



Test av mobilapplikasjoner

Sahdia Moghal

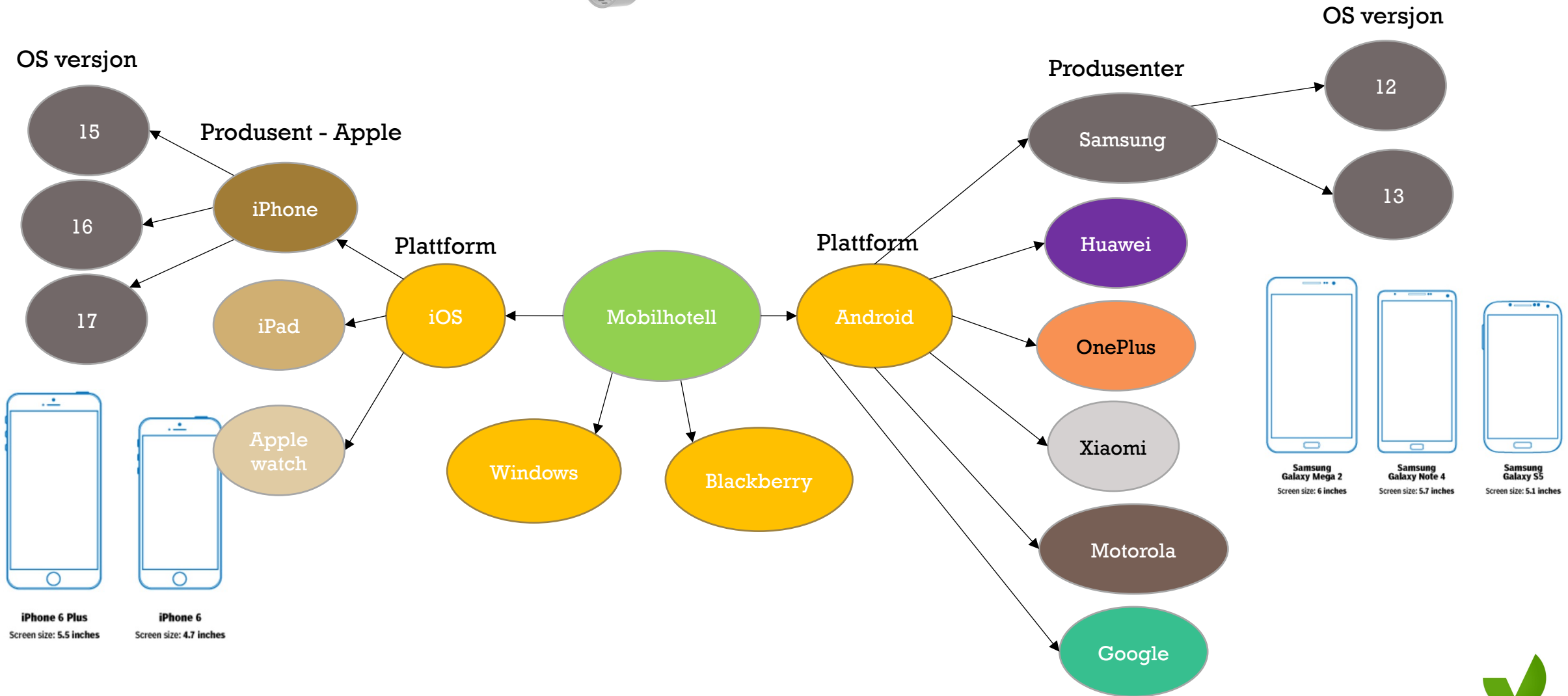


AGENDA

- Mobilhotellet
- Typer apps
- Testing av mobilapper
- Teste for Universell utforming
- Testflight/Beta
- Verktøy
- Automatisering med Maestro
- Utfordringer



MOBILHOTELLET



MOBILHOTELLET - EMULATOR/SIMULATOR

Emulator

- Tar tid å sette opp
- Etterligner maskin- og programvare
- Tilgang til kamera, GPS..
- Ikke tilgang til touch, oppløsning,
- Kan kjøre flere

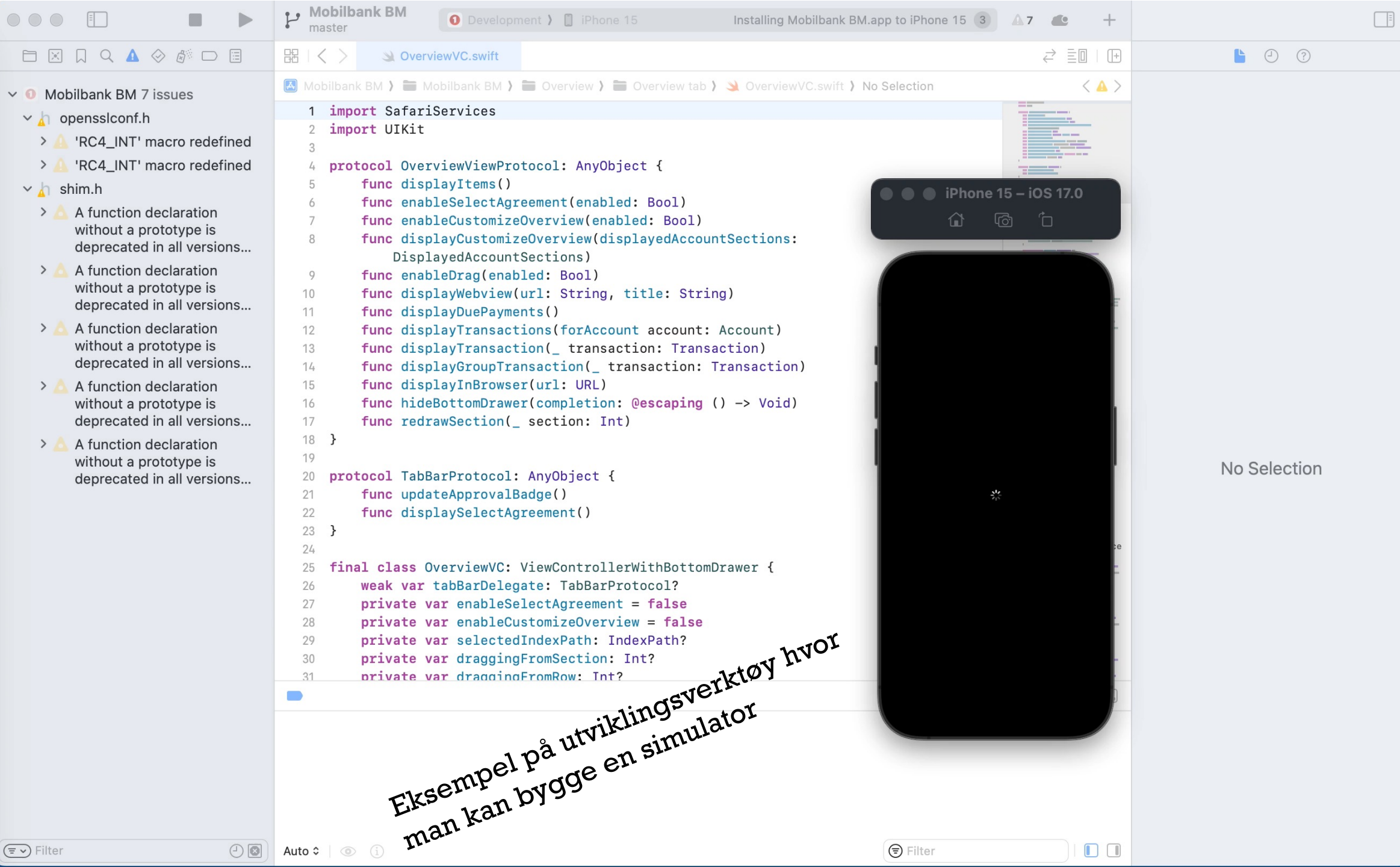


Simulator

- Raskere å sette opp
- Flere simulatorer kan kjøre på samme maskin
- Ikke tilgang til kamera, GPS, akselerometer, gyroskop

- Test underveis i utviklingsprosessen
- Gjenskap alltid bugs på ekte device.
- Feelingen er alltid best på fysisk enhet

