

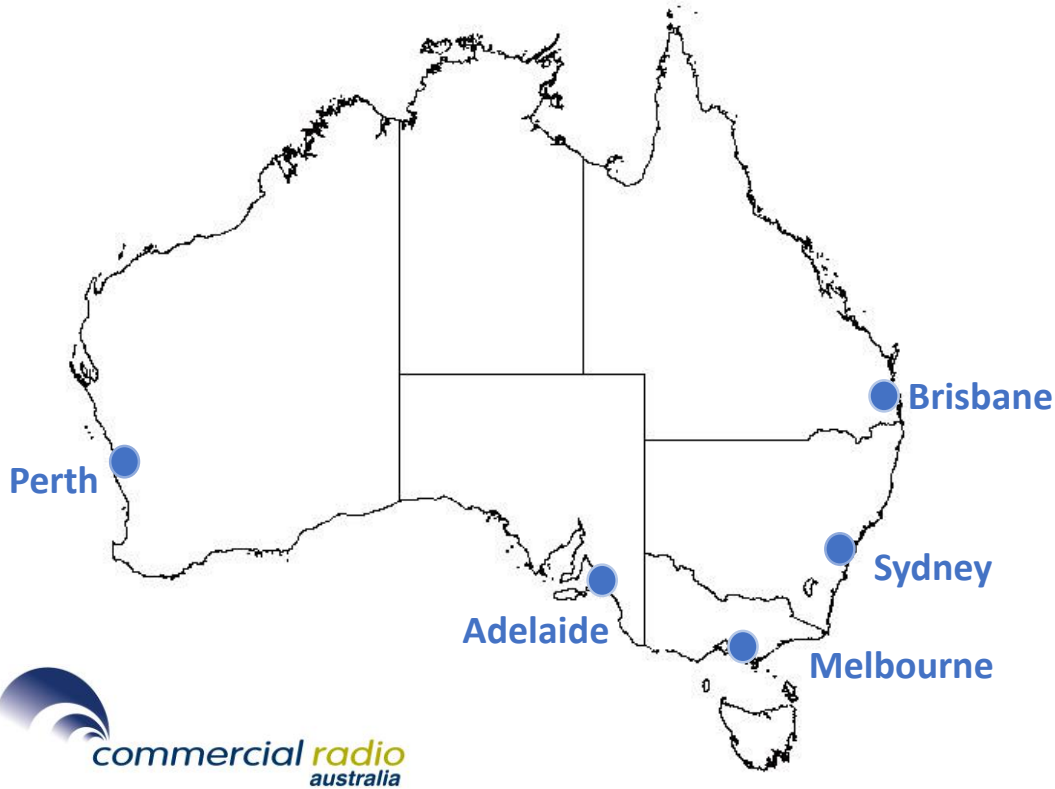
Country Mouse - City Mouse: Bringing the “Big Smoke” to the Bush The Australian Regional Reach & Frequency Project



