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Slides 1 and 2. A big challenge in cities like Tainan, Kathmandu, Istanbul, and L.A. is to decide which buildings to fix among thousands of buildings that may be vulnerable. And then, after we decide which buildings to fix (what to target), we need to decide how to fix them without doing more harm (which has occurred in the past).

Slide 3. The size of the problem is awesome as it is clear from this photograph from Kathmandu.

Slide 4. Yet, we know some of these buildings, most of which do not meet our norms at all, are worse than others. We cannot afford fixing all deficient buildings out there, so we should start by fixing the ones that we believe are worse.

Slide 5. But we need to be ready to be wrong. Here are observations collected by Japanese researchers in Erzincan, Turkey. All symbols without a number represent a 4-story building built following the same drawings and presumably using the same practices. The boxes represent blocks. So you can see that all these buildings were within a few hundred metres from one another. Yet, nearly 50% of them had severe damage caused by an earthquake in 1992 and the rest did not. Can any evaluation method out there explain this?

Slide 6. Here is another example, this time from Armenia Colombia (1999). The building on the left was supposed to be the same as the one on the right (no longer there). Both had URM bearing walls to resist vertical and (presumably unexpected) lateral loads. Why did the building on the left not collapse? Is it differences in demand? Or small differences in capacity? Or both?

Slide 7. The previous slides suggest that in identifying the worst among the bad (buildings) we need to be ready to be wrong at least half the time. From that point of view alone it follows that whatever screening method we use ought to be simple.

Slide 8. This slide shows that an index as simple as a weighted sum of ratios of areas of walls and columns to total floor area (x axis) correlates well with frequency of damage (y axis). In fact, within the worst bin, it turns out that one is likely to be wrong half the time (give or take). NCREE’s index is also simple and also provides good correlation with damage frequency. Can we ask for more?

Slide 9. So now I go back to the how to fix the worst among the bad (buildings).

Slide 10. I think in this arena Taiwan has set the bar quite high. Here is a district office building that survived elegantly the earthquake of 2016. Notice that in its long direction it had been strengthened with RC walls. That is what the profession usually calls for. But notice that in the short direction the end walls (which were infill brick walls) were left untouched (as far as I know) and yet they did the job as well as the RC walls in the other direction. Does this not suggest that to tackle the immense problem that I illustrated with the photo of Kathmandu with which I started may be a matter of simply talking with architects and masons to rearrange bricks in our old, presumably deficient buildings? Of course, there are better ways to fix buildings, but those are bound to be more expensive and therefore less likely to get used especially in places where the law is not always followed and where the size of the problem happens to be larger.