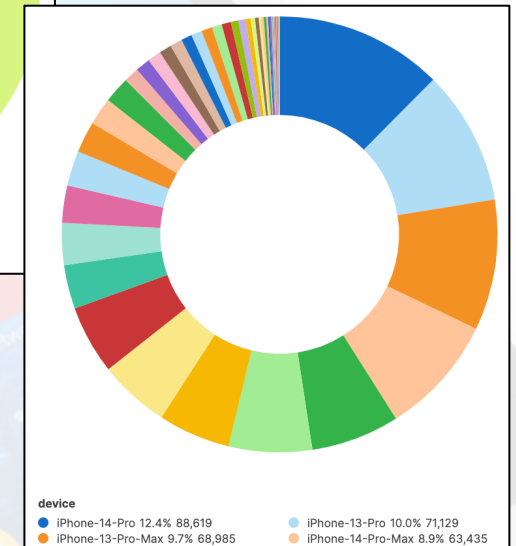
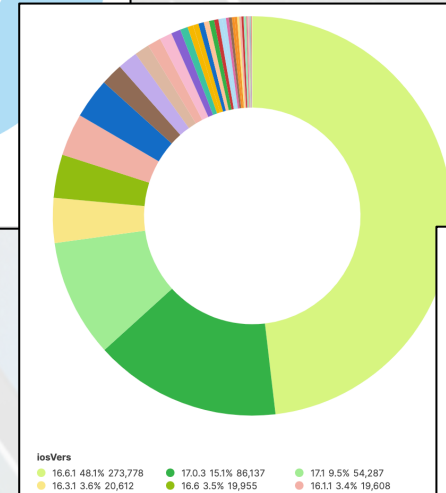
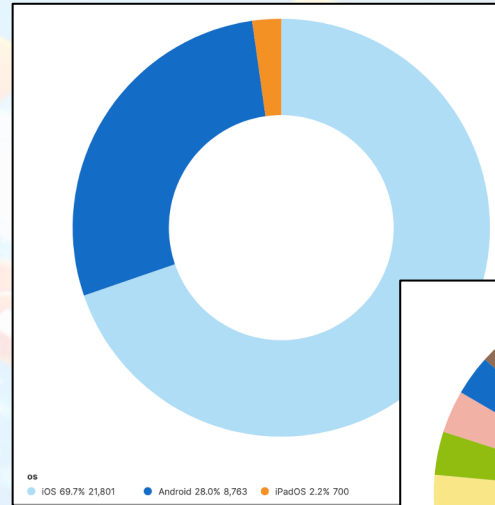




Eksempel på utviklingsverktøy hvor
man kan bygge en simulator

MOBILHOTELLET – ANALYTICS OG LOGGING

- Plattform
- OS versjon
- Type enhet
- Antall nedlastninger
- Appversjon
- Crashlytics



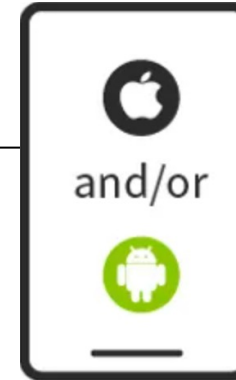
TYPER APPER

Web app



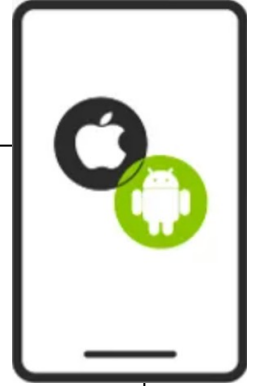
- Ingen nedlasting. Åpnes via internet browser
- Flere plattform
- Ikke tilpasset enheter
- Kan ikke benytte seg av device features
- Enklere, billigere, kjappere å lage

Native



- Lastes ned og installeres
- Spesifik plattform, språk (swift/kotlin)
- Vedlikehold på hvert OS
- Bedre brukeropplevelse
- Benytter device features
- Dyrere

Hybrid



- Lastes ned og installeres
- Blanding av native og web
- Flere plattform
- Bedre brukeropplevelse
- Benytter device features





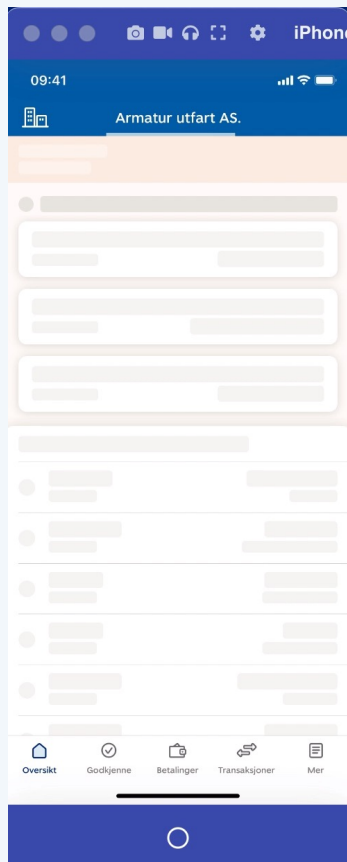
TESTING AV MOBILAPPLIKASJONER

- mine erfaringer fra SpareBank 1

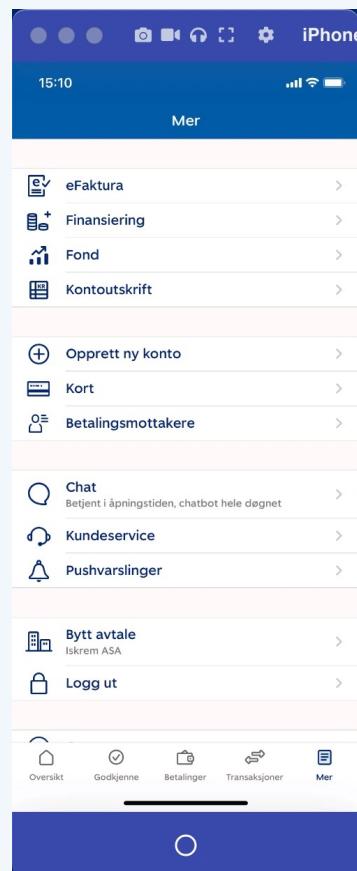


TESTING AV MOBILAPPER

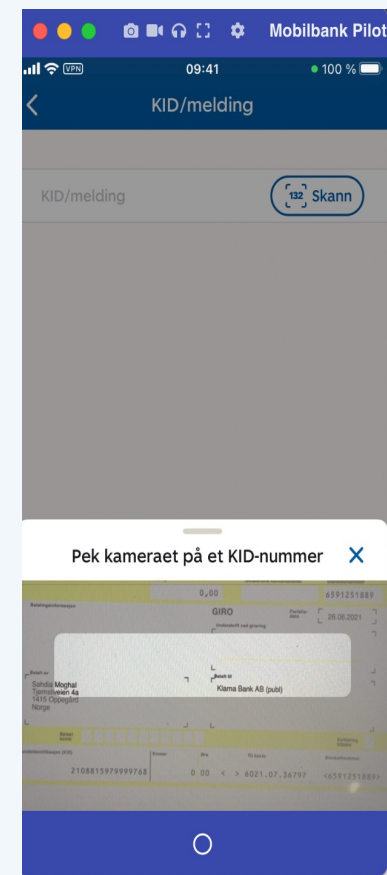
Hastighet, innlasting, krasj



Tillatelser (kamera, push etc.)

