

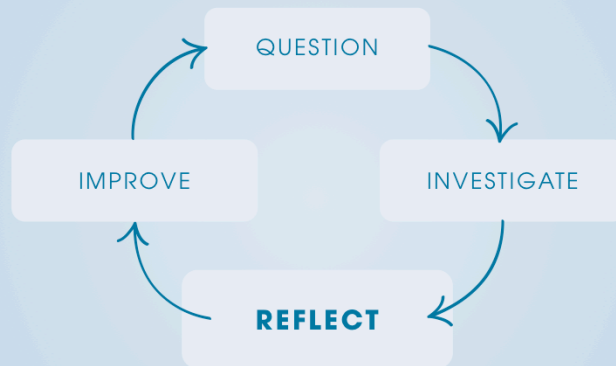
Team-Based Inquiry

Reflect Phase



In this presentation, we will cover the Reflect Phase of the TBI cycle: analyzing data! By now, you've identified your TBI team and your TBI questions, you've selected the best data collection methods, and collected data from visitors using those methods. Now: What do you do with that mountain of data? It's time to bring that data to your team to identify patterns and start thinking about improvements.

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You are ready for the Reflect Phase



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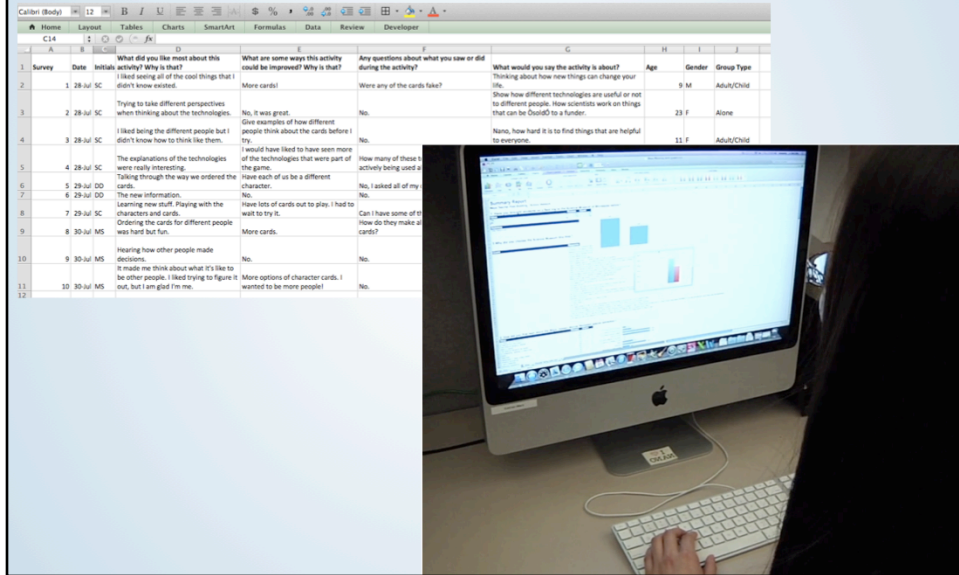
Data Entry



Data			
Data			
Data			
Data			
Data			

Entering the data is your first step. The easiest ways to enter data are in a spreadsheet or a text document, depending (OF course) on what kind of data you have.

Excel is best for entering numeric data



Excel or other spreadsheets are good for projects that collect a lot of numeric data, including information from questions that have limited response categories such as age, state of residence, or questions with a predetermined list of responses—like a ranking scale. With numeric data, you probably want to enter all your data into a spreadsheet so that you can easily calculate counts, percentages, and averages using the program itself and relying less on your own math skills.

Excel is best for entering numeric data

The composite image illustrates the importance of data validation in Excel. On the left, a screenshot of an Excel spreadsheet shows a survey form with columns for 'Survey #', 'Data collector', 'Date', and various survey questions. A 'Data Validation' dialog box is open, showing the 'Data' tab with 'Allow: decimal numbers' and 'Between: 1 and 100'. On the right, a photo shows a young child with glasses sitting at a desk, typing on a laptop. At the bottom left, a cartoon character of a man in a white lab coat and glasses has a speech bubble that says: 'Improve the data entry process by setting boundaries!'.

