ray Stata.

STATATA: I'm sure that the legacy of the great accomplishments that were born in Building 20, that you've all heard about here today, are going to be preserved, and extended, and enhanced in this new space that will replace that time-honored building. While we're at it, I would just advocate that we might as well do it right, and I would solicit your support. Thank you very much.

[MUSIC PLAYING]

SPEAKER 1: It was an open and inviting intellectual community. Indeed, it was. And this thing is that-- the nice thing is, you had neighbors that weren't necessarily people doing what you were doing.

SPEAKER 2: The best time to come in when you wanted to meet somebody was at 11 o'clock at night, because during the daytime-- the classes, this and that. But at 11 o'clock at night everybody was in working.

SPEAKER 3: I think I know you. I'm trying to think of where, though. I'm trying to figure it out.

SPEAKER 4: I've learned since that lots of things were going on that I never did wander in and discover.

SPEAKER 5: So this is the fountainhead from which so many things again.

SPEAKER 6: There was Herman Haus, who is now institute professor. He came originally from Slovenia. I escaped from Hungary. There was Abe Verse who escaped from Romania. There was Reggie Russell who didn't escape but she was from England. There were even one or two Americans there.

- SPEAKER 7:** Hi. Reno worked on the big clock. No, the little clock. The little clock, a little bit. But never on the big clock. I'll see you later.
- SPEAKER 8:** It was such a vibrant place and people were always so friendly in this building. And to see it now empty is kind of a sad experience.
- SPEAKER 9:** My impression of Building 20 was always that it was where everything got put that somehow didn't fit anywhere else.
- SPEAKER 10:** And the other thing-- which is outrageous, and it has affected us seriously-- is that neither Cambridge nor MIT can fix that goddamn street.
- SPEAKER 11:** Jerry? Jerry stays there because he likes to smoke, and so he can open his window and cheat.
- SPEAKER 12:** Since we didn't have any facilities for coffee and [INAUDIBLE] had all kinds of facilities, we wander in there and have coffee with Milk Bone dog biscuits. And I got to like Milk Bone dog biscuits.
- SPEAKER 13:** Dr. Adler had an Irish Wolfhound. When you wanted to walk down on this corridor and that dog also was coming in the opposite direction you have to go into one of the doorways because that tail of the dog swept from one side the corridor to the other side. It was a giant beast. It was the size of the calf, and if you got hit by tail you knew it.
- SPEAKER 14:** And the place, when I came here, stank of soap, mayonnaise, and candy, and chocolate. Candy, right.
- SPEAKER 15:** And someone had placed a large notice on the back page of Thursday, somewhere around 1970 or so. And it said something like-- it was basically a reminder to people that the Department of Linguistics office was in the same part of Building 20 as the ROTC building, and therefore that any war demonstrators need to trash selectively. That was the terms that was used. It said, please trash selectively.
- SPEAKER 16:** Some people regarded it as sort of run down, even at that time. But I came from a pre-fabricated laboratory at the University of Chicago. So for me, this was a step up in physical surroundings. -Between last night and today during the day I saw more people, having more fun, making more contacts with more people for more diverse purposes than I can remember in a long, long time. And I'm just so delighted at how many of you decided to pay tribute to your favorite building-- come back and say goodbye to Building 20 in a dignified way, the way we have.
- PRESENTER:** Today's been a wonderful day reminiscing about the building. I have to say, it's the first wake I've ever attended for a physical structure.
- [MUSIC PLAYING]
- PRESENTER:** This, ladies and gentlemen, is the wonderful committee that brought you the event today.