Australian Radio Measurement Background

asi

#asiradio18

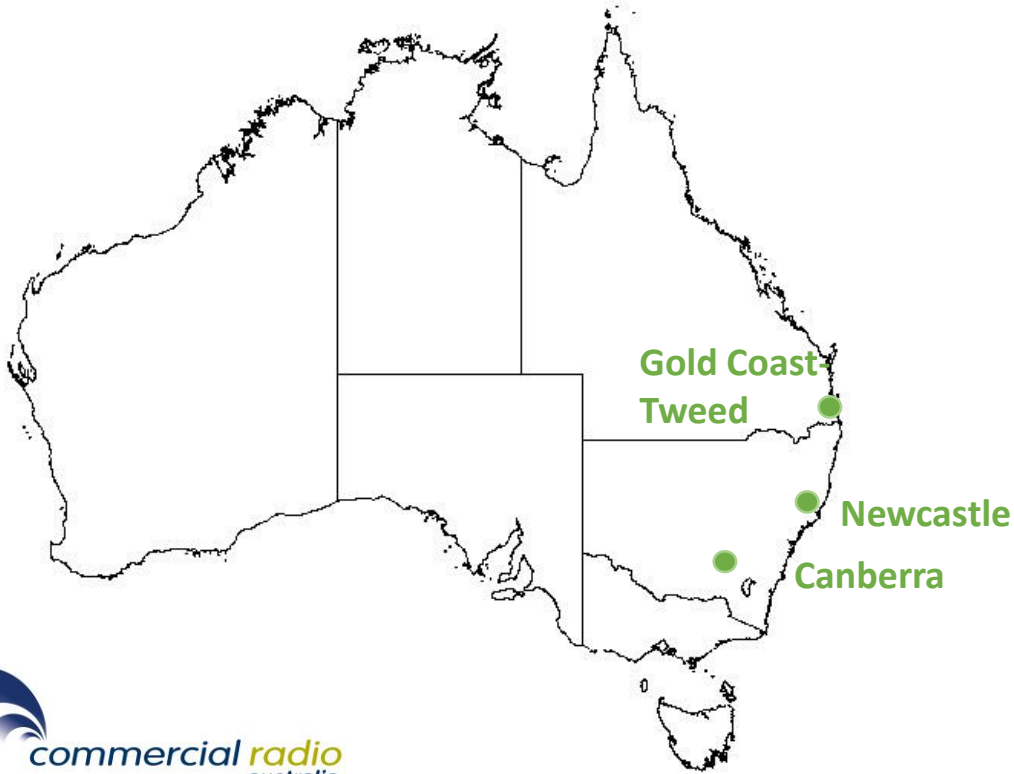


- Five major metro markets
 - Gfk conduct diary surveys
 - Survey each market 8x / year

Metro Market	Population (m)
Sydney	4.5
Melbourne	4.5
Brisbane	2.0
Adelaide	1.1
Perth	1.7
Total Metro	13.8



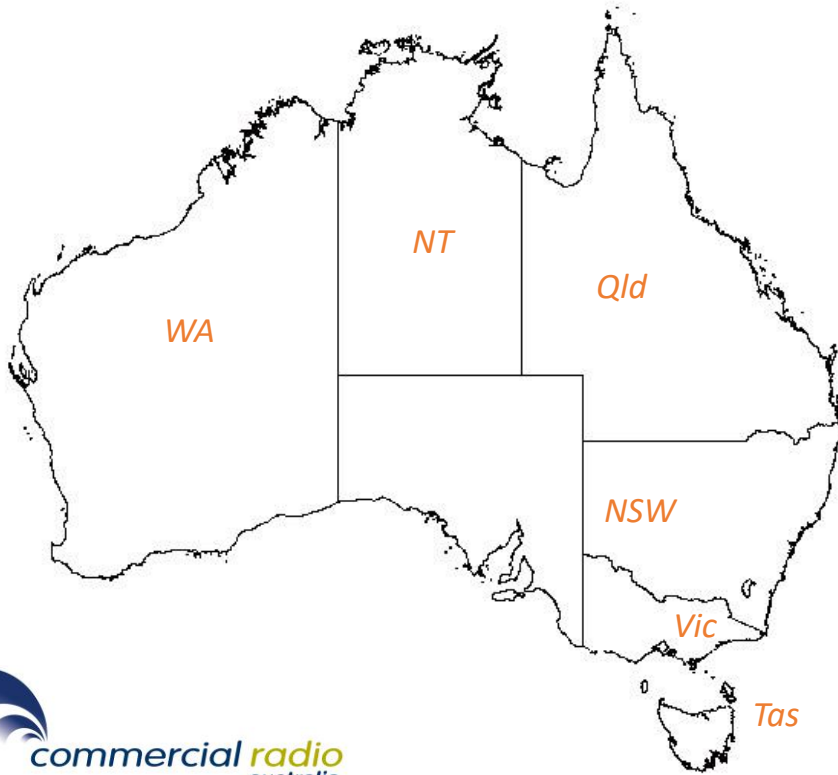
Australian Radio Measurement Background



- Three large regional markets
 - Gfk conduct diary surveys
 - Survey each market 3x / year