In Excel, you can also set up the spreadsheet to better control data entry. When you are working with people who are not fully embedded in the TBI study, the more boundaries you put on data entry, the more accurately the data will be entered.

Word or Excel support open-ended data

Survey	Date	Initials	What did you like most about this activity? Why is that?	What are some ways this activity could be improved? Why is that?	Any questions about what you saw or did during the activity?	What would you say the activity is about? Thinking about how new things can change your life.	Age	Gender	Group Type
1	28-Jul	SC	I liked seeing all of the cool things that I didn't know existed.	More cards!	Were any of the cards fake?	Thinking about how new things can change your life.	9	M	Adult/Child
2	28-Jul	SC	Trying to take different perspectives when thinking about the technologies.	No, it was great.	Were any of the cards fake?	Thinking about how new things can change your life.	23	F	Adult
3	28-Jul	SC	I liked being the different people but I didn't know how to think like them.	I would have liked to have seen more of the technologies that were part of the game.	Were any of the cards fake?	Thinking about how new things can change your life.	11	F	Adult/Child
4	28-Jul	SC	The explanations of the technologies were really interesting.	Have each of us be a different character.	Were any of the cards fake?	Thinking about how new things can change your life.	34	M	Adult Only
5	29-Jul	DO	Talking through the way we ordered the cards.	No.	Were any of the cards fake?	Thinking about how new things can change your life.	16	F	Adult/Child
6	29-Jul	DO	The new information.	No.	Were any of the cards fake?	Thinking about how new things can change your life.	24	M	Adult Only
7	29-Jul	SC	Learning new stuff. Playing with the characters and cards.	Have lots of cards out to play. I had to wait to try it.	Were any of the cards fake?	Thinking about how new things can change your life.	10	F	Adult/Child
8	30-Jul	MS	Ordering the cards for different people was hard but fun.	More cards.	Were any of the cards fake?	Thinking about how new things can change your life.	37	M	Adult/Child
9	30-Jul	MS	Hearing how other people made decisions.	No.	Were any of the cards fake?	Thinking about how new things can change your life.	14	M	Adult/Child
10	30-Jul	MS	It made me think about what it's like to be other people. I liked trying to figure it out, but I am glad I'm me.	More options of character cards. I wanted to be more people!	Were any of the cards fake?	Thinking about how new things can change your life.			
11	30-Jul	MS			Were any of the cards fake?	Thinking about how new things can change your life.			
12	30-Jul	MS			Were any of the cards fake?	Thinking about how new things can change your life.			

For open-ended responses, which come from questions that include no pre-determined number of answers, you can type them all into Word or another text program, or make copies of the original data collection sheets. If some of your questions are numeric and some are open-ended responses, you can copy the open-ended responses into a Word document and use both a spreadsheet and a text file for the team to review. That way, the list of responses to each question are already there!

Clean your data set!



Review the entered data, starting with randomly checking 5%.

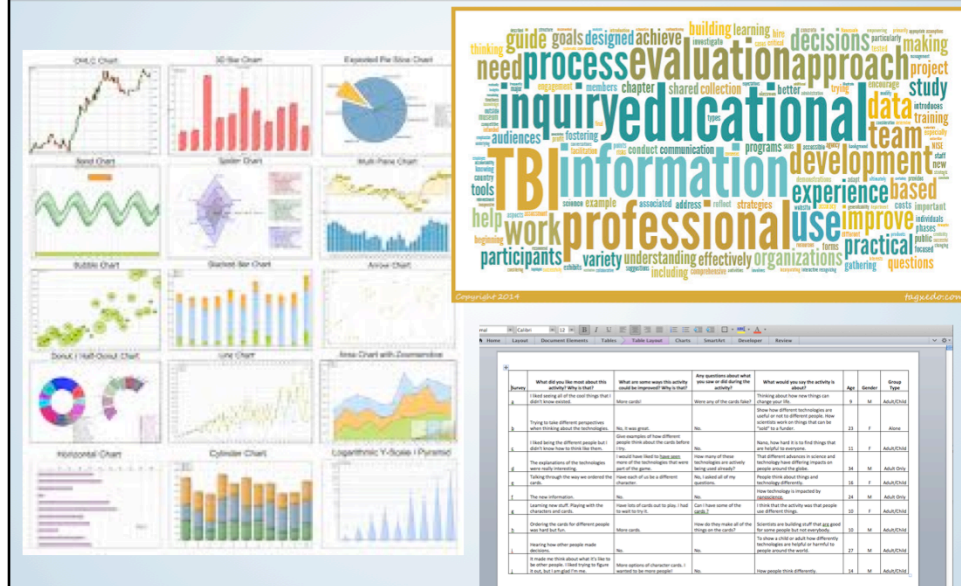
If you find errors, check another 5%.

