Link to questionnaire

Legenda

I'm the spirit of the question

I'm a question

I'm a finding
I'm a key factor in a finding

I'm a result
I'm the key result

I'm a ranked result (significant)
I'm the key result (significant)

I'm a ranked result (super critical)
I'm the key result (super critical)

I'm a result that turned out to be irrelevant because the question was not well formulated.

→ I'm a future research question

Conclusion
[Author]: I'm a conclusion

Analysis board for Questionnaire ONE Planner Hip 3D issued in June 2021

About the surgeon

Reason: Exp. 3D Templating
Question: What's your level of experience with 3D templating?
Finding: 4/10 Describe a good enough lvl of experience in 3D templating. **Meaning that 6/10 have limited to no experience in 3D templating.**
2/10 No experience
2/10 Little
2/10 Some
1/10 Good
3/10 Extensive

Conclusion
We've got a minority of users who self report to have good to extensive experience.

Reason: Who does the templating
Question: Do you as a Surgeon use the 3D planning software for templating, or do you have an assistant/fellow/rep doing this for you?
Finding: Surgeons as well as others have to be able to template the same case. Because a significant minority of responders self template, and another significant minority of responders let a fellow or a sales rep do the initial templating. All surgeons verify the template regardless of who made it.

Conclusion
Everyone verifies it regardless. A minority self-templates.

Reason: Decision making power
Question: What role do you have in the decision making process when it comes to the use of templating software?
Finding: **The majority are decision makers.** A small minority are advisors. Masse in particular works in both public and private institutions. When in private he is a decision maker, while in public he is an advisor without much of a voice. Only 1 (Patel) is fully subject to an Administration's decision.
6/10 are Decision makers
2/10 are Advisors
1/10 Decisions are done by an administration

Conclusion
Gil: Plenty of decision makers in this group. Also private institutions seem to give more leverage to surgeons as opposed public ones.

Reason: Time before surgery
Question: Imagine that someone else is templating a case for you. How much time before surgery would you expect to get your case plan back for review?
Finding: **Half consider maximum 5 business days acceptable.** A small minority considers max 7 days. Middleton in particular divides cases between complex and simple ones. The simple ones are fine so long they are ready in the same day. For the complex ones more time is required. He did not specify how long.
5/10 Max 5 Biz days
3/10 Max 7 Biz days
2/10 Max 3 Biz days

Conclusion
Ivo: Plenty of time to fallback to manual work, assuming some basic level of automation

3D Templating currently in use

Reason: Their time vs Time from Sales -rep
Question: 3D Templating a case vs 3D Templating a case by sales rep or autoplanner
Finding: **The expectation** of the majority (7/10) **to review a case by a sales rep,** fellow or autoplan **is between 3 minutes (minimum) and 7 minutes (maximum).**
Reviewing a case by sales rep or fellow (Autoplan too)
1/10 take 1 min or less
1/10 take 2 mins
5/10 take 3 mins
2/10 take 4-7 mins
The expectation of the majority (8/10) **to template a case in 3D is between 4 minutes (minimum) and 10 minutes (maximum).**
3D Templating a case
1/10 take 2 mins
2/10 take 4-7 mins
6/10 take 8-10 mins

Reason: Perceived time spent on a 3D case
Question: On average how much time do you spend templating a case in 3D?
Finding: Half (4/8) perceive spending 4-7 minutes templating a 3D case.
4/8 spend 4-7mins
2/8 about 2 mins
2/8 no response
1/8 spend 3 mins
1/8 spend 8-10mins

Conclusion
Gil: 4-7 minutes, clear.

Reason: Percentage of cases planned in 3D
Question: In general what percentage of your cases do you plan in 3D?
Finding: The two largest groups are composed of 2 people each. Both are minorities. Unfortunately everyone seems to fall in a different category.
2/8 Plan between 51-90% of cases in 3D
2/8 Plan less than 1%
1/8 Plans all (100%) of cases in 3D
1/8 Plans 1-5%
1/8 Plans 6-10%
1/8 Plans 11-20%

Conclusion
Gil: There is no consensus here. Only 8 answered. Most fall under 50%. A significant number even under 20%.
Mirjam: this is because only half of the group has good 3D templating experience at all. I see more value in the question 'What cases would you template in 3D if available?'

Reason: Solutions they already like
Question: Has there been one (or more) 3D templating software tools that you particularly like?
Finding: 4/10 a significant minority has used and liked Mako. This seems to be a difficult question that many don't want to answer. Kamath in particular has used a lot of applications. Liu has experience with Formus
Toy, Kendoff, Patel & Masse: No response
Middleton: Mako
Takao: Avoided an acceptable answer
Lawrie: Mako
Kamath: Mako, Corin, EOS, Medacta MyHip, Young Hip (CGraphics and Dyonics)
Liu: Formus
Miller: Mako

Conclusion
Gil: Mako mako mako mako
They seem to rule this area, so whatever we do, we should capitalize on the fact that surgeons are already familiar with it.

Perceived Pros vs Cons of 3D

Reason: Reasons to like 3D software
Question: What do you like about that 3D templating software and why?
Finding: Many consider 3D as a more accurate tool than 2D. In the case of Takao, he uses Mako for Mako implants, and 2nd Hip for the rest. Liu lists a series of reasons:
1. Automated process to segment and landmark position prostheses.
2. Indices that are measured along the combined version of implants.
3. Measurements of neck cut height from saddle and stem alignment.
4. Cup bone contact percentage
Middleton mentions better graphics that you can spin. Kamath mentions an ability to execute a plan intra-op.
Kendoff like Middleton mentions fancy graphics and increased accuracy. Miller agrees on the accuracy.