Regional Market	Population (000)
Gold Coast-Tweed	591
Newcastle	508
Canberra	394
Total Regional	1,493

Australian Radio Measurement Background



- Many smaller regional markets

Qld	Population (000)
Sunshine Coast	312
Townsville	223
Toowoomba	203
Ipswich	202
Cairns	163
Mackay	144
Maryborough	95
Bundaberg	85
Emerald	53
Kingaroy	51
Mt Isa	25
Roma	16
Total Qld	1,572

WA	Population (000)
Mandurah	90
Wheatbelt	73
Albany	45
Geraldton	42
Kalgoorlie	36
Esperance	18
Total WA	304

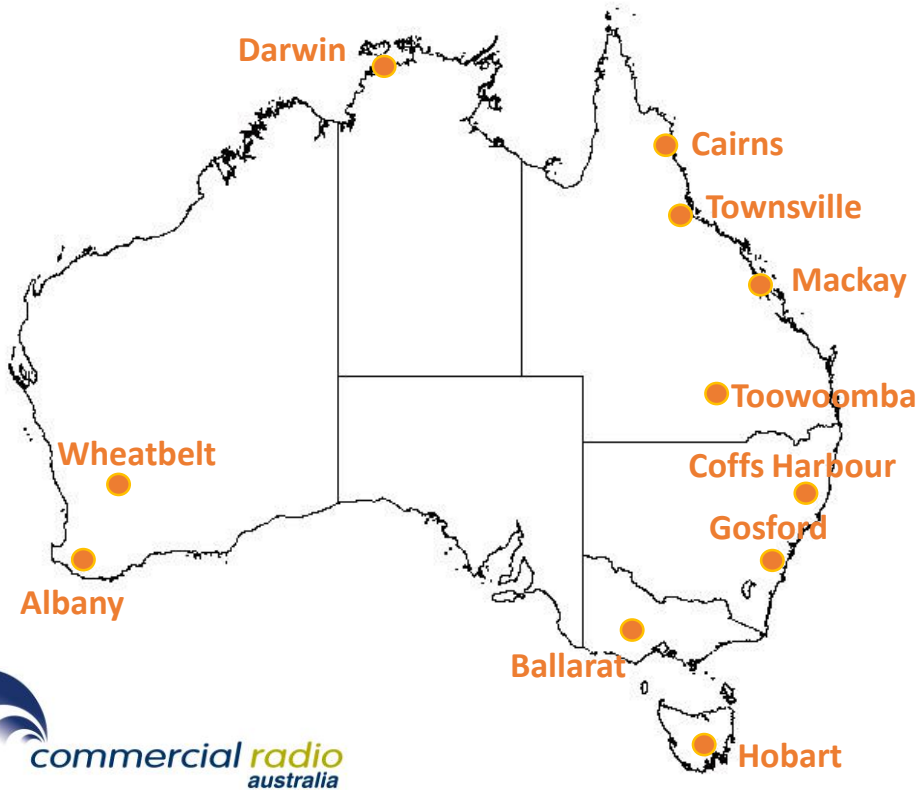
NT	Population (000)
Darwin	131

NSW	Population (000)
Gosford	301
Wollongong	268
Albury	138
Port Macquarie	125
Coffs Harbour	78
Griffith	64
Dubbo	63
Total NSW	1,037

Vic	Population (000)
Shepparton	171
Ballarat	123
Mildura	60
Horsham	58
Mt Gambier	52
Colac	49
Hamilton	46
Swan Hill	39
Total Vic	598