If there are more errors, check all of the data.

TBI Data - Study 1.xlsx																								
HomeLayoutTablesChartsSmartArtFormulasDataReviewDeveloper																								
C1E1F1G1H1I1J1K1L1M1N1O1P1Q1R1S1T1U1V1W1X1Y1Z1AA1AB1AC1AD1AE1AF1AG1AH1AI1AJ1AK1AL1AM1AN1AO1AP1AQ1AR1AS1AT1AU1AV1AW1AX1AY1AZ1BA1BB1BC1BD1BE1BF1BG1BH1BI1BJ1BK1BL1BM1BN1BO1BP1BQ1BR1BS1BT1BU1BV1BW1BX1BY1BZ1CA1CB1CC1CD1CE1CF1CG1CH1CI1CJ1CK1CL1CM1CN1CO1CP1CQ1CR1CS1CT1CU1CV1CW1CX1CY1CZ1DA1DB1DC1DD1DE1DF1DG1DH1DI1DJ1DK1DL1DM1DN1DO1DP1DQ1DR1DS1DT1DU1DV1DW1DX1DY1DZ1EA1EB1EC1ED1EE1EF1EG1EH1EI1EJ1EK1EL1EM1EN1EO1EP1EQ1ER1ES1ET1EU1EV1EW1EX1EY1EZ1FA1FB1FC1FD1FE1FF1FG1FH1FI1FJ1FK1FL1FM1FN1FO1FP1FQ1FR1FS1FT1FU1FV1FW1FX1FY1FZ1GA1GB1GC1GD1GE1GF1GG1GH1GI1GJ1GK1GL1GM1GN1GO1GP1GQ1GR1GS1GT1GU1GV1GW1GX1GY1GZ1HA1HB1HC1HD1HE1HF1HG1HH1HI1HJ1HK1HL1HM1HN1HO1HP1HQ1HR1HS1HT1HU1HV1HW1HX1HY1HZ1IA1IB1IC1ID1IE1IF1IG1IH1II1IJ1IK1IL1IM1IN1IO1IP1IQ1IR1IS1IT1IU1IV1IW1IX1IY1IZ1JA1JB1JC1JD1JE1JF1JG1JH1JI1JJ1JK1JL1JM1JN1JO1JP1JQ1JR1JS1JT1JU1JV1JW1JX1JY1JZ1KA1KB1KC1KD1KE1KF1KG1KH1KI1KJ1KK1KL1KM1KN1KO1KP1KQ1KR1KS1KT1KU1KV1KW1KX1KY1KZ1LA1LB1LC1LD1LE1LF1LG1LH1LI1LJ1LK1LL1LM1LN1LO1LP1LQ1LR1LS1LT1LU1LV1LW1LX1LY1LZ1MA1MB1MC1MD1ME1MF1MG1MH1MI1MJ1MK1ML1MM1MN1MO1MP1MQ1MR1MS1MT1MU1MV1MW1MX1MY1MZ1NA1NB1NC1ND1NE1NF1NG1NH1NI1NJ1NK1NL1NM1NO1NP1NQ1NR1NS1NT1NU1NV1NW1NX1NY1NZ1OA1OB1OC1OD1OE1OF1OG1OH1OI1OJ1OK1OL1OM1ON1OO1OP1OQ1OR1OS1OT1OU1OV1OW1OX1OY1OZ1PA1PB1PC1PD1PE1PF1PG1PH1PI1PJ1PK1PL1PM1PN1PO1PP1PQ1PR1PS1PT1PU1PV1PW1PX1PY1PZ1QA1QB1QC1QD1QE1QF1QG1QH1QI1QJ1QK1QL1QM1QN1QO1QP1QQ1QR1QS1QT1QU1QV1QW1QX1QY1QZ1RA1RB1RC1RD1RE1RF1RG1RH1RI1RJ1RK1RL1RM1RN1RO1RP1RQ1RR1RS1RT1RU1RV1RW1RX1RY1RZ1SA1SB1SC1SD1SE1SF1SG1SH1SI1SJ1SK1SL1SM1SN1SO1SP1SQ1SR1SS1ST1SU1SV1SW1SX1SY1SZ1TA1TB1TC1TD1TE1TF1TG1TH1TI1TJ1TK1TL1TM1TN1TO1TP1TQ1TR1TS1TT1TU1TV1TW1TX1TY1TZ1UA1UB1UC1UD1UE1UF1UG1UH1UI1UJ1UK1UL1UM1UN1UO1UP1UQ1UR1US1UT1UU1UV1UW1UX1UY1UZ1VA1VB1VC1VD1VE1VF1VG1VH1VI1VJ1VK1VL1VM1VN1VO1VP1VQ1VR1VS1VT1VU1VV1VW1VX1VY1VZ1WA1WB1WC1WD1WE1WF1WG1WH1WI1WJ1WK1WL1WM1WN1WO1WP1WQ1WR1WS1WT1WU1WV1WW1WX1WY1WZ1XA1XB1XC1XD1XE1XF1XG1XH1XI1XJ1XK1XL1XM1XN1XO1XP1XQ1XR1XS1XT1XU1XV1XW1XX1XY1XZ1YA1YB1YC1YD1YE1YF1YG1YH1YI1YJ1YK1YL1YM1YN1YO1YP1YQ1YR1YS1YT1YU1YV1YW1YX1YY1YZ1ZA1ZB1ZC1ZD1ZE1ZF1ZG1ZH1ZI1ZJ1ZK1ZL1ZM1ZN1ZO1ZP1ZQ1ZR1ZS1ZT1ZU1ZV1ZW1ZX1ZY1ZZ1																								
Survey #	Data collector	Date	# of fingers	Interest in TBI	Interest in science	What did you do at the museum	Who is with you today	Favorite exhibit	What is nano?	If the museum could do anything...	Age	Gender												
1	Steve	9/16/14	10	Very high	Yes	Everything! I love this place	Just me	Dinosaurs	Wrong	Get bigger! I want to see more.	205	Male												
2	Harvey	9/16/14	9	5	Yes!!!	Saw the show, went into the Alone	The dinosau	Wrong	Have more on space and time tra	47	Male													
3	Earle	9/16/14	10	4	10	I waited for my family to fini	Gramma	The one on	I don't know.	Have more on space and time tra	50	Male												
4	Chet	9/16/14	24	3	10	Climbed the dinosaur, played Uncle, sister, co	Dinosaurs	There are lots	Put in a game room where you ca	52	Male													