Conclusion
Gil: Accuracy seems to be a big plus point. However no accuracy claim is needed so long it is perceived.

Reason: Reasons to dislike 3D software
Question: What do you dislike about that 3D templating software and why?
Finding: Many quote **Time needed** as a limitation of 3D. Kamath mentions the time to **process a CT scan** or the manual entry process of the values.
- **Inability to adjust stem height and alignment**
- **Lack of ROM**
- **Lack of Impingement** assessment
- **Inability to use spinopelvic motion** info.
- **Making landmarks in the robot that are accurate** with the plan.

Conclusion
Ivo: Many of the disadvantages should not apply to OPH3D (little time needed, ROM/impingement, pelvic tilt)
Gil: A focus on perceived time spent is key for the tool's success. The range is between 4-7 mins per case.
Mirjam: many did not answer the question wrt 3D templating in general, but they commented on what they use/have used. Agree with Ivo, most does not apply to OPH3D.

Reason: Perceived advantages of 3D over 2D
Question: What are the key advantage(s) of templating a 3D case over a 2D case?
Finding: Kendoff summarizes the two largest expectations. Accuracy and the correct sizing.

→ If they are already convinced that 3D is already more accurate, do we have to make any claims?

Reason: Perceived disadvantages of 3D over 2D
Question: What are the disadvantage(s) of templating a 3D case over a 2D case?
Finding: Two words. Time and Cost, as Kamath mentioned it. The need for CT Scan is where the cost plays a role.

Conclusion
Time is the main perceived disadvantage of 3D vs 2D

Segmentation of Osteophytes

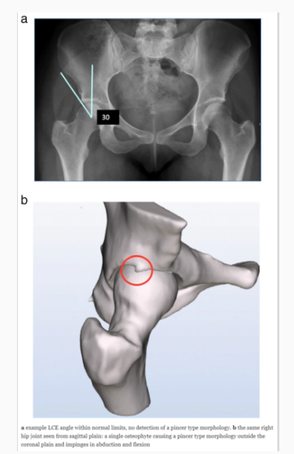
Reason: Importance of segmentation of osteophytes for a typical hip replacement case
Question: How important is the segmentation of osteophytes for a typical hip replacement case?
Finding: For a typical hip replacement **most consider Segmentation of Osteophytes moderately important to important.**
Osteophytes
4/10 Important
4/10 Moderately important
1/10 Very important
1/10 Not important

→ Can we get sample cases of degraded hips or ones that include osteophytes?

Conclusion
Gil: For "most cases" scenario osteophytes have less importance. Then again, surgeons said that they would use a 3D planner for the complex cases, and 2D for common cases.

Reason: Importance of segmentation of osteophytes for a severely degraded case
Question: How important are osteophytes and segmentations when the joint is very degraded?
Finding: For a very degraded joint however **most consider osteophytes segmentation important to very important.**
The main motivation why they are important to surgeons is that they affect the position of the implant and the possibility of impingement. So Surgeons try their best to remove them when they find them.
Osteophytes
4/10 Very important
3/10 Important
2/10 Moderately important
1/10 Slightly important

→ Why is segmentation of osteophytes in degraded joint more important than in a straight forward case?



→ What do surgeons even mean by osteophytes? Mirjam indicated that they meant bony outgrowth, whereas I tend to think about partially loose bodies. Our software assumes a single mesh that consists of one connected component

Conclusion
Gil: We would need to first have a clear view of what an osteophyte is and plenty of examples of them.

Motion tests

Reason: Pre-op motion tests performed by surgeon
Question: What are the physical motion tests you perform on a patient pre-op? Please elaborate on the why of performing these tests.
Finding: Many surgeons mentioned the FADIR test
- Flexion
- Adduction
- Internal Rotation
Masse mentioned that other tests aren't particularly reliable.

Reason: How would you use ROM in cases
Question: How would you use motion simulation in templating your cases? Please include at what step in the templating you would use motion simulation and why.
Finding: Most surgeons (except Patel who does not care about ROM) **care the most about Impingement simulation within ROM.**

Intra-op motion tests

Reason: Intra-op motion tests performed by surgeon
Question: What motion tests do you perform intra-op, before replacing the hip?
Finding: No surgeon seems to perform motion tests intra-op.
- Kamath did elaborate a bit more in ROM situation where it is limited due to arthritis.

Reason: Intra-op motion tests performed by surgeon after hip replacement
Question: What motion tests do you perform intra-op, after replacing the hip?
Finding: Lawrie is the most detailed in his response:
From a posterior approach:
- Full 0° extension and max external rotation: Checks anterior stability
- Adduction of 15°
- Flexion of 30°
- Internal rotation of 30° (sleeping)
- Max flexion in neutral abduction & adduction
- Max flexion in neutral ER/IR (knee to chest)
- Flexion to 90°
- Neutral abduction & adduction
- Max internal rotation before dislocation (you want to see 60° or greater)
From an anterior approach (on the hana table):
- Max external rotation in neutral abduction & adduction
- Full extension 0° (see whether hip stays in essentially with >90° external rotation)
- Extension to floor
- Extension to floor and max external rotation prior to dislocation (you want to see 60° or greater)
Masse occasionally conducts the Ranawat test. AN dlike most **testing stability at 90° flexion**

Dynamic movement

Reason: Focus on dynamic movements
Question: What do you think of a focus on more dynamic movements (both femur and pelvis moving), such as walking, getting up out of a chair, lacing shoes, picking something from the floor in sitting and/or standing position?
Finding:
- The majority is of the opinion that they would like to have this feature but it does not hamper their work (6/10).
- A minority (3/10) consider them important enough to be a must or a game changer.
- 1/10 mentions that he would not know how to use it.