Tas	Population (000)
Hobart	231
Launceston	116
Total Tas	347

Australian Radio Measurement Background



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Research Economics

8 main markets = 15m people vs
36 regional markets = 4m people

Regional markets can't afford diaries

Surveys Not Diaries Used in Regional Areas

- CRA commissioned XTRA Research to conduct regional surveys
 - Select markets surveyed via CATI
 - Typically once per year/every other year
 - Sample sizes typically 300-1200 respondents
- Primary metric is Station Listened to Most (SLM)
 - Overall & by daypart (sessions)
 - Also captures other stations listened
- Current data is limiting for commercial operators
 - No reach and frequency
 - Difficult sell air time to major agencies
- Want reach & frequency data “like the city”

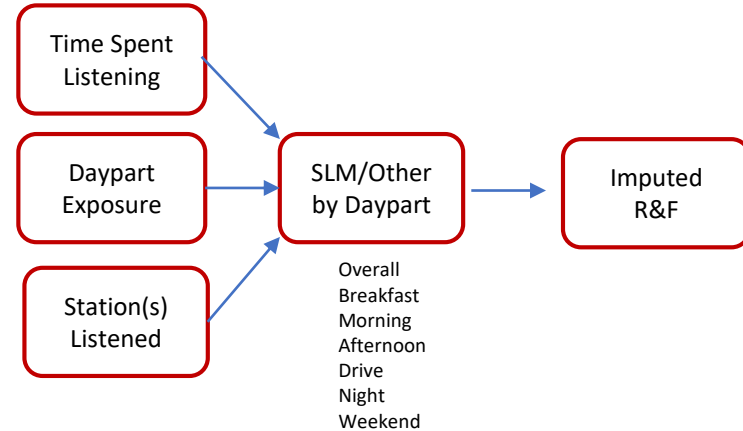


RegionalRF: Creating R&F from Surveys

- Use personal probability approach
 - Estimate reach by station/session

- Build model of listening from survey
 - Time Spent Listening
 - Allocation to dayparts (session)
 - Stations listened

- Benchmark model R&F to diary data
 - Gold Coast, Newcastle, Canberra



RegionalRF: TSL Allocation Model

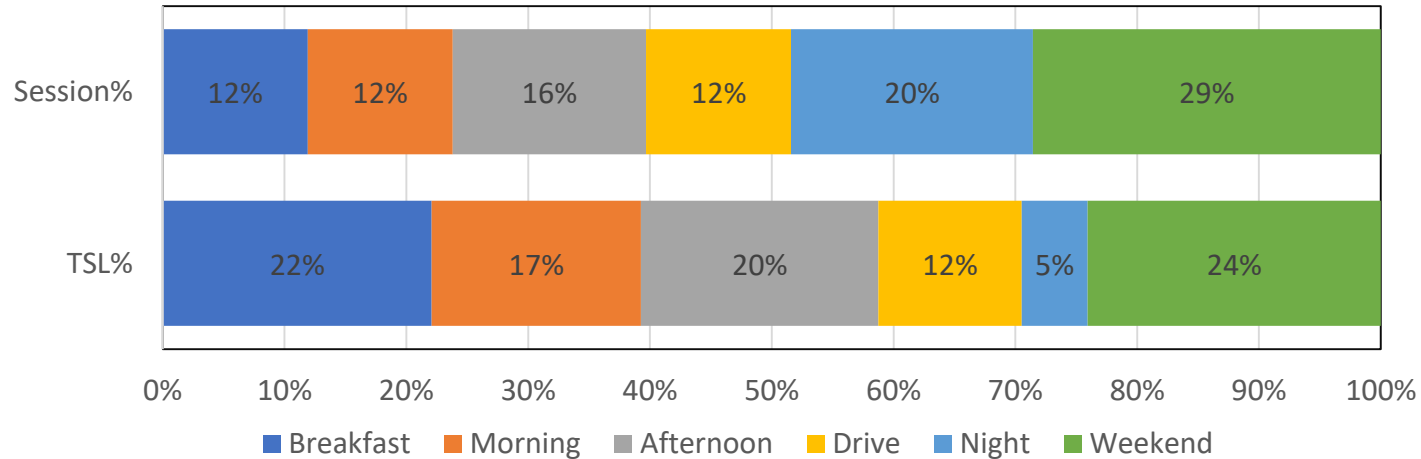
- Survey only provides an overall Time Spent Listening (TSL) value
- Need to allocate “average daily listening” to stations by daypart
- First calculate hours/week per listener from the answer to TSL question