5	Gladys	9/16/14	5, 4	3	8	Had breakfast in the lobby. I extended family	Dinosaurs	I have never	Fighting dinosaurs - like Jurassic F	43	Male													
6	Ravioli	9/16/14	10	3	8	Saw the special exhibition at Adult and child	The dinosau	I don't know.	More changes. Exhibits and movi	16	Male													
7	Edie	9/16/14	8	Medium	8	Read every label there was	Adult and child	Mummy	I didn't see th	Provide more information - there	342	Male												
8	Austin	9/16/14	9.5	Very low	Some	I dunno. Wandered around, Church group	The nano or	Scientists thin	Talk about God and different ide	12	Male													
9	Malarkey	11/21/27	19	Low	7	I followed my child as he was My pet dog, Pep	My favorite	Wrong	Let animals in so I can bring my li	9	Male													
10	Malarkey	11/21/27	10	Medium	6	I was a field trip chaperone. My sister, mom	That mumm	Wrong	Have more good stuff for teens	16	Male													
11	Malarkey	11/21/27	10	High	6	My partner and I came to se The whole fami	The old mui	Wrong	I think you need animals and alco	47	Female													
12	Malarkey	11/21/27	10	Very high	7	The kids were in the way of	Adult only group	Dinosaurs r	Right, but che	Be more fun. Have rollercoasters	50	Female												
13	Malarkey	11/21/27	11	High	8	We people watched. You ha School group	Mummy is	Wrong	I think you are doing a great job.	12	Female													
14	Gladys	2/12/71	5, 5	2	None	Sat around - it was boring he	Adult only group	Nano mini	What is that?	Keep updating things and showin	43	Female												
15	Gladys	2/12/71	5, 4.5	3	Not much	I am here to help my child be	Alone	Nano mini	Hazardous wa	Provide more on societal issues a	16	Female												
16	Gladys	2/12/71	5, 5	5	Some	I showed my child how to m	Adult and child	Nano mini	Tiny molecule	Current research on stem cells ar	456	Female												
17	Gladys	2/12/71	5, 2	5	Kinda	I am their nanny, and it was	Adult only group	Dinosaurs	Why are you	The kids love it, so don't change	12	Female												
18	Gladys	2/12/71	4, 5	3	Yes!	We came here because it w	Adult and child	Nano mini	It is about litt	Provide spaces for all types of pe	9	Female												
19	Earle	47/86/01	10	4	9	I was testing my science skill	Uncle Sam, Aunt	That nano	It is the build	Have more for babies - my sister	16	Female												
20	Earle	47/86/01	10	5	6	I only got to see one area be	My wife and son	Nano?	Is th	Don't test me	Cheaper tickets so I can come ba	34	Female											
21	Ravioli	47/86/01	10	5	7	We only came for the movie	My brother and	The mumm	I don't know.	Have birthday parties and sleepo	32	Female												
22	Ravioli	47/86/01	10	4	4	We just got here. We haven't	My dad and mor	I don't wanna	talk to you anymore. I am done with this.	12	Female													
23	Ravioli	47/86/01	10	3	9	All work and no play makes Jack a dull boy.	All work and no play makes Jack a dull boy.	All work and no play makes Jack a dull boy.	All work and no play makes Jack a dull boy.	All work and no play makes Jack a dull boy.	All work and no play makes Jack a dull boy.	All work and no play makes Jack a dull boy.												