Reason: What dynamic movements
Question: What dynamic movements do you find the most important? See previous question for examples. Please elaborate on why.
Finding:
- Lacing shoes
- Picking something from the floor while sitting
- Stretching Achilles heels while standing and pushing hips with hands.
- Getting up from a chair (low chair)
- Bending over
- Normal gait
- Stair climbing
- Stair descending
- Putting socks
- Squatting
- Sitting cross-legged
- Taking a big step with operative leg behind

→ What's the difference between picking something up and getting out of a chair?

Are there other motions that test unique rotations?

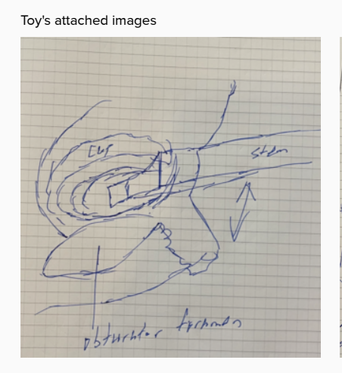
Conclusion
Ivo: Key motions that each test something unique:
- Picking something up from floor (flexion)
- Getting out of chair (extreme flexion, different forces)
- Extension (like achilles stretching)
- Normal gait
- FADIR
- Abduction

1. Extreme flexion
2. Extreme extension
3. FADIR
4. Abduction

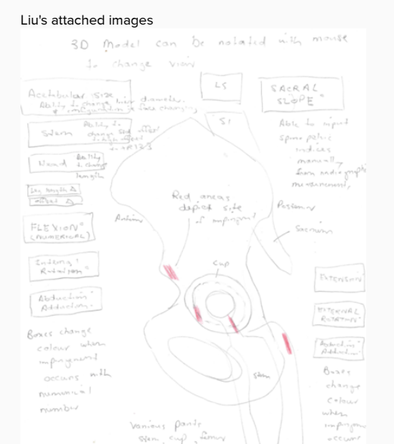
Impingement

Reason: Visualizing impingment
Question: How would visualizing impingement be useful for you?
Finding: Most coalesce into this idea: Image or 3D model showing implanted components where you can change the flexion of the joint to trigger impingement. As you are doing it, you see the impingement.

Toy's attached images

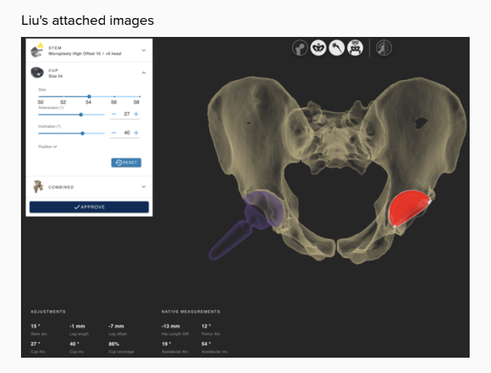


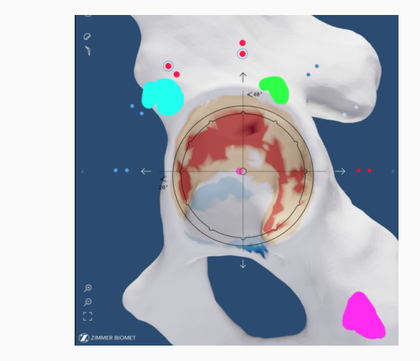
Liu's attached images



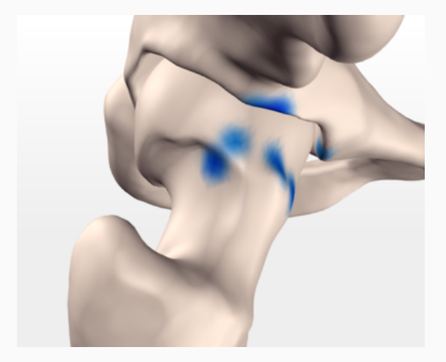
Reason: Personal idea to visualize impingement
Question: My idea to visualize contact of implant with the native bone is...
Finding: Most mention a change in color (particularly red) for the demarcation of impingement. Middleton & Lawrie went as far as describing the need to change the implant in the process.
Kamath mentions Dyonics and Mako 4.0 as ideal examples. Or Stryker HipMap Check.

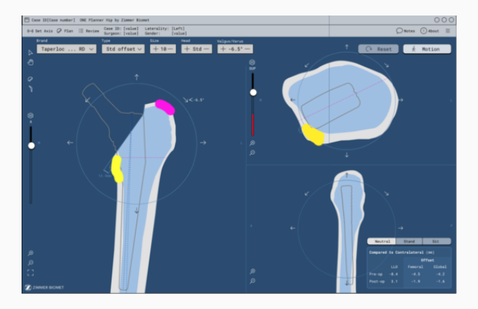
Liu's attached images

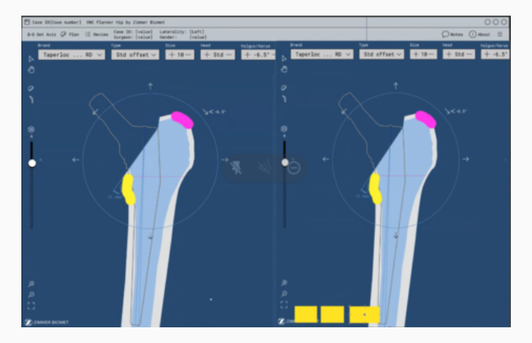




Conclusion
Ivo: Webplanner concept should work fine







Interface findings

Cups

Heatmap
Reason: Are heatmaps the correct approach?
Question: A heatmap is an ideal way of representing an implant's contact with the native bone.
Finding: Strongly yes!
There is a strong consensus here.
5/10 Strongly agree
4/10 Agree
1/10 Neither disagree nor agree

