Contact is natural in the real world but often avoided in 3D animated features. Animators tend to make acting decisions that minimise or avoid contact within and between their characters and the world, and when apparent contact does occur, it can tend to feel both "floaty" and unrealistic. 'Ratatouille' called for dynamic, tactile characters that would feel very much a part of their animated environment, squashing into and against each other, props and the world itself. The contact needed to be compelling and believable within that cartoon world, and with that in mind we aimed to develop and deploy technology that would allow animators to easily setup collision relationships, make acting decisions with contact response interactively, and alter the resultant shapes.

After identifying typical contact scenarios (e.g. characters sitting, leaning against each other, etc) and sketching how we would like the resultant shapes to look, we settled on a cartoon 'plunger' effect. Finally, we optionally perform a relaxation of affected points.

Each of our characters has several built-in weight maps that alter the response across the surface. There are maps for controlling the degree of bulging/denting (e.g. the belly tends to bulge much more than the back of the hands), for avoiding bleed between regions of the body, altering the direction that points are pushed, limiting how far we can press, etc. The animator has the ability to override these maps and controls per body part as they see fit.

Many of the props on the show are automatically built for 'out-of-the-box' use as colliders, but we also crafted primitive objects for animators to use (e.g. planes, ellipsoids and primitive subdivs) that implement their own efficient contact algorithms, and rendered 2.5d collidable ground maps for many of our shots. For arbitrary objects that lack the contact & collision deformers, we can use FFD lattices that can be collided into.

Animators made extensive interactive use of the technology for both broad and subtle contact when posing and crafting motion. For example, in Figure 1 Remy squishes against the inside a jar as Linguini's fingers contact and are deformed by the outside. Other typical uses included hand contact into faces & against bodies, characters leaning against the world, touching, holding and brushing props, deforming and being deformed by furniture, and in much body and foot contact with the ground. Less expected uses included shots where scooter tires deformed by lattices squashed against ground maps, inverted colliders cheated food inside mouths, built-in rigged colliders prevented teeth/cheek penetration and aided in cheek/shoulder contact, and simulation could rapidly fix intersecting geometry when cloth simulation yielded 'surprising' results.