Once you have all of your data entered into spreadsheets or word documents, make sure you clean your data. Review the entered data to the original form to make sure everything is exactly the same. Generally, you should check at least 5% of your data. If you find problems, check another 5%. If problems persist, check every piece of data.

Viewing and visualizing the data



Now that the data is entered and cleaned, it is time to pull the full group together to reflect. For the numeric and other close-ended questions, consider giving the TBI-team tables, charts, or other graphics to visualize the results. Provide these data visualizations at the same time you move through the open-ended responses, and reserve discussing potential changes based on any of the close-ended findings until after all of the data has been analyzed.

Use the Data Reflection Cheat Sheet

Data Reflection Cheat Sheet

Use the four steps outlined below to focus on the purpose of your team-based inquiry (TBI) study, immerse yourselves in the data, and make sense of the information you collected.

1. Describe and clarify:
The facilitator reminds the team of the inquiry and data discussion goals. The group asks questions as needed.

2. Observe and discuss:
The group spends time reviewing the data. Afterwards, each team member mentions one unique piece of data that he or she feels is particularly interesting or important.

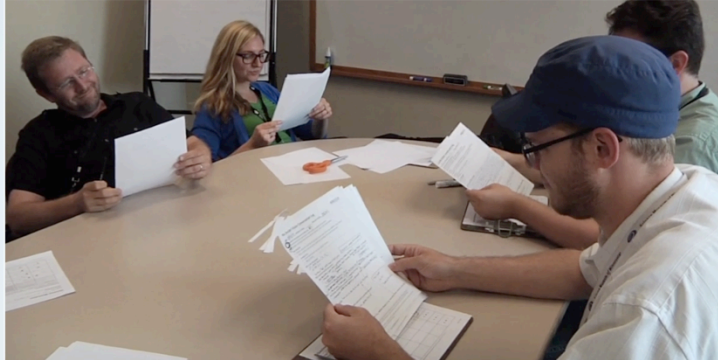
3. Immerse and notice:
Each team member suggests a unique theme or pattern he or she notices in the data related to the goal of the data reflection.

4. Categorize and explain:
After exhausting potential themes, the team sorts the data by theme, counting the number of data points in each category and discussing possible explanations.

Use the cheat sheet in the TBI Guide Appendix to help you and your team walk through the reflection process with open-ended questions.