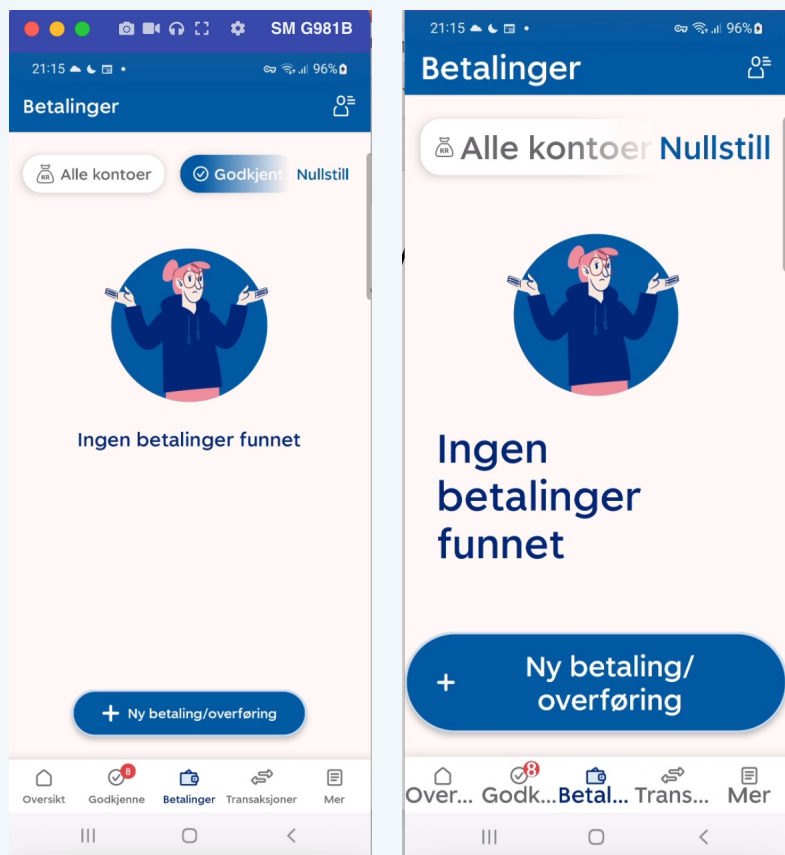


Kamera og andre device features

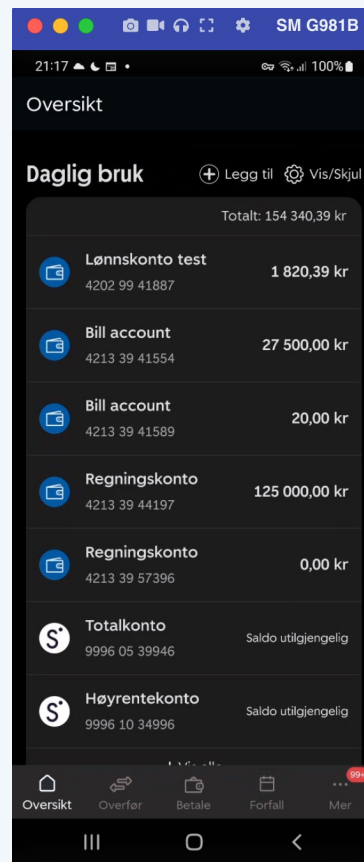


TESTING AV MOBILAPPER

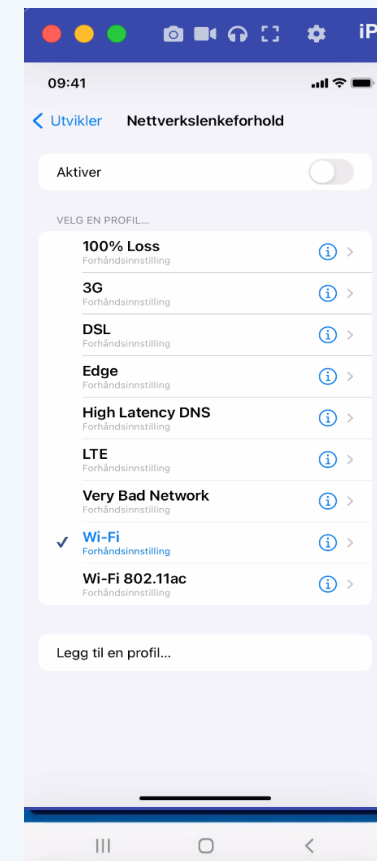
Skalering (UU)