→ Should we use a diverging color map? So distinct colors depending on whether there is contact or not

→ What levels of depth should we visualize? Prevent that a typical plan is 90% in the deepest level

vs Current iteration
Viridis is no longer used, but a red-neutral-blue scale

Conclusion
Gil: Heatmaps for the win

Cams
Reason: Cams likely to be of use for the cup
Question: When you're making a pre-op plan, what views do you use to template the cup/shell?
Finding: A, 0:00, 3:00 & 9:00 Are necessary by half of the responders. 8/10 Consider clock slices from necessary to useful.
A: 8/10 Necessary, 2/10 Useful
P: 5/10 Useful, 3/10 Necessary, 1/10 Not useful
0:00: 7/10 Necessary, 2/10 Useful, 1/10 Not useful
3:00: 5/10 Necessary, 4/10 Useful, 1/10 Not useful
6:00: 4/10 Not useful, 3/10 Necessary, 3/10 Useful
9:00: 5/10 Necessary, 3/10 Useful, 2/10 Not useful
All clock views: 4/10 Necessary, 4/10 Useful, 2/10 Not useful

vs Current iteration
Hours are presented exclusively as slices, without the 3D background

Conclusion
Gil: The slices that we are proposing in the new iteration should suffice.

Center of rotation
Reason: Points of rotation that we should use
Question: What centers of rotation would you like to see in 3D for cup placement?
Finding: Most agree on the center of rotation of the cup. Native head and acetabulum come close in 2nd place suggesting that both may be important.
Center of rotation of acetabulum: 6/10
vs
Center of rotation of the native head: 6/10
vs
Center of the cup: 7/10
- 1 person selected all of them
- Masse: "on the lat view, this is not the center of rotation but the bottom, and I don't see much interest in it. The point should be some how on the rim or close to it"

→ The center of rotation of the acetabulum is often ill-defined as the cup is not as round as people assume

→ Literature refers to the importance of staying close to the native center of rotation.

→ What do we do if the femoral head is not spherical or completely gone?

vs Current iteration
Same, as previous design

Conclusion
Gil: It is clearly the center of the cup.

Reason: Still needing 2D view despite a perfectly Lateral view.
Question: Given the current design would you need the cup's lateral view to be visualized in 2D as well?
Finding: The majority agrees that it would not be necessary given the current design. 4/10 dissented.
No: 6/10
Yes: 4/10

vs Current iteration
Fan-style selector added instead of these

Conclusion
Gil: With a proper slice, 2D view isn't necessary. And that is with the old design already.

Info
Reason: Info needed for Cup placement
Question: What information must we show for cup / shell placement?
Finding: Everyone agrees that Leg length difference is the most important piece of info to show. After that
- Size/Type Liner
- Supine cup incl.
- Supine cup version
- Global offset
Then the would like to haves (Marked in green below)
Results
Size/Type Liner: 7/10 Must, 3/10 Would like
Supine cup incl.: 9/10 Must, 1/10 Not necessary
Supine cup version: 9/10 Must, 1/10 Not necessary
Pelvic tilt: 7/10 Would like, 3/10 Must
Sacral slope: 5/10 Would like, 3/10 Must, 1/10 Not necessary
Stem version: 6/10 Would like, 4/10 Must
Change in tilt from Pre-op: 6/10 Would like, 2/10 Must, 1 No opinion
Combined version: 5/10 Would like, 4/10 Must, 1/10 Not necessary
Leg length diff.: 10/10 Must
Global offset: 8/10 Must, 2/10 Would like
Orientation of views: 6/10 Must, 3/10 Would like, 1/10 Not necessary

→ This question focuses on "metadata" rather than visual aspects, like the need to see volume slices or simulated fluoro

→ Are the 2D hourly slices adequate for figuring out the best fit?

→ How do we show more information without cluttering the screen? Do they need everything at the same time? It seems grouped into:
- pelvic tilt (e.g. sacral slope)
- cup angles (probably always visible)
- relation to stem (stem & combined version)
- LLD & offset table (probably always visible)

→ Maybe we can design a table like the LLD & offset, but then for the cup & stem angles

→ The pelvic tilt seems to be "3 values, sacral slope/tilt sitting & standing and pelvic mobility

Reason: Missing info for cup placement
Question: If you would need other pieces of information that have not been mentioned in the previous question please elaborate below
Finding: The majority did not comment but the 4 that did said the following:
a. Difference of the acetabular center of rotation vs center of implant.
b. Percentage of bone contact that ignores osteophytes beyond 3mm
c. Native (acetabular) bone version.
d. Size of acetabular shell and how far it is from the center of native hip in mm.