First: Remind yourselves of the inquiry question—what it is that you are seeking to answer through your data. Review the project, its goals, and how and when the data was collected.

2. Read and discuss the data



Have everyone read through all of the data. What individual pieces surprise them?

Second: Give everyone time to read through the data. Make sure everyone has a common understanding of the data set by having each person identify and discuss an individual piece of data that they think is interesting. This will ensure people are looking at each element of data and not just jumping to patterns, and it will illuminate any hidden assumptions team members have about the way people think, learn, facilitate, and so on.

3. Describe patterns in the data



Make sure to focus on the patterns that will help you answer your TBI question!



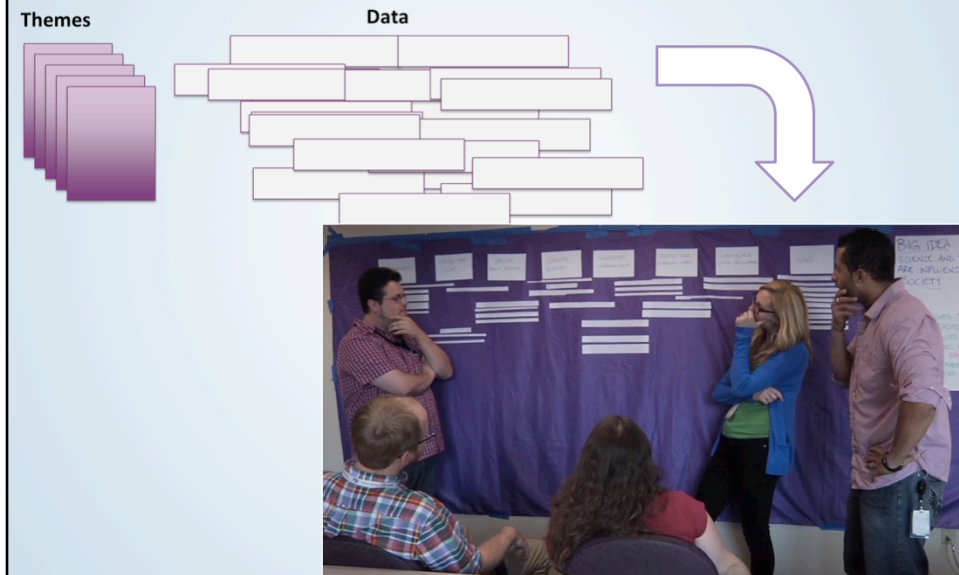
Third: Look through the data to uncover patterns that seem to be rising out of the data. Alternatively, if your TBI question seeks to uncover the key elements within a predetermined list, you can start with that list as a way to illuminate the patterns. As a group, list out all of the patterns you think you are seeing that relate back to your TBI question.

4. Identify each data point in your patterns



Fourth: Record how prevalent and how strong each pattern is within the data by identifying each data point that is part of the pattern. It is ok if data points fit within multiple patterns, and it is ok to split up responses if pieces fit under different patterns.

Sorting data into patterns



Consider a couple of different steps to work through sorting the data into each pattern: On Post-It notes, write down every single pattern your group previously identified. Then, cut up the data (careful to keep track of where each piece came from), and begin placing the paper strips under each appropriate pattern.

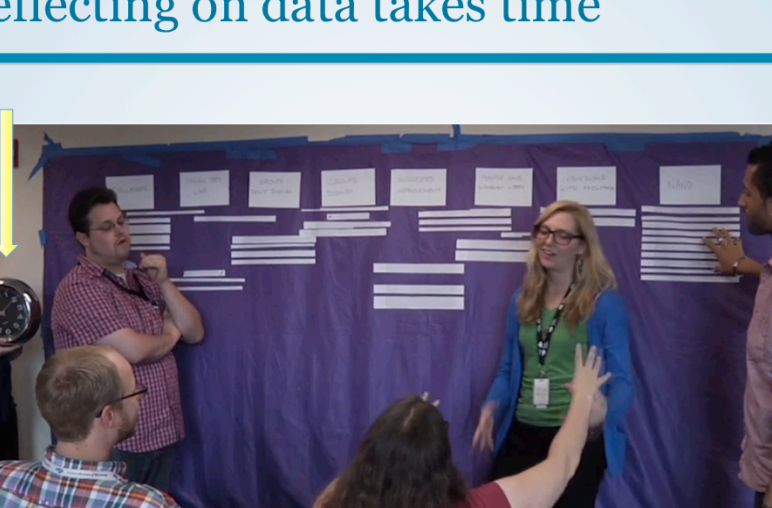
Check your patterns

Check for similarities, differences, and redundancies in your data points for each pattern AND in the patterns themselves