Dark mode/light mode

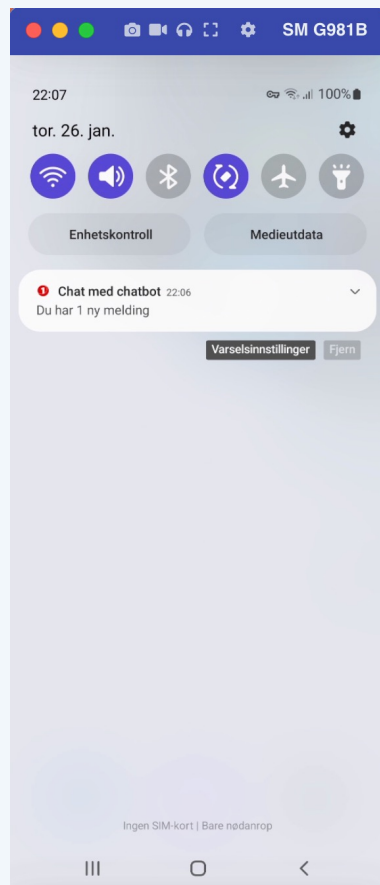


Nettverk/Timeouts

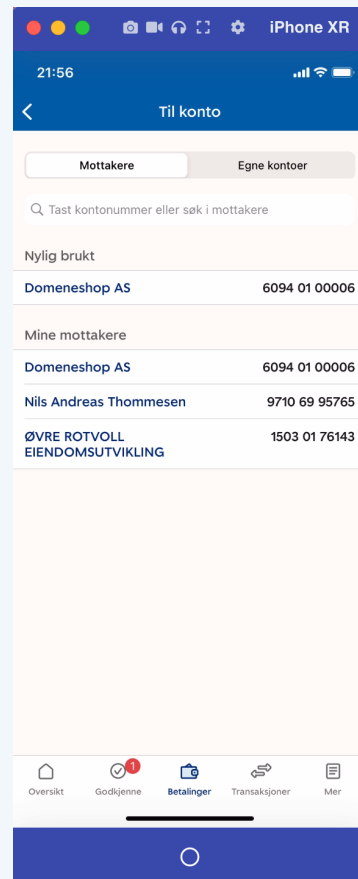


TESTING AV MOBILAPPER

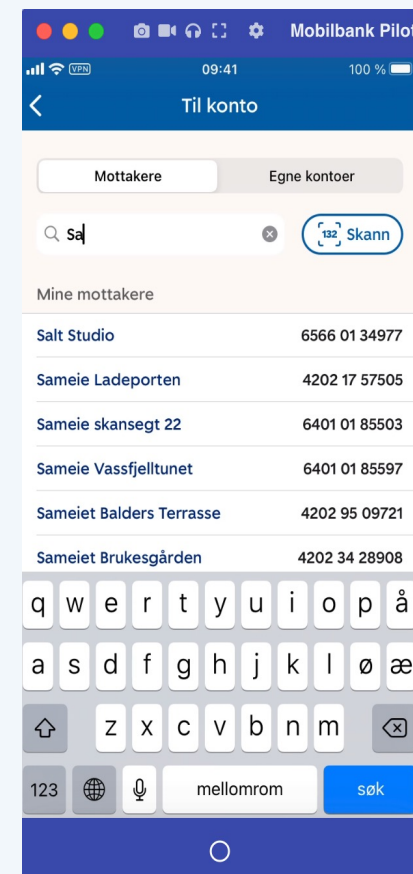
Varslinger og push



Installere, oppdatere og lokalt lagrede data

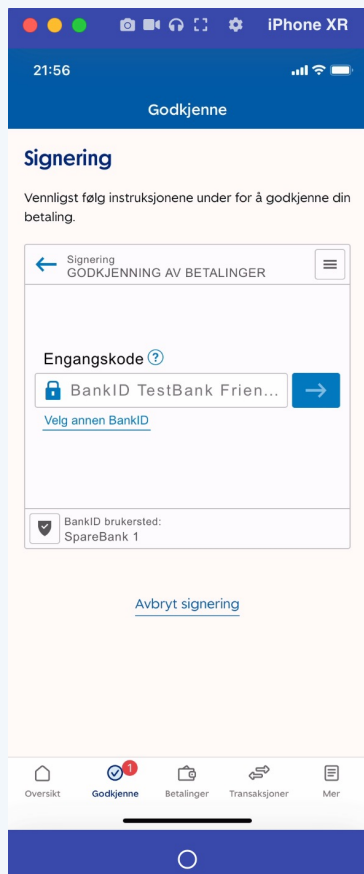


Input-felter

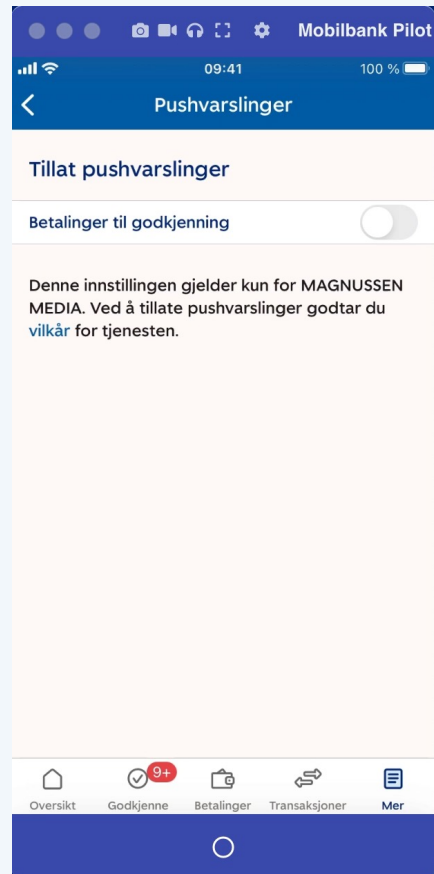


TESTING AV MOBILAPPER

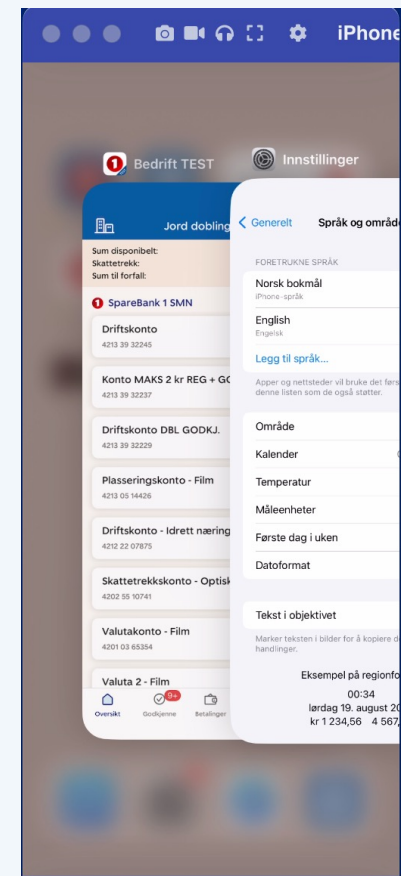
Integrasjon mot betalingsleverandør



Interne/eksterne lenker

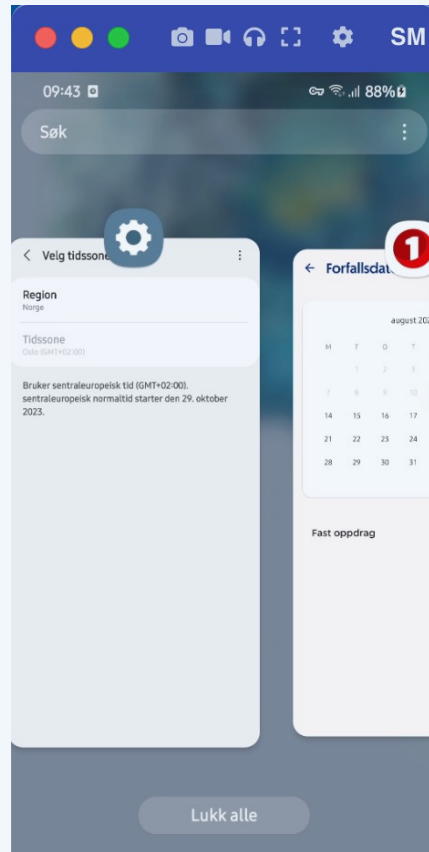


Språk

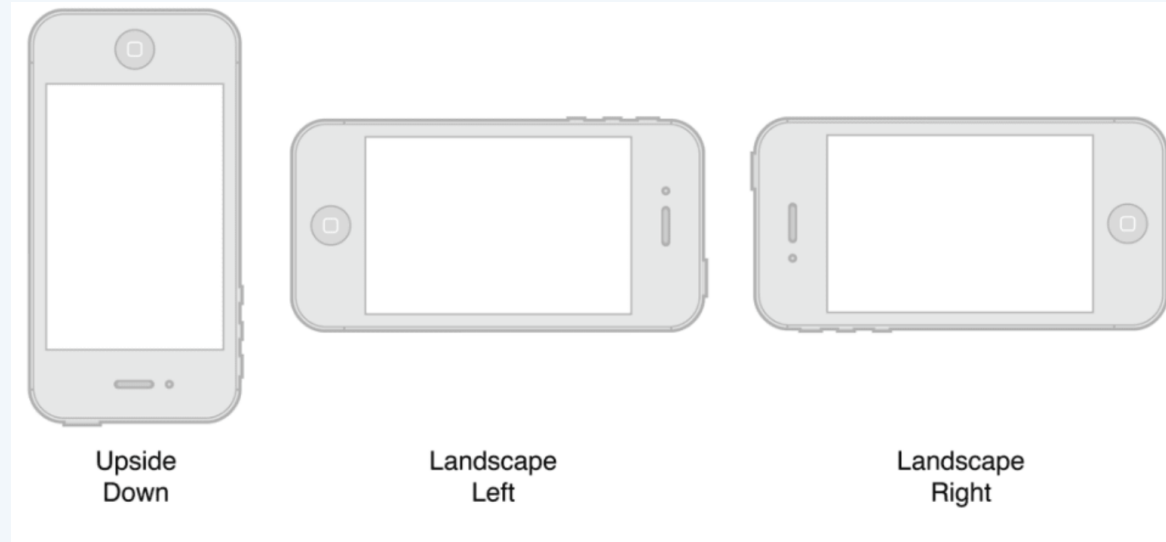


TESTING AV MOBILAPPER

Region/ tid



Portrait vs Landscape





UNIVERSELL UTFORMING OG MOBILAPPTESTING

- mine erfaringer fra SpareBank 1



UNIVERSELL UTFORMING AV APPER

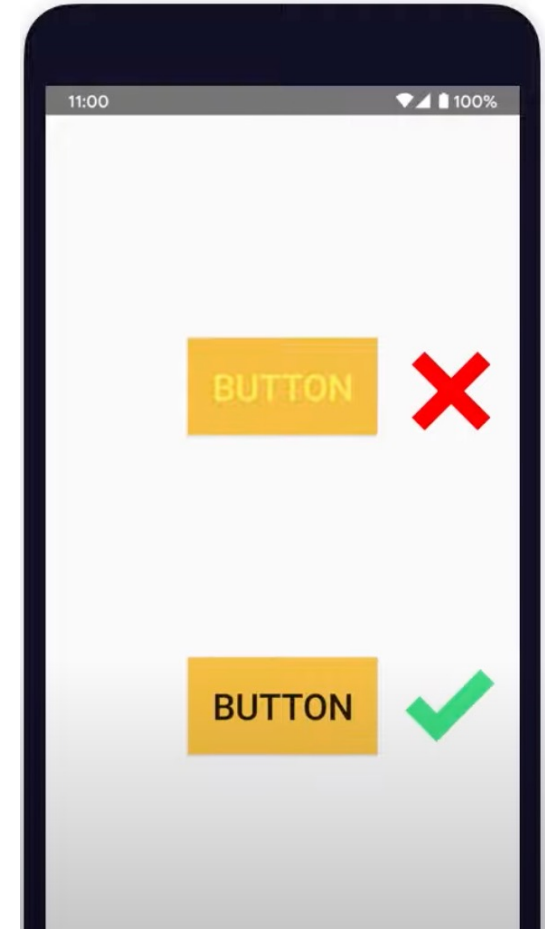
- [WCAG](#) – foreslår og beskriver en rekke krav til UU
- [Utilsynet](#)
- Mobilapper følger de samme kravene som nettløsninger, og spesielt apper for banktjenester, billettkjøp.
- Sjekkliste – hvilke krav vil jeg teste?
- Implementer og test det som passer i appen
- Det finnes flere verktøy for å hjelpe til med UU testingen



UNIVERSELL UTFORMING AV APPER

- **Kontrast**
- Farger
- Zoom
- Tastatur navigering
- VoiceOver/Talkback (skjermlesere)

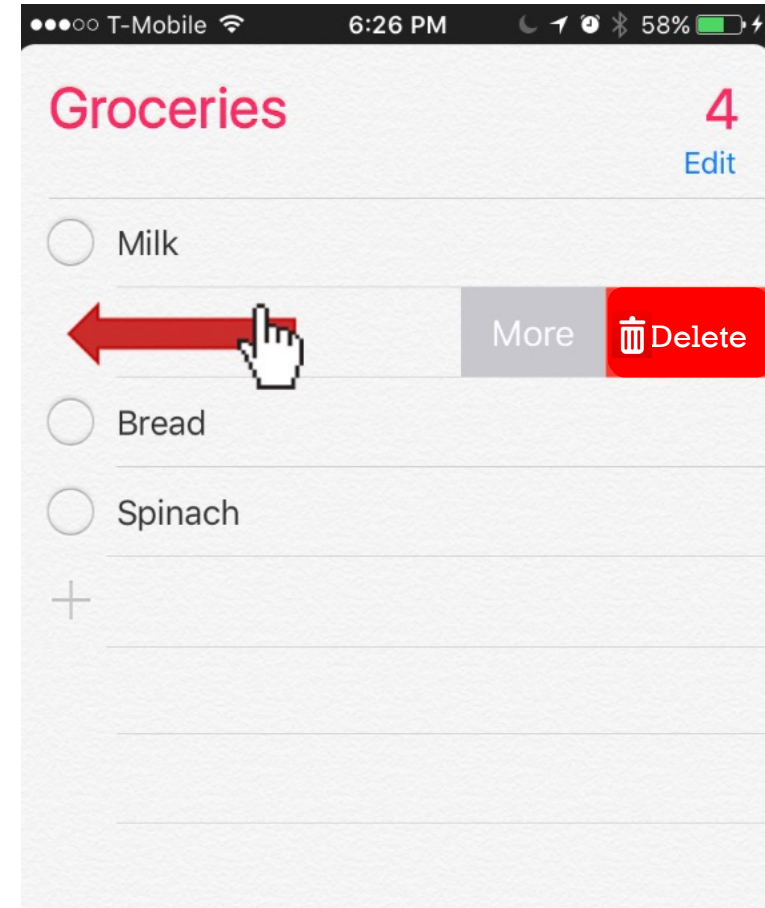
Tanaguru Contrast Finder - Sjekker fargekontraster og foreslår gyldige alternativer etter WCAG2.0 krav