Axis of rotation
Reason: Axis for cup's rotation
Question: What axis do you consider logical to use to rotate the cup?
Finding: A vast majority agrees with the center of the cup as the center of rotation.
8/10 Center of the Cup
2/10 Center of the Acetabulum

→ We'll need to determine whether the hours are attached to the cup or the acetabulum

→ I believe it should be the cup as we want the hours to always slice through the part of the cup where it is the widest

Reason: Should the liner follow the cup?
Question: Do you think it makes sense to use the same axis of rotation for the liner?
Finding: The majority agrees with the Yes side. However 1 of the 10 did mention a significant exception. The face changing liners.
6/10 Yes
1/10: Yes, except for face changing liners.
1/10 No
1/10 Unsure
1/10: It depends

Conclusion
The slices have to always be in the center of the cup. Because the idea of the hours is to always have the thickest part of the cup visible. You can't do that if you focus on the center of the acetabulum.

Reason: Regarding the case information
Question: Please comment on the display of case information in the mock-up below
Finding: There are a few pieces of info that would be useful in this area:
- Patient name (Not possible given ZB policy)
- Date of surgery
- Gender
- Anterior or Posterior case

→ To Dr Massé: Why do you need to know if you will perform a direct anterior or a posterior procedure?

→ What difference does it make for templating (in 3D)? That's something that you don't see in 3D anyway. I understand that you want to have that information in the case management system PMP but why in the planner?

vs Current iteration
Gender added

Conclusion
Gender was missing, now it is added. It may be a good idea to add a date of surgery as well.
Mirjam: do not add date of surgery as this is subject to change

Reason: Regarding the controls
Question: Please comment on the display of case information in the mock-up below

vs Current iteration
No more sliders

Cup inspector

Reason: Regarding the cup placement table
Question: Please comment on the display of case information in the mock-up below

vs Current iteration
No table

Reason: Regarding the planned leg length difference table
Question: Please comment on the display of case information in the mock-up below

→ What to do with "hip length" as we call it leg length difference in OPH? I don't recall exactly how we decided on this for OPH 2D

vs Current iteration
Table modified to OPH 2D

Reason: Regarding the views and angles
Question: Please comment on the display of case information in the mock-up below

Conclusion
These angles should probably be in a single table and possibly combined with stem & combined version

vs Current iteration
Mostly no angles

Reason: Regarding the entire inspector
Question: Please comment on this screen. For now we intend to call this feature cup inspector

vs Current iteration
- 3 viewports are presented
- ~~Slices without 3D background~~
- Every camera is named according to surgeon's heuristics

Stem

Cams
Reason: Cams likely to be of use for the stem
Question: What views of the femur & stem must you have to template a stem? (Select 1 to 4 views)
Finding: For stem planning there were 2 cams that were clearly required by nearly everyone who **A and LAT (Sagittal)**. A runner up on this list where half of the population indicated also as important was the **Transverse camera**
- A/AP: 9/10
- LAT/Sagittal: 8/10
- SUP/Transverse: 5/10
- P/PA: 3/10
- MED: 3/10

Info
Reason: Info needed for Stem placement
Question: What information must we show for stem placement?
Finding: As for the information that we must show in the stem inspector. **Femoral version, Valgus/Varus, Stem version** were widely agreed by the majority in all cases either as a must have or a would-like-to-have
- **Femoral version: 7/10 Must, 2/10 would like, 1/10 Not necessary**
- **Valgus/Varus: 5/10 Must, 5/10 would like**
- **Stem version: 6/10 Must, 4/10 would like**

Reason: Missing info for Stem placement
Question: If you would need other pieces of information that have not been mentioned in the previous question please elaborate below.
Finding:
- Many surgeons mentioned **boney contact** as their main data point that they'd like to see. Suggestions came in the form of percentage and heatmaps.
- **Point of entry into the canal** so the angle of entry into the proximal femur is suited for the implant (sagittal).
- Warning if the zone of contact is not within the normal integration zone.
- Coordinate systems being used to represent valgus/varus, femoral version and stem version.
- Dynamic neck cut measurements.

→ The way that we calculate the neck cut in OPH 2D is it sufficient or do we need something else? (Femoral neck saddle for instance) - At the moment we only measure from the lesser trochanter.

Controls
Reason: Controls for the stem, are they enough?
Question: Please comment on the controls that we want to provide to template the stem (for your convenience we enlarged the section in the mock-up screen below)
Finding:
- Massé isn't sure about the Varus/Valgus control helping him too much. He considers this to be set by the anatomy of the patient instead. He mentions that if Varus/Valgus is kept then he would also put version.
- If the choice isn't automated then Liu mentioned that the **Stem height needs to be adjustable like the varus/valgus.** Especially if we have a heatmap helping the user.
- Having a **dynamic heatmap that aids the user in the positioning** of the stem.
- Kamath mentioned a control to adjust the **cranial/caudal depth of placement.**

vs Current iteration
No more sliders

Conclusion
- Remove varus/valgus controller/slider
- Remove varus/valgus number on bone model

Info
Reason: Is the info of the femoral ver. enough?
Question: Please comment on the femoral and stem version information in the mock-up below (for your convenience we enlarged the information box in the mock-up)
Finding:
- Masse: Doubts about whether we need the full length of the femur.
- He also wonders whether we need the distal condyle to calculate this.
- Kendoff finds the screen very technical. But concedes at the end that it may be necessary.