TSL Factors	Hours/Week
1 = Less than 1 hour	3.5
2 = 1 - 2 hours	10.5
3 = 2 - 3 hours	17.5
4 = 3 - 4 hours	24.5
5 = 4 - 5 hours	31.5
6 = 5 hours plus	38.5

RegionalRF: TSL Allocation Model

- Survey provides only estimate of total Time Spent Listening (TSL)
- Next build estimate of time in each “listened session”
 - Recognises not everyone listens to every daypart
 - Use “calibration” data from diary studies

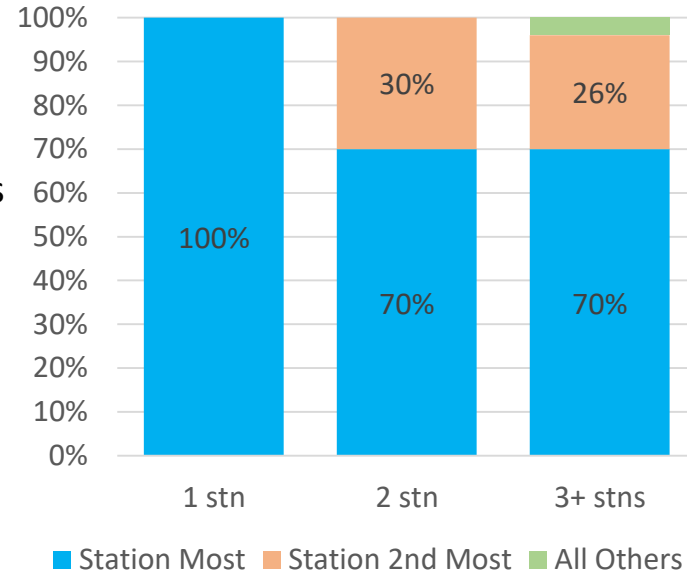
Diary Data: Session Listening vs Session Length



RegionalRF: TSL Allocation Model

- Survey provides only estimate of total Time Spent Listening (TSL)
- Next build estimate of time in each “listened session”
- Then allocate time to listened stations
- Divide session listeners into three groups
 - Group 1: Listen to one station only
 - Group 2: Listen to one main station/one other station
 - Group 3: Listen to one main station/two or more other stations
- Use diary to estimate time allocation by station
 - Proportion of listening varies only slightly by daypart
 - Does vary by person but most have clear favourite