UNIVERSELL UTFORMING AV APPER

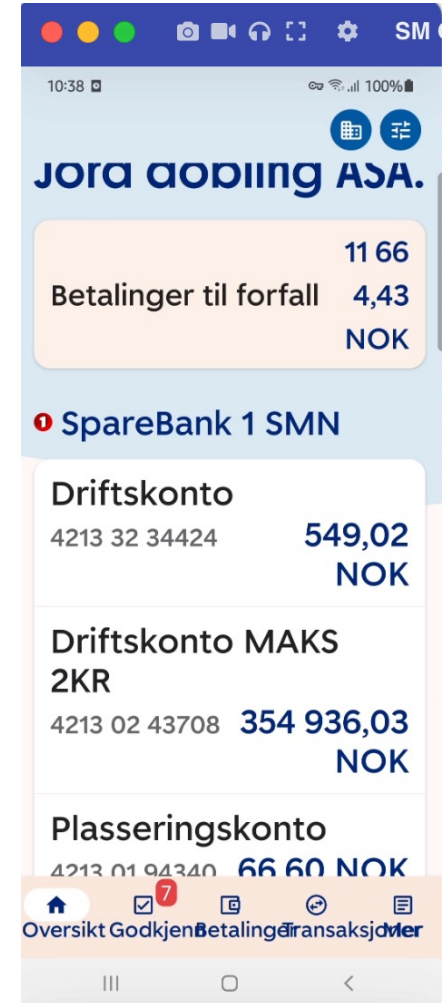
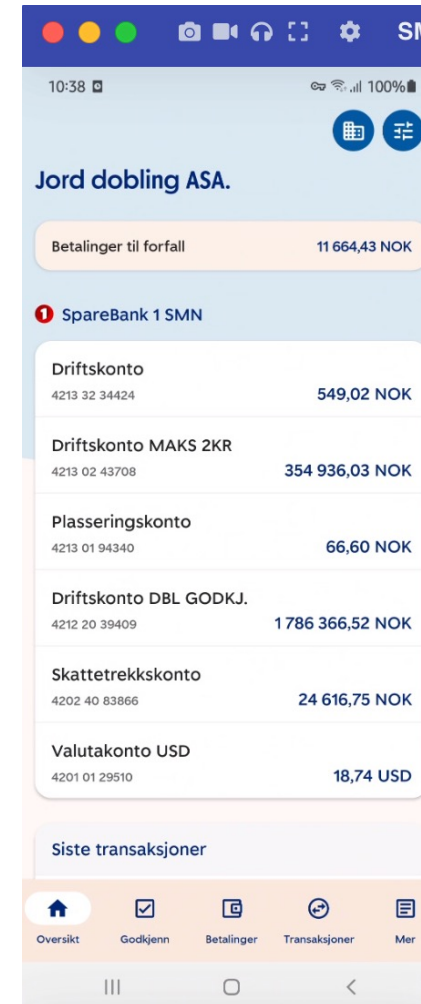
- Kontrast
- Farger
- Zoom
- Tastatur navigering
- VoiceOver/Talkback (skjermlesere)

Colour Contrast Analyser - Validerer fargekontraster etter WCAG2.0 krav



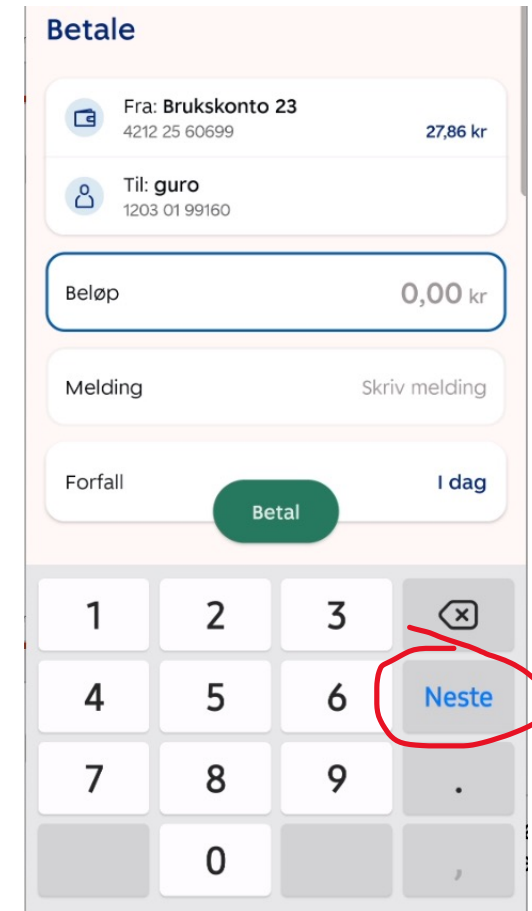
UNIVERSELL UTFORMING AV APPER

- Kontrast
- Farger
- Zoom
- Tastatur navigering
- VoiceOver/Talkback (skjermlesere)



UNIVERSELL UTFORMING AV APPER

- Kontrast
- Farger
- Zoom
- Tastatur navigering
- VoiceOver/Talkback (skjermlesere)



The screenshot shows a mobile payment app interface titled "Betale". It includes a transaction summary with "Fra: Brukskonto 23" and "Til: guro", a "Beløp" field showing "0,00 kr", and a "Melding" field. At the bottom is a numeric keypad. A red circle highlights the "Neste" button, which is located to the right of the number "6" in the keypad.

Betale

Fra: Brukskonto 23
4212 25 60699 27,86 kr

Til: guro
1203 01 99160

Beløp 0,00 kr

Melding Skriv melding

Forfall I dag

Betal

1 2 3 

4 5 6 Neste

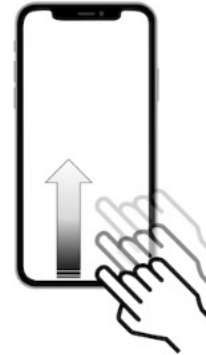
7 8 9 .

0 ,

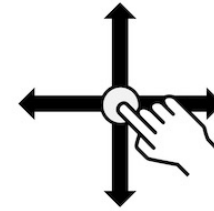


UNIVERSELL UTFORMING AV APPER

- Kontrast
- Farger
- Zoom
- Tastatur navigering
- VoiceOver/Talkback (skjermlesere)



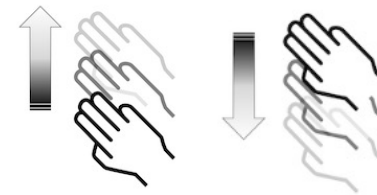
Sveip med 1 finger
for å åpne
hjemskjerm



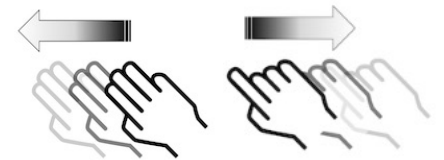
Dra en finger



Dobbelklikk for
å åpne/velge



Scroll opp/ned
med 3 fingre



Swipe til høyre/venstre
med 3 fingre

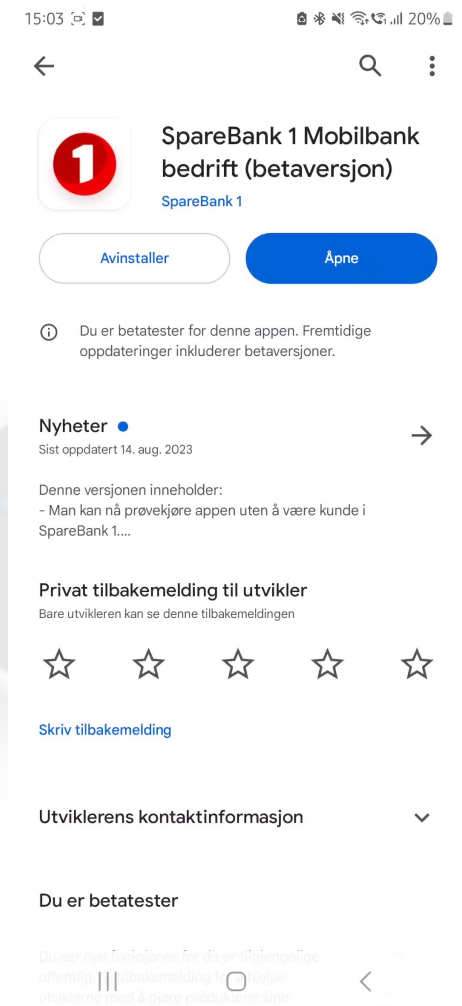


The image features three overlapping tablets. The top tablet shows a home screen with icons for Camera, Network, Store, News, Friends, Settings, and a text editor. The middle tablet displays a search bar and a clock. The bottom tablet shows a home screen with icons for Phone, Messages, Music, Home, Camera, Network, Chat, and Internet. A semi-transparent circular overlay is centered over the tablets, containing the text 'TESTFLIGHT/BETA BRUKERE' in a bold, black, distressed font.