vs Current iteration
No table

Reason: Info about leg length difference table
Question: Please comment on the information display for the planned leg length difference in the mock-up below (for your convenience we have enlarged the information section in the mock-up)
Finding:
- Middleton: Prefers Hip length not Leg length. He considers hip length easier.
- Use of +1mm/-1mm not shorter longer labels.
- Coordinates that are used to measure the LLD and the Global offset difference are important.
- An expandable table that can include **hypothetical cases of different neck lengths and offset options.**
- The table is too long to read
- **How the calculations for the femoral offset are done, as well as the global offset**
- **Standardization across 2D OPH and ROSA Intra-op workflows.**
- Confusing

vs Current iteration
Table modified to OPH 2D

Stem inspector
Reason: Regarding the entire inspector
Question: Please comment on this screen in general (stem inspector).
Finding:
- Massé seems enthusiastic about the AP view in particular. He would like to see the femur cut in the middle of the stem so he can see inside it.
- He also mentions this for the Cup view at 00h00.
- Liu Would like to have highlights of the areas of contact between the bone and implant.
- Liu mentions that the top right picture should show a cross section of the proposed neck cut height and its relationship with the stem.
- Liu mentions that it would be useful to measure and display neck cut height from neck cut saddle, greater trochanter and lesser trochanter.
- Takao cares about having the coronal, axial and sagittal planes.
- Toy would flip the axial image so the femoral condyles point down.
- Kendoff: seems to prefer a black interface

Liu generated this image

Axis of rotation
Reason: Point that the surgeons would use to rotate a stem
Question: What is the axis of the stem that you use to rotate?
Finding: Overall this question seemed to have caused more confusion. It was misunderstood by many. It may be worth to try it again in another way.
Most agree that it is the central axis.

Toy attached this image

Liu attached this image

→ How do we define the Axis? (Make mockup to help the question)
- The question was widely misunderstood.

Full screen
Reason: Split vs Full-screen
Question: How useful would it be to have a full screen view for the cup and stem?
Finding: The views that proved popular to enable in full-screen mode.
Of the 2 Cup views and 3 Stem views presented. **Cup AP, and Stem AP** had equal very strong support. The other view that has proven very popular is **Lateral cup view**. The two other significant views Stem lateral and Stem superior also saw a significant amount of support but not to the same level.
- **Cup A/AP: 6/10 Must, 4/10 Would like**
- **Sagittal/Cup lateral: 6/10 Must, 3/10 Would like**
- **Stem A/AP: 6/10 Must, 4/10 Would like**
- **Sagittal/Stem lateral: 4/10 Must, 5/10 Would like,** 1/10 Not necessary
- **Stem superior: 5/10 Must, 4/10 Would like,** 1/10 Not necessary

Surgeon's perceived priorities

Reason: Presets or templates
Question: If you cannot request lateral x-rays, would it be useful for you to manually select a "profile" of exemplary types of patients, some examples being: hypermobile, normal, stiff (stuck sitting or stuck standing) and fused for example?
Finding: There is a majority (6/10) that considers this not useful. And a minority that would consider it useful. (4/10).
Either pelvic tilt categorization with laterals or not at all.
- 4/10 Yes (it's useful to get an idea of the effects of different profiles on my template)
- 5/10 No (if I cannot determine a pelvic tilt categorization based on lateral x-rays that would not be of any use)
- 1/10 No opinion
- (No) Kamath: My opinion is to be able to access hip-spine features only if lateral views were obtained and values entered into software
- (No) Toy: I think it would give you information. Unless you know the specific characteristics of that patient, it would not necessarily give you useful information.

Conclusion
Mirjam: Either pelvic tilt categorization with laterals or not at all.

Autoplan
Reason: Desire for Autoplan
Question: Autoplan mode
Finding: **The majority (including Masse) 8/10 consider it a nice to have, so long it does not delay the software release.** Masse in particular considers the templating tool not useful without ROSA.
The minority (2/10) considers it a must.
- 7/10 Would like but not a must: Autoplan by the software is nice to have in the first version, but can be added later if I would get the ONE Planner Hip 3D according to scheduled timeline
- 2/10 Autoplan is a must, even if it delays the release (Autoplan by the software is a must have in the first version (at launch) even if it will impact the scheduled timeline for release)
- Masse: again, I don't see much benefit to template 3D if I don't have ROSA, so timeline have to be match with ROSA hip v2. I would have to try and see how long it take, but I feel it will be a long process to do from start. If so, people will drop out. Better to have autoplan, then we only have to make small adjustment

Conclusion
Mirjam & Gil: Autoplan mode nice to have at launch: however not worth to jeopardize timeline for it