%time with station in session by #listened

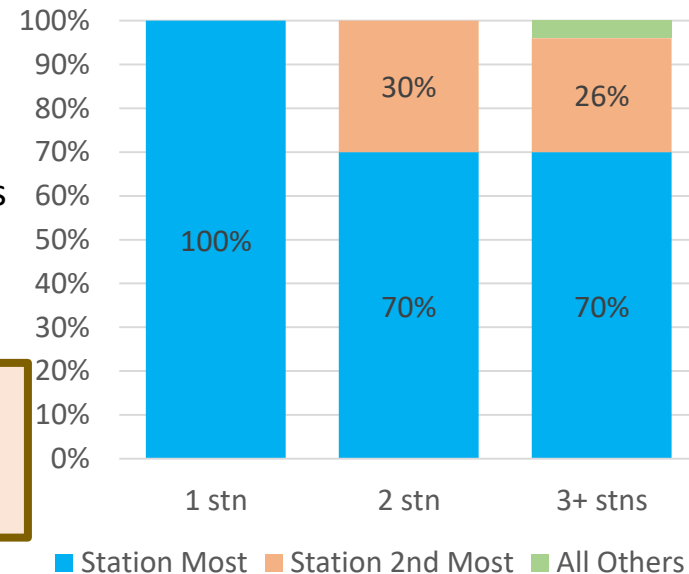


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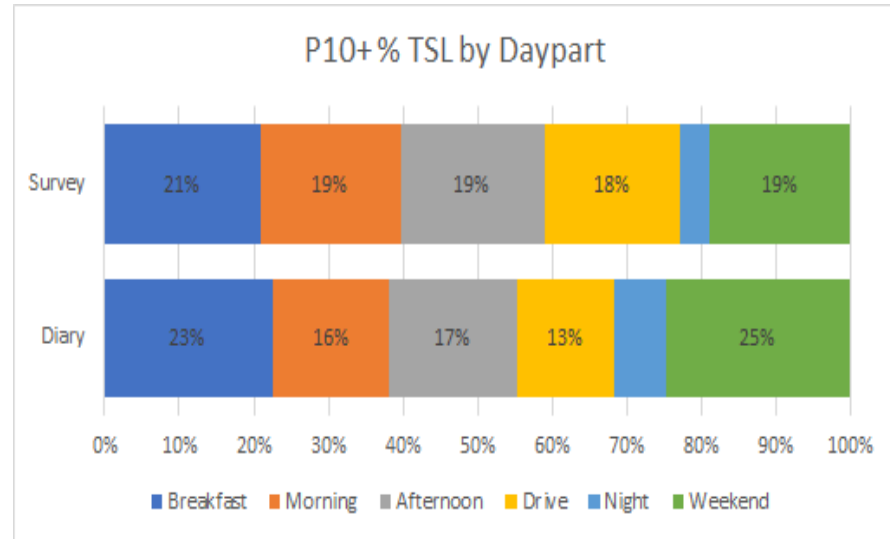
Implemented model assumes constant allocation by person across dayparts

%time with station in session by #listened



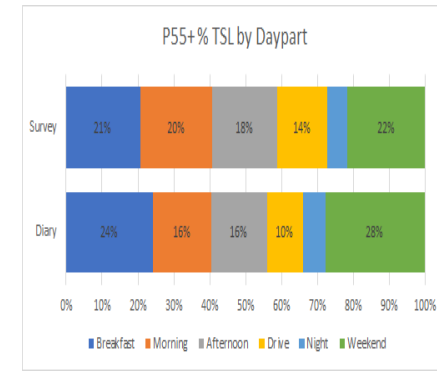
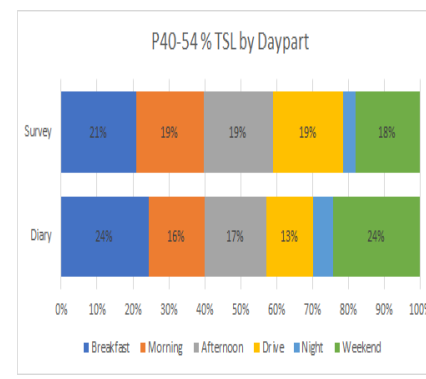
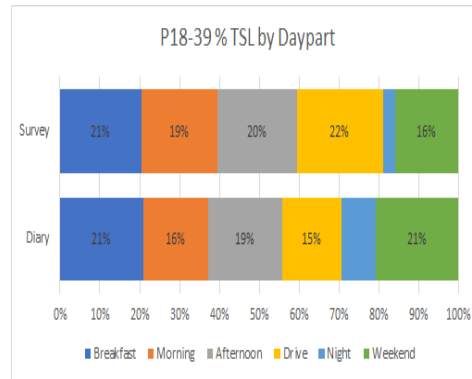
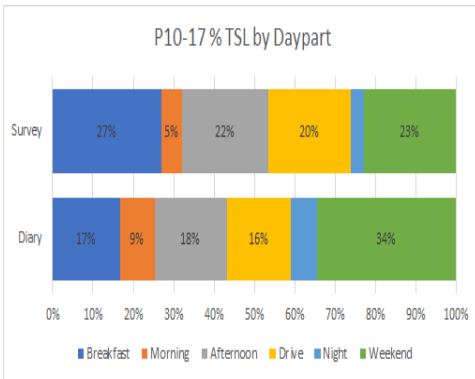
RegionalRF: TSL Validation