TESTFLIGHT/BETA BRUKERE



TESTFLIGHT/BETA BRUKERE



- Brukere melder seg på programmene
- Får tilgang til funksjoner før andre brukere
- Kan sende utvikler tilbakemelding
- Brukerne har ofte et annet bruksmønster enn oss som tester appen
- Utviklere følger med på logger – oppståtte feil, krasj i appen logges
- Utviklere og testere kan utføre feilretting før appen releases til alle andre brukere
- Velger selv periode for test i beta – 1 dag, 1 uke, 1 mnd..
- Release til «resten» av brukerne når man føler seg trygge på at det ikke er kritiske feil/andre feil i betaversjonen
- Trenger ikke alltid bruke beta, av og til går release til beta + resten samtidig. Feks ved mindre feilrettinger, men også ved veldig kritiske feil.





PROXYVERKTØY

Manipulering og negativ testing



Proxyman | Listening on 10.230.196.45:9090 12 New Updates Free version

HTTP HTTPS WebSocket | JSON Form XML JS CSS GraphQL Document Media Other

Favorites

- Pinned
- Mobilbank BM
- Saved
- All
- Apps (20)
- Domains (46)

URL Contains Q Text

Show: %F New: %N Remove: %N Up: %↑ Down: %↓ On/Off: %B Hide: ESC

ID	URL	Code	Method	Client	Status	Time	Duration	Edited
594	https://www.test.sparebank1.no/corporate/banking/mobilbank/authentication/srlogin	200	PUT	Mobilbank BM	Completed	10:47:50.224	1.30 ms	
595	https://www.test.sparebank1.no/corporate/banking/mobilbank/authentication/srlogin	200	PUT	Mobilbank BM	Completed	10:47:50.368	294 ms	
594	https://www.test.sparebank1.no/api/corporate/banking/authorization/agreements	200	GET	Mobilbank BM	Completed	10:47:50.671	1.02 s	
595	https://www.test.sparebank1.no/smn/nettbank-bedrift/avtale/rest/avtale	200	PUT	Mobilbank BM	Completed	10:47:51.701	804 ms	
596	https://www.test.sparebank1.no/api/corporate/banking/mobilbank/pushnotifications/settings/DE4B0DCA-C875-4C9E-87B2-4EA47...	200	GET	Mobilbank BM	Completed	10:47:52.519	353 ms	
597	https://www.test.sparebank1.no/corporate/banking/mobilbank/overview/account?skipCache=true	200	GET	Mobilbank BM	Completed	10:47:52.652	1.04 s	
598	https://www.test.sparebank1.no/corporate/banking/mobilbank/support/keep-alive	200	GET	Mobilbank BM	Completed	10:47:52.650	286 ms	
599	https://www.test.sparebank1.no/corporate/banking/mobilbank/support/analytics?key=ios.bm.native.status.sendkeepalive	204	GET	Mobilbank BM	Completed	10:47:52.650	245 ms	
600	https://www.test.sparebank1.no/api/corporate/banking/financing/overview/account/credit	200	GET	Mobilbank BM	Completed	10:47:52.652	394 ms	
601	https://www.test.sparebank1.no/api/corporate/banking/organisations	200	GET	Mobilbank BM	Completed	10:47:52.651	339 ms	
602	https://www.test.sparebank1.no/api/corporate/banking/settings/accountsettings	200	GET	Mobilbank BM	Completed	10:47:52.652	306 ms	
603	https://www.test.sparebank1.no/corporate/banking/mobilbank/support/analytics?key=ios.bm.native.status.appvisible	204	GET	Mobilbank BM	Completed	10:47:52.643	302 ms	
604	https://www.test.sparebank1.no/smn/nettbank-bedrift/betaling/rest/godkjenn	200	POST	Mobilbank BM	Completed	10:47:52.705	790 ms	

GET 200 OK https://www.test.sparebank1.no/corporate/banking/mobilbank/overview/account?skipCache=true

Request Header Query Body Cookies Raw Summary Comment +

Host: www.test.sparebank1.no

Content-Type: application/vnd.sparebank1.v1+json; charset=utf-8

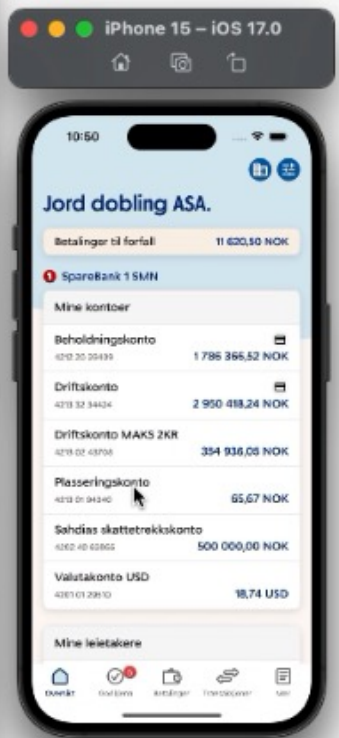
Accept-Encoding: gzip, deflate, br

Cookie: sb1-webso-prodlik=y+eulJs67piBUQ01L8mFhV/rqONYyzCDFKU7xPPF+NA06DEZ9f2ZJ+LWS2MGvA9d/M29y7fsq8NcMJCIYAm6RENLAjhvsik/huJSmIqfUIPDly3e4g9m6PcAVMFM0YE4qeJ9utt3C5QkLGTcRnYa8z4KC0quDOsR+cx6idiXlzxMouWHj+usREVfU17bLLCih6SXo3+WCzIEHffby61Wu7gmeJ0IZhObq/JwNH1o8H45/NS7w7u5RySUIfUO1Z8luUji9ZY0B9+BKounBpED6dZtwFF3uRnzHUqvsA7swf5gcX+CuID9hzZyhXrIBLqVakGsDkSgsV+VhMN0G8s7kebZyTxZ3IDm5uofEmys7WOpndLA4o4OXV3EtpEk0wyZq1Y/v9GB+cIMjMmFwOUveVAZwcbHwW4x82d0LqFK4kf81bqvS8W8i7PSFvckypG2yVZR5t7ILXzTre1quKln330nn7u8qeCjIH6ysmvrOlnNxdQzTR2pOsBGk85w; DIGITALBANK_SESSIONID=GS11FS06Ha5K3yuQlewh-AmYVb0R4MMzQuFQIDEnj-EoUsPyP5LSz89j46y0fyYP4e-6iaPNYtFC4uYRpQ2gVigILJGyleq4n7oJ5v1nRZtJ0WSFTAmetZ8cZanfEfr; AUTH_LATENCY_TIMESTAMP=1699609670477; AUTH_SESSION_DATA=Jl97atJmK7bryWwKAbdBdG==; X-CSRFToken=0AE6C42D.EE60.654DFC26; DSESSIONID=0AE6C42D.EE60.654DFC26; Spor=db4dfa71.609b83d4c14f9

Response Header Body Raw JSON + VND.SPAREBANK1.V1+JSON

```
{  "securityDepositAccountType": "UNSPECIFIED",  "accountNumber": "42024083866",  "accountKey": "LgwZ1PwRZshBUSZw8LHD",  "accountName": "Skattetrekkskonto",  "accountType": "Skattetrekkskonto",  "type": "SKATTETREKKSKONT0",  "iban": "N01342024083866",  "swiftAddress": "",  "balanceAtHand": 24616.75,  "balance": 24616.75,  "balanceInNok": 24616.75,  "canPayFrom": true.
```

1/125 rows selected 154 MB ↑ 5 KB/s ↓ 10 KB/s Map Local Breakpoint Proxy Overridden



