Table S1 EM data and refinement, related to Figure 3

	Overall	Composite Model*	Core	DIS3-PIN	DIS3-RNBCS	MTR4	MTR4-dsDNA/RNA
Data collection							
Particles	122284		122284	122284	91483	122284	33967
Pixel size	1.07 Å/px						
Defocus range (μM)	-1.0 to -3.0						
Voltage (kV)	300						
Electron dose (Å)	85.23 e–/Å^2						
Reconstruction (RELION)							
Accuracy of rotations (º)	1.35		2.07	1.65	1.40	1.47	1.82
Accuracy of translations (pixel)	0.81		0.88	0.78	1.04	0.98	1.34
Resolution (Å)	3.45		3.31	3.40	3.80	3.54	3.91
Map sharpening B-factor (Å^2)	73.6		47.4	64.3	90.6	82.1	84.0
Model composition							
Non-hydrogen atoms	31633	31633	17826	1817	5469	6623	6623
Protein residues	3889	3889	2310	212	647	726	726
Nucleic acid residues	59	59	5	8	14	37	37
Refinement							
Map CC (around atoms)	0.738		0.754	0.688	0.744	0.729	0.741
FSC (map,model)=0.143 (Å)	3.39		3.25	3.33	3.66	3.46	3.79
FSC (map,model)=0.5 (Å)	3.62		3.40	4.04	3.95	3.77	4.06
RMS deviations							
Bond lengths (Å)	0.006	0.001					
Bond angles (º)	0.748	0.41					
Validation							
Molprobity score/Percentile	2.06/73rd	2.03/74th					
Clashscore/Percentile	9.78/73rd	9.1/77th					
Rotomer Outliers (%)	0.06	0.03					
C-beta deviations	0	0					
Ramachandran plot							
% favored	90.1	90.0					
% allowed	9.9	10.0					
% outliers	0.0	0.0					

* Composite model generated by combining respective coordinates from each refinement in focused maps.

Table S2 Oligonucleotides used in this study, related to Key Resources Table

Type	Sequence 5′ to 3′	Source
RNA	Fluorescein-AGC ACC GUA AAG ACG C	IDT
RNA	GCG UCU UUA CGG UGC UAA AAA AAA AAA AAA AAA AAA	IDT
RNA	AGC ACC GUA AAG ACG C	Dharmacon
RNA	Fluorescein-GCG UCU UUA CGG UGC UCA CCA CAC CAC ACC ACA CCA CAC CAC ACC ACA CCA CAC AAA AAA AA	Dharmacon
RNA-DNA chimera (DNA underlined)	GCG UCU UUA CGG UGC UAA AAA AAA AAA AAA AAA AAA AAA	Dharmacon
RNA-DNA chimera (DNA underlined)	Fluorescein-GCG TCT TTA CGG TGC T CA CCA CAC CAC ACC ACA CCA CAC CAC ACC ACA CCA CAC AAA AAA AA	Dharmacon
RNA-DNA chimera (DNA underlined)	GCG TCT TTA CGG TGC T CA CCA CAC CAC ACC ACA CCA CAC CAC ACC ACA CCA CAC AAA AAA AA	Dharmacon
4SU-labeled RNA-DNA chimera (DNA underlined)	Fluorescein-GCG TCT TTA CGG TGC TAA AAA AAA AAA AAA AAA A(4SU)A	Dharmacon
4SU-labeled RNA-DNA chimera (DNA underlined)	Fluorescein-GCG TCT TTA CGG TGC TAA AAA AAA AA(4SU) AAA AAA AAA	Dharmacon
4SU-labeled RNA-DNA chimera (DNA underlined)	Fluorescein-GCG TCT TTA CGG TGC TAA AAA (4SU)AA AAA AAA AAA AAA	Dharmacon
4SU-labeled RNA-DNA chimera (DNA underlined)	Fluorescein-GCG TCT TTA CGG TGC T(4SU)A AAA AAA AAA AAA AAA AAA	Dharmacon
4SU-labeled RNA-DNA chimera (DNA underlined)	Fluorescein-GCG TCT TTA CGG TGC T CAC ACC ACA CCA CAC CAC ACA AAA AA(4SU) A	Dharmacon
4SU-labeled RNA-DNA chimera (DNA underlined)	Fluorescein-GCG TCT TTA CGG TGC T CAC CAC ACC ACA CCA CAC CAC ACC ACA CCA CAC CAC ACA AAA AA(4-S-U) A	Dharmacon
DNA	GTG TGG TGT GGT GTG GTG TGG TGT GGT GTG GTG TGG T	IDT
DNA	Fluorescein-GTG TGG TGT GGT GTG GTG TGG TGT GGT GTG GTG TGG T	Dharmacon
DNA	TTT TTT TTT TT	IDT
DNA	TTA TTT TTT TT	IDT
DNA	TTT TTT ATT TT	IDT
DNA	GTG TGG TGT GGT GTG GT GT	IDT
DNA	GCGTCTTTACGGTGCT	IDT
DNA	ACCACACCACACCACAC	IDT