- Ran model against multiple regional surveys
- Compared to diary surveys from “similar” markets
- Firstly overall listening levels by daypart matches well
 - Modelled time spent by daypart close to diary
 - Difference in Drive is genuine (less commuting)



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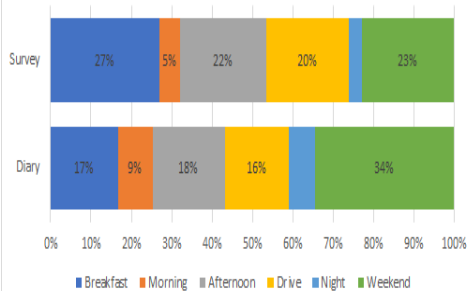


RegionalRF: TSL Validation

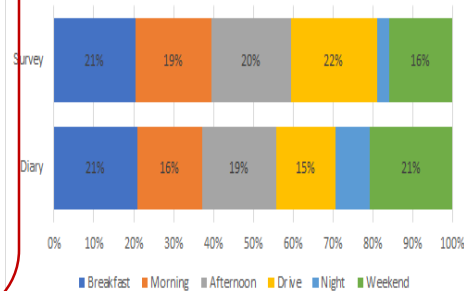
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Teen demo differences a partly due to data granularity (low sample counts) and genuine behavioural differences