PROXYVERKTØY

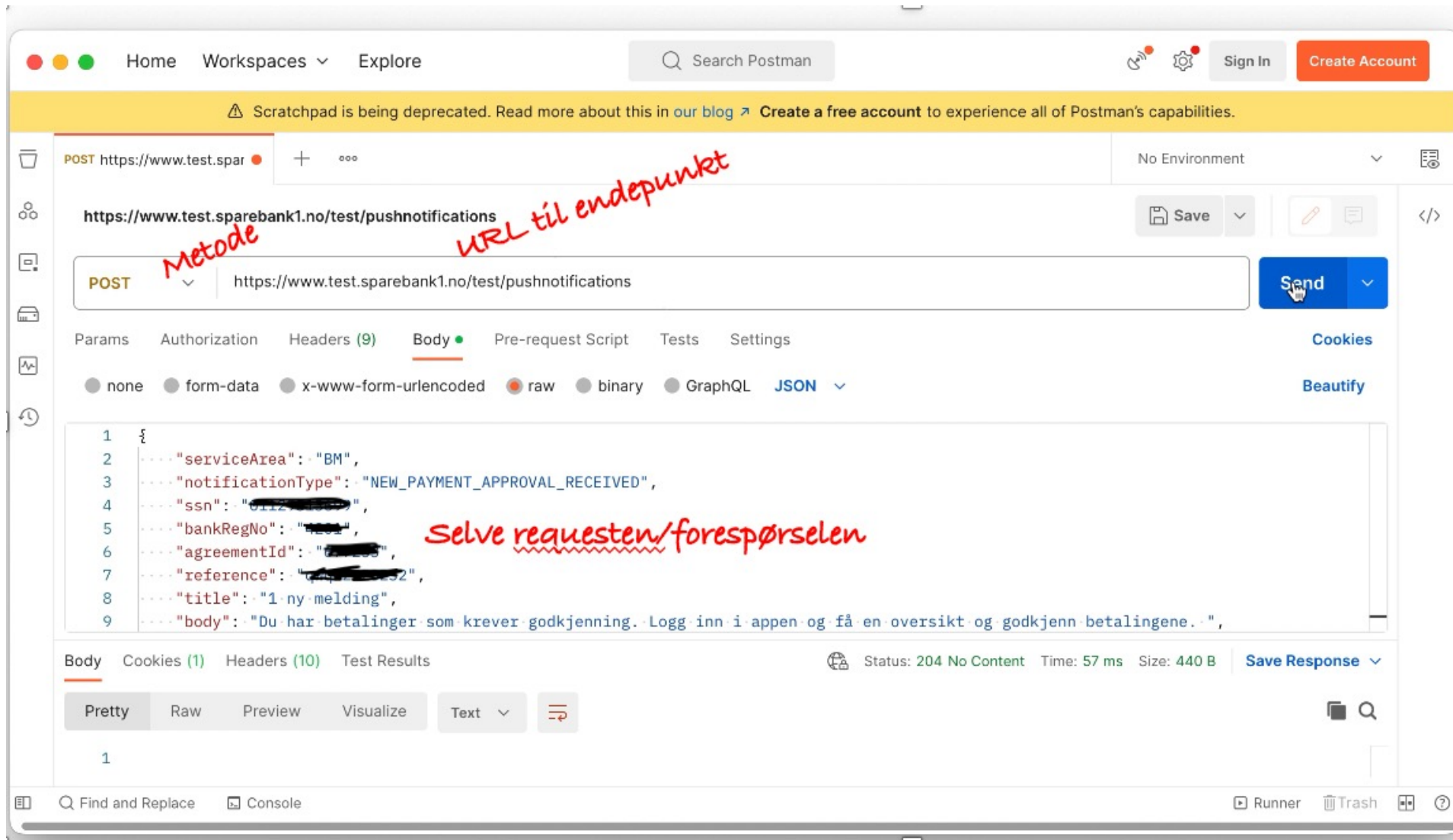
- Telerik Fiddler
- Charles Proxy
- Flipper
- **Proxyman**
- Stetho (<chrome://inspect/#devices>)





TESTE BACKEND API'ER - MED POSTMAN

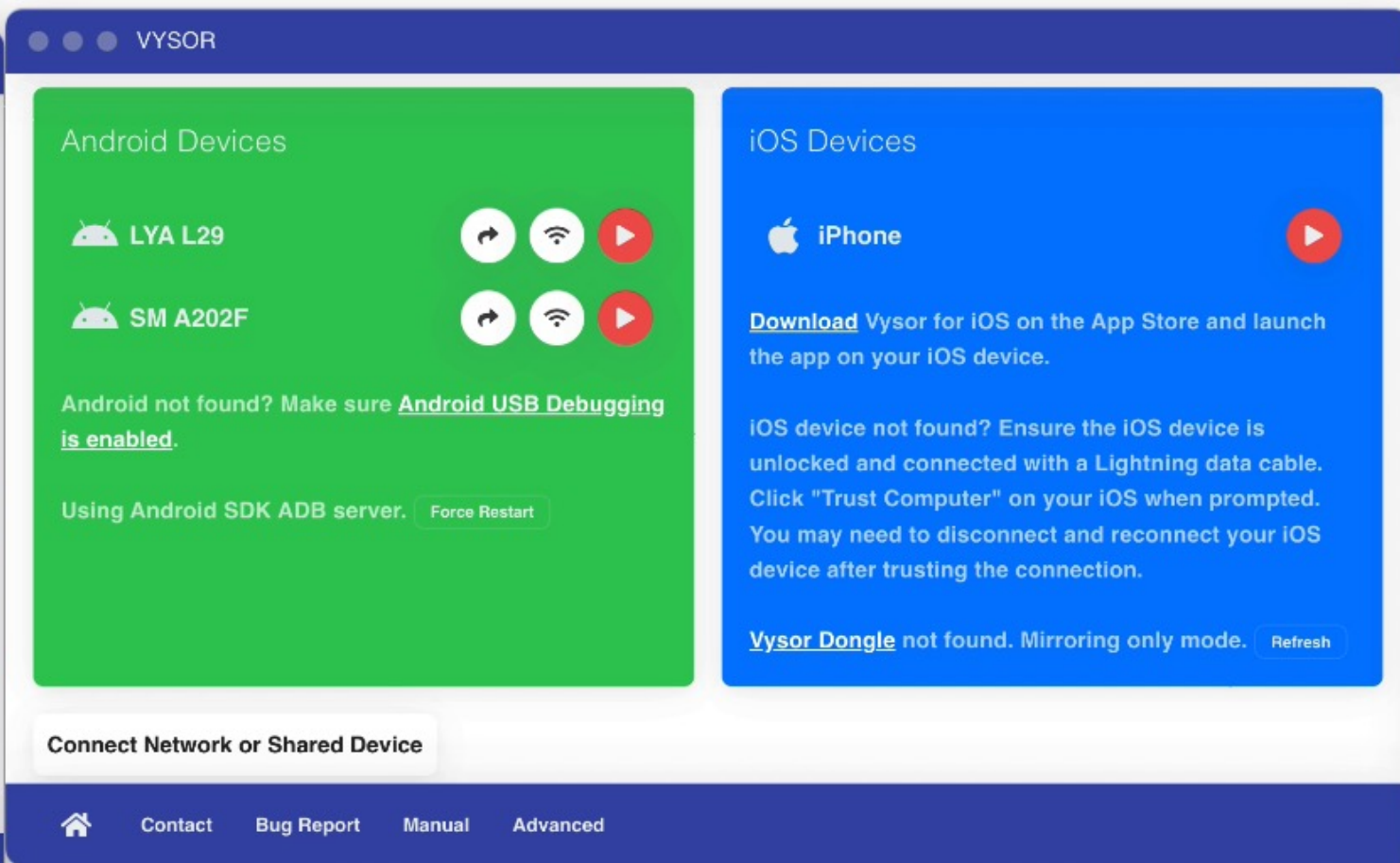
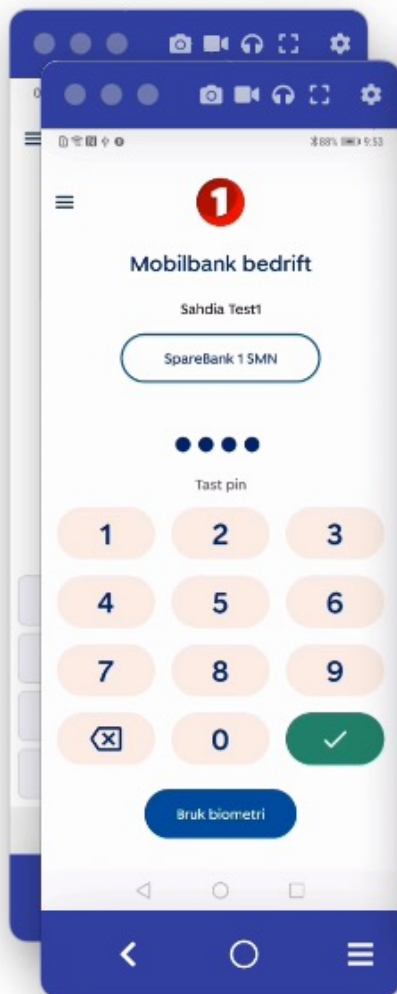




The image features three overlapping tablets. The top tablet shows an iOS-style interface with icons for Camera, Store, Network, News, Friends, and Settings. The middle tablet displays a Windows Phone-style interface with a large clock and a 'Search the Web' bar. The bottom tablet shows an Android-style interface with icons for Phone, Messages, Music, Home, Internet, Chat, Network, and Camera. A semi-transparent circular overlay is centered over the middle tablet, containing the text 'DELE MOBILSKJERM - MED VYSOR'.