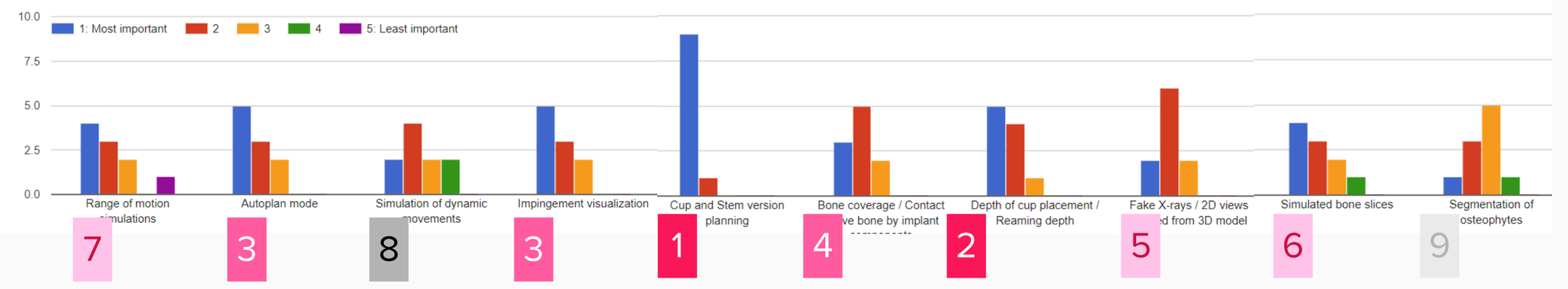
Features (ranked)
Reason: Future features ranked by surgeons
Question: Please rank the features. 1 is most important, 5 is least important.
Finding: Surgeons consider the most important features in the following order:
1. **Cup and Stem version planning**: Most important feature. Nearly unanimous agreement.
2. **Depth of cup placement / Reaming depth**: Widespread agreement that this is a very important feature.
3. (Tied) Impingement visualization & Autoplan mode: Both are tied in level of importance. There is wide acceptance that both features are important.
4. Bone coverage / Contact with native bone: A minority considers it very important. However half considers it important.
5. Fake X-Rays: The majority does not consider it very important. However a very significant majority considers it important. This suggests that it is a significant secondary feature.
6. Simulated bone slices: A minority considers it very important. Once one considers the people who consider it important one sees that there is a solid desire for this feature. A small minority feels neutral to unimportant on this feature.
7. Range of motion simulation: A significant minority considers it very important. Once you consider the surgeons who consider it important, it is clear that this feature is significant. Only one person ranked it as the least important feature.
8. Simulation of dynamic movements: A minority considers it important, but not the most important. And there is a significant minority that is either neutral or considers it unimportant.
9. Segmentation of Osteophytes: The majority is neutral on this feature, suggesting that it is the least important of all the ones listed.

The following list contains the values
1. Cup and Stem version planning: **9/10 Must, 1/10 Would like**
2. Depth of cup placement / Reaming depth: **5/10 Must, 4/10 Would like,** 1/10 Neutral
3. (Tied) Impingement visualization: **5/10 Must**, 3/10 Would like, 2/10 Neutral
4. (Tied) Autoplan mode: **5/10 Must,** 3/10 Would like, 2/10 Neutral
5. Bone coverage / Contact with native bone: **3/10 Must, 5/10 Would like,** 2/10 Neutral
6. Fake X-Rays: **2/10 Must, 6/10 Would like,** 2/10 Neutral
7. Simulated bone slices: 4/10 Must, 3/10 Would like, 2/10 Neutral, 1/10 Not important
8. Range of motion simulation: 4/10 Must, 3/10 Would like, 2/10 Neutral, 1/10 Least important
9. Simulation of dynamic movements: 2/10 Must, 4/10 Would like, 2/10 Neutral, 2/10 Not important
10. Segmentation of Osteophytes: 1/10 Must, 3/10 Would like, 5/10 Neutral, 1/10 Not important

→
1. Range of Motion simulation, how important is it?
2. Autoplan, is it really that important? What would you consider being an autoplan?
3. Do they know the difference between the fake Xrays and simulated bone slices?
4. Do the consider loose bone fragments to be osteophytes as well or just osteophytes attached to the joint bones

Conclusion
Mirjam & Gil: We need to change the format of this question to improve the internal validity of the question itself. Is autoplan really that important? It does not seem to match the rest of the questionnaire.

Please rank the features. 1 is most important, 5 is least important.

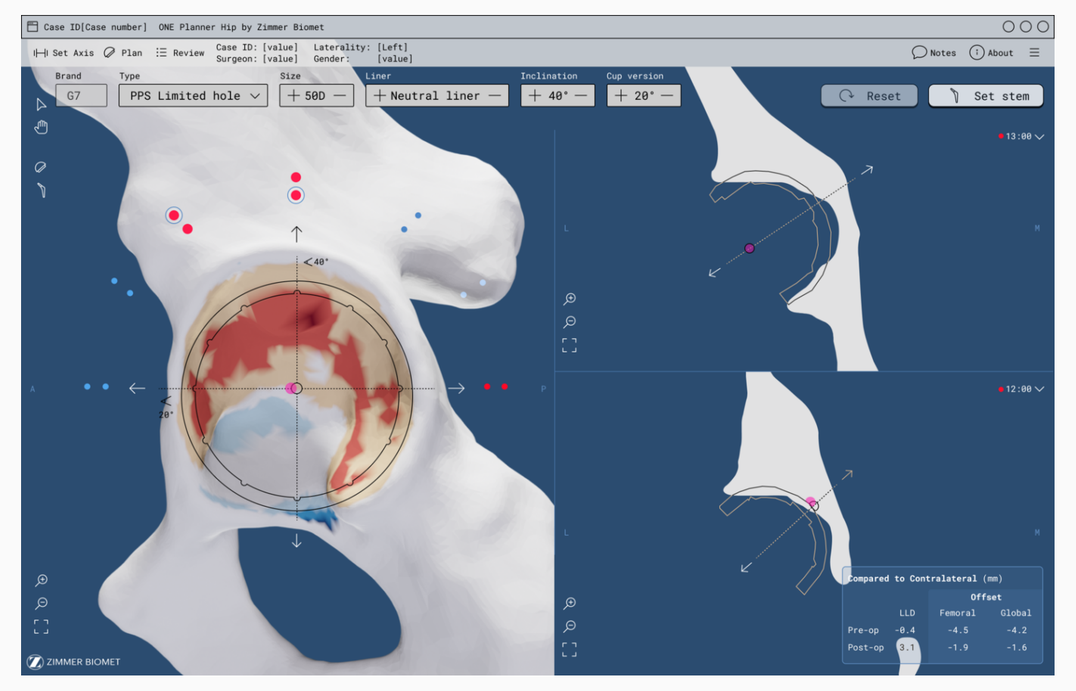


Usage
Reason: The right tool for the right case
Question: In the near future, ONE Planner Hip is available for use with X-ray imaging (2D) and with CT scans (3D). Please specify what cases would you use a 3D planner vs a 2D planner.
Finding:
- The majority of surgeons agree that they would use 2D for simple cases, and 3D for complicated cases.
- A minority would use 3D in all cases given that they can get a CT Scan
- Kendoff finds 2D good enough. However the question and set of answers do not match well. So his answers are naturally contradictory.
- Masse has a confusing answer.