Once the data is sorted, have the group step back and review the data within each pile. Do they hang together? Are they similar to another pattern's set of data? At this point, it is ok to lump themes together into something bigger or more inclusive patterns or to split them up and identify unique patterns that may have previously been overlooked.

Reflecting on data takes time



A group of people are gathered around a large purple cloth that serves as a workspace. The cloth is covered with various papers, diagrams, and sticky notes. A woman on the left is holding a clock, and a yellow arrow points to it. The group appears to be engaged in a collaborative activity, possibly a workshop or a meeting, where they are reflecting on data. The setting is a room with a white wall and a blue banner at the top that reads "Reflecting on data takes time".

is the phase of the TBI process that takes the team the longest to work through. Make sure your team is aware of this and is prepared for the possibility that the identification process may not be completed within a one-hour meeting. Because of the amount of time it takes to analyze data, your team can consider a couple of different ways to speed up the analysis.

Getting Through the Analysis

- Walkthrough individually or as a team
- Open-ended questions coded individually
- A sub-team completes the fourth step for the team

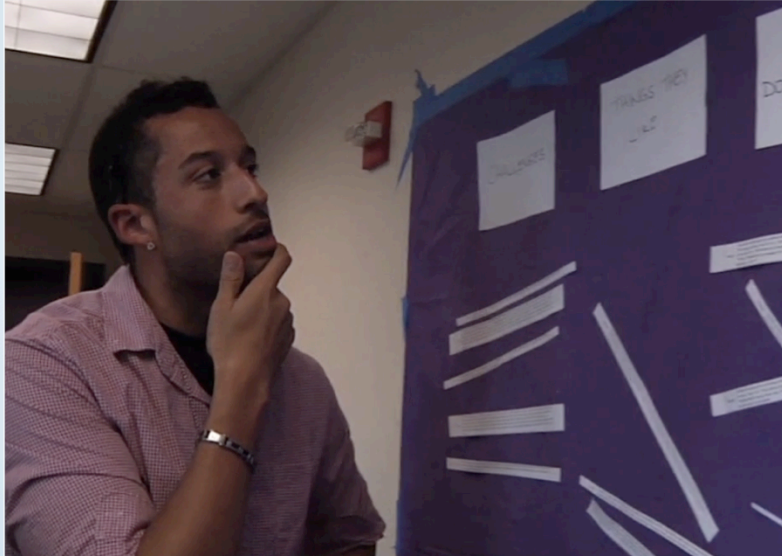


These are lots of ways to analyze the data. What works best for your study and your team?

Because of how long it takes to analyze data, your team can consider a couple of different ways to get through the analysis.

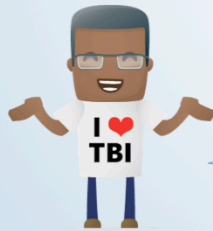
- (1) As a team or as individuals, you can walk through the process described here.
- (2) Or you can have each team member take the answers to one or two open-ended questions and identify patterns and code them on their own. In this case, the team would come back together and each member would describe the patterns they identified.
- (3) Another option would be to have a sub-team of the TBI team complete the fourth step for the whole group after the group has identified the major patterns. Regardless of how you code and analyze the data, the most important piece is to make sure everyone on the team is somewhat familiar with all of the information and in agreement about the codes, patterns, and general findings.

Reflecting takes practice



You may find that your team stumbles through the reflection process the first few times you try. It is natural for our minds to jump right to identifying patterns instead of immersing ourselves in the data. If that happens, if people move to step three before finishing step two, that's ok. Note the pattern and then ask them to continue pointing out interesting, confusing, or provocative data points to help the group thoroughly read and understand the data.

Next up: Turning data into action!



Have your data analyzed?
Good! Let's improve!

Ready to put those findings into practice? Go to the next presentation to learn how to translate all those data patterns into improvements to your institution.



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