DELE MOBILSKJERM - MED VYSOR







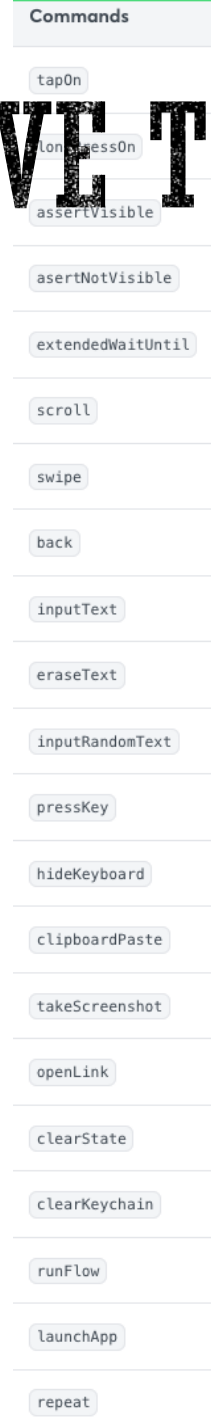
MAESTRO

Automatisering av mobil UI



MAESTRO - SKRIVE TESTER/FLOWS

- Enkle flows
- Enkelt å skrive en flow
- YAML
- Ingen sleep(), wait(3000) osv.
- Ingen kompilering



```
BM_Navigering.yaml
1  appId: no.sparebank1.bm.mobilbank
2  ---
3  - launchApp:
4    appId: "no.sparebank1.bm.mobilbank"
5    stopApp: true
6    clearState: true
7
8  - tapOn: "Skriv inn PIN"
9  - inputText: "1122"
10 - assertVisible: "Logg inn"
11 - takeScreenshot: build/innlogging.png
12 - tapOn: "Logg inn"
13
14 - assertVisible: "Oversikt"
15 - tapOn: "Oversikt"
16
17 - assertVisible: "Godkjenn"
18 - tapOn: "Godkjenn"
19
20 - assertVisible: "Betalinger"
21 - tapOn: "Betalinger"
22
23 - assertVisible: "Transaksjoner"
24 - tapOn: "Transaksjoner"
25
26 - assertVisible: "Mer"
27 - tapOn: "Mer"
28
29 - assertVisible: "Kort"
30 - tapOn: "Kort"
31
32 - assertVisible: "Kortoversikt"
33
34 - stopApp
35
36
```



The image shows two overlapping windows from the Maestro IDE. The background window is titled 'BM_Login.yaml' and 'UNREGISTERED'. It contains a YAML configuration for an app test:

```
1 appId: no.sparebank1.bm.mobilbank
2
3 - launchApp:
4   appId: "no.sparebank1.bm.mobilbank"
5   stopApp: true
6   clearState: true
7
8 - tapOn: "Skriv inn PIN"
```

The foreground window is titled 'Maestro — simctl' and shows the command 'java -classpath ~/.maestro/lib/maestro-cli-1.27.0.jar:/...' and the device 'Running on iPhone 15 - iOS 17.0 - CE647279-BB54-4409-82CD-E09F0DDFE703'. It displays a test flow with the following steps, all marked with green checkmarks:

- > Flow
- ✓ Launch app "no.sparebank1.bm.mobilbank" with clear state
- ✓ Tap on "Skriv inn PIN"
- ✓ Input text 1122
- ✓ Assert that "Logg inn" is visible
- ✓ Tap on "Logg inn"
- ✓ Assert that "Oversikt" is visible

The bottom status bar of the IDE shows 'Line 10, Column 28', 'Spaces: 4', and 'YAML'.



MAESTRO - SKRIVE TESTER/FLOWS

- Kjører andre flows i flow'en
- Lage mappestruktur og kjøre en hel mappe/suite med flows
- Kjøre flows i en definert rekkefølge
- Enkelt status på resultat + rapport

```
maestro/  
├── auth/  
│   ├── Login.yaml  
│   └── Onboarding.yaml  
├── checkout/  
│   ├── CheckoutWithCreditCard.yaml  
│   ├── CheckoutWithGooglePay.yaml  
│   └── CheckoutWithInvalidInfo.yaml  
├── common/  
│   ├── OpenDeepLink.yaml  
│   └── ScrollToSelected.yaml  
├── search/  
│   ├── FilterByCategory.yaml  
│   ├── Search.yaml  
│   └── SearchHistory.yaml
```

```
config.yaml  
  
flows:  
  - auth/*  
  - checkout/*  
  - search/*  
  
excludeTags:  
  - util
```

```
BM_Login.yaml BM_Navigering.yaml  
1  appId: no.sparebank1.bm.mobilbank  
2  ---  
3  
4  - launchApp:  
5    appId: "no.sparebank1.bm.mobilbank"  
6    stopApp: true  
7    clearState: true  
8  
9  - tapOn: "Skriv inn PIN"  
10 - inputText: "1122"  
11 - assertVisible: "Logg inn"  
12 - tapOn: "Logg inn"  
13  
14 - assertVisible: "Oversikt"  
15  
16 #Navigator  
17  
18 - tapOn: "Oversikt"  
19  
20 - assertVisible: "Godkjenn"  
21 - tapOn: "Godkjenn"  
22  
23 - assertVisible: "Betalinger"  
24 - tapOn: "Betalinger"  
25  
26 - assertVisible: "Transaksjoner"  
27 - tapOn: "Transaksjoner"  
28  
29 - assertVisible: "Mer"  
30 - tapOn: "Mer"  
31  
32 - assertVisible: "Kort"  
33 - tapOn: "Kort"  
34  
35 - assertVisible: "Kortoversikt"  
36  
37 - stopApp  
38  
39
```

```
sahdia.moghal@NSA-C02F1HYKMD6M Documents % maestro test Maestro  
Running on iPhone 14 Pro Max - iOS 16.4 - C3E82A31-A293-4070-9DE1-68C0F368EAE8  
Waiting for idb service to start..  
Waiting for Simulator to boot..  
Waiting for successful taps  
Simulator ready  
  
Waiting for flows to complete...  
  
[Passed] BM_Navigering  
[Failed] BM_Oversikt  
  
1/2 Flow Failed
```



MAESTRO - SKRIVE TESTER/FLOWS

- Skyløsning med mange flere muligheter
 - Parallelle tester
 - Schedule tester
 - Integrere med CI pipeline

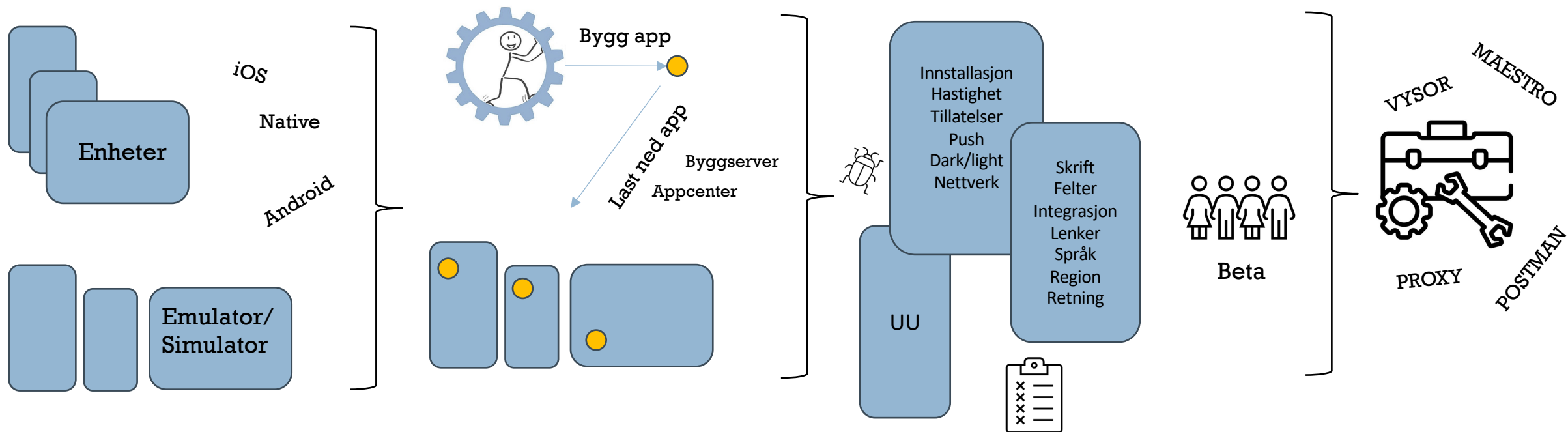


UTFORDRINGER MED MOBILAPPTESTING

- Kan ikke nå ut til ALLE
- Tvungen oppgradering til nyere appversjon
- Bakoverkompatibilitet
- Backend vs Frontend



OPPSUMMERING





Takk for meg



Sahdia Moghal

Epost: sahdiamoghal@gmail.com



Sahdia Moghal
Senior consultant at SOCO Norge AS