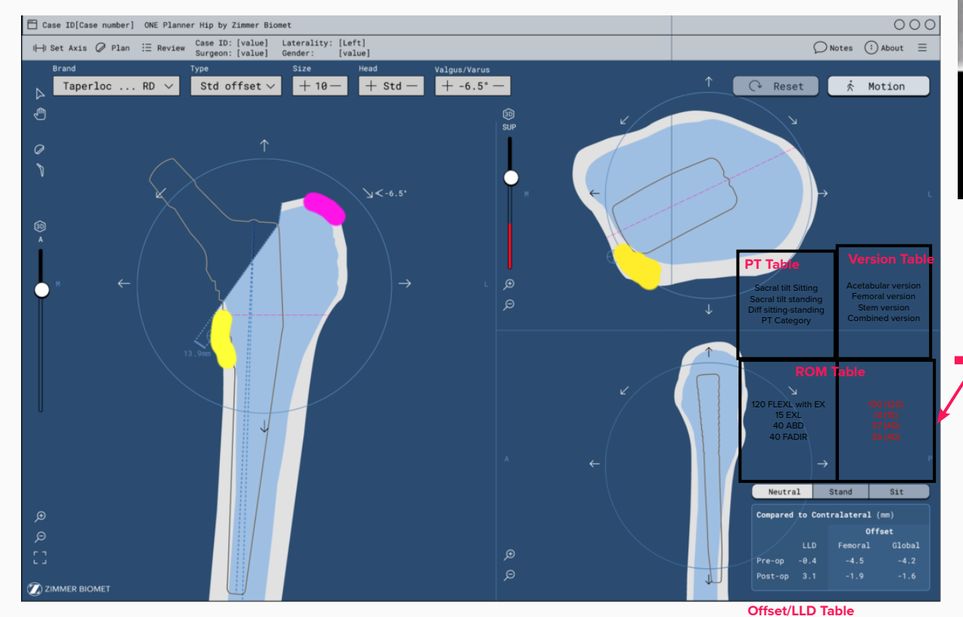
Results:
- 7/10 Would use the 2D Planner for straight forward cases, and 3D for complicated cases
- 3/10 Would use 3D for all cases given that they can request a CT Scan
- 1/10 2D is good'nuf (Kendoff, who would also use 3D for complicated cases).
- 1/10 Masse: "With a ROSA V2, with reaming and cup impaction and stem help (v3...) I would use it for most"

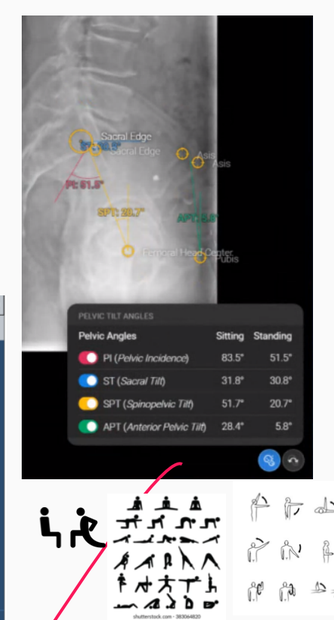
Conclusion
Reason: In retrospect
Question: If you have any additional comments, please enter below.
Finding:
- Middleton considers it good looking
- Middleton, Lawrie, Liu, Toy, Masse would like to see a prototype.

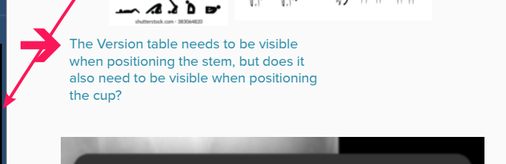
Current iteration of design



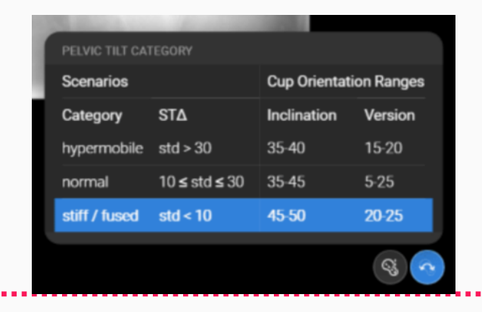
Conclusions for future iterations of the design







→ The Version table needs to be visible when positioning the stem, but does it also need to be visible when positioning the cup?



To do
Regarding how impingement visualization is:
- If we know that the plan has impingement we turn it off by default.
- The user will always be able to toggle the ROM tests.

To do
Regarding stem inspector
We need to be able to see the 3D version in the stem as well not just the slices.

To do
Regarding entire flow
1. Calibrate
2. Change the stem + Fem. Neck cut + Motion Sim
3. Change the cup + Motion Sim
4. Test motion / Approve
5. Preview fake X-Ray (Optional): Close case

Current iteration of design