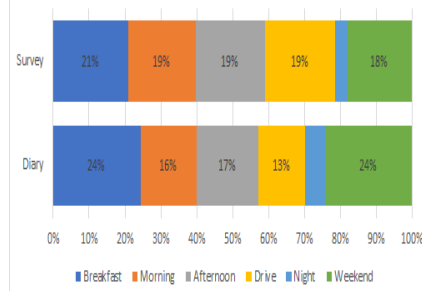
P10-17 % TSL by Daypart



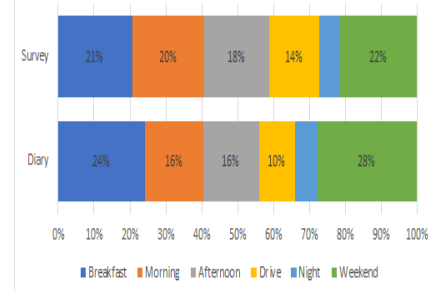
P18-39 % TSL by Daypart



P40-54 % TSL by Daypart

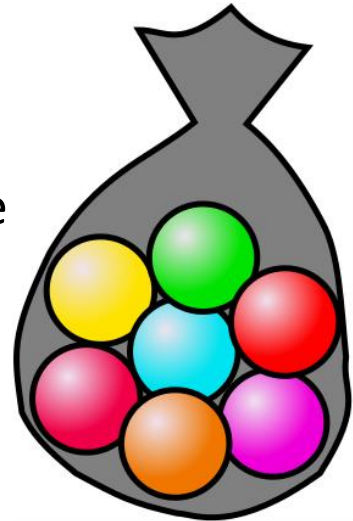


P55+ % TSL by Daypart



Regional RF: Building 1+ Exposure Estimate

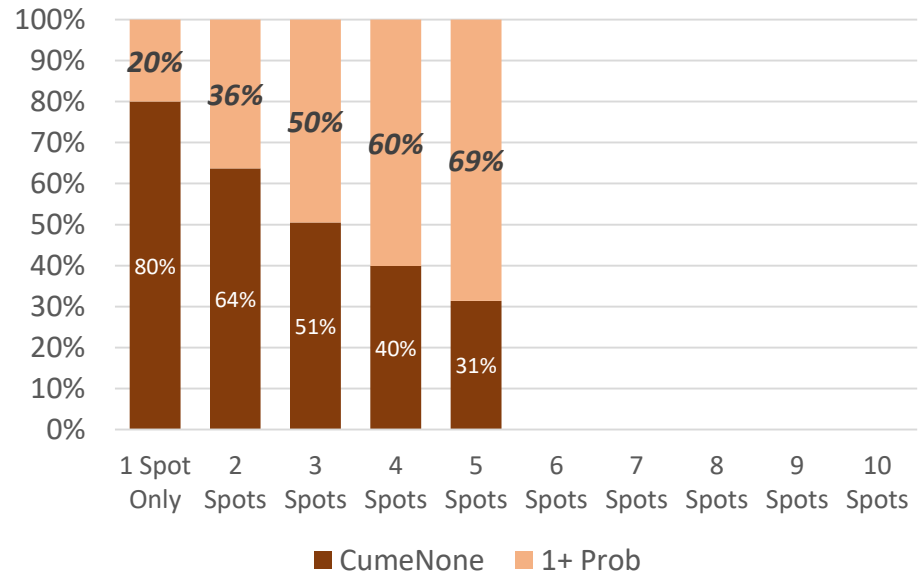
- The TSL modelling creates a personal probability of listening
- Use personal probability to estimate 1+ reach to schedule
- Use Bag of Marbles approach
 - Each Quarter Hour listened is like coloured marble
 - Each “spot” in a schedule like a draw from the bag
- Simple statistics provides estimates of picking “at least one red marble”
 - Calculate probability of getting “no red marble”
 - Deduct that probability from one
 - Gives estimate at individual level for **any** exposure



Reach Estimate (1+ Session Exposure)

- Say, respondent has probability of listening to breakfast session for station of 0.200
- A “random spot” on the station has a 20% chance of being heard
- Probability says there is a 69% chance the person will hear to at least one spot in five

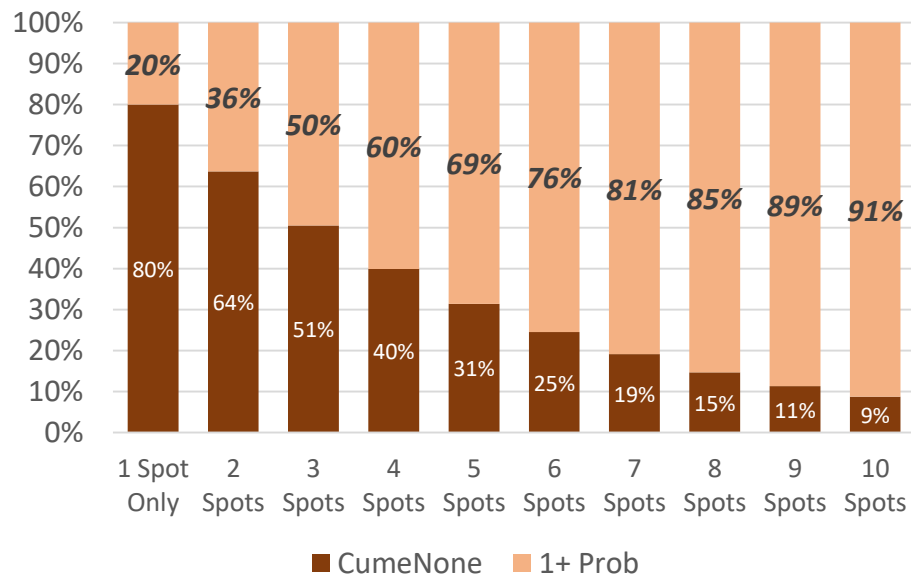
Probability 1+ spot heard after n spots
(Person Prob = 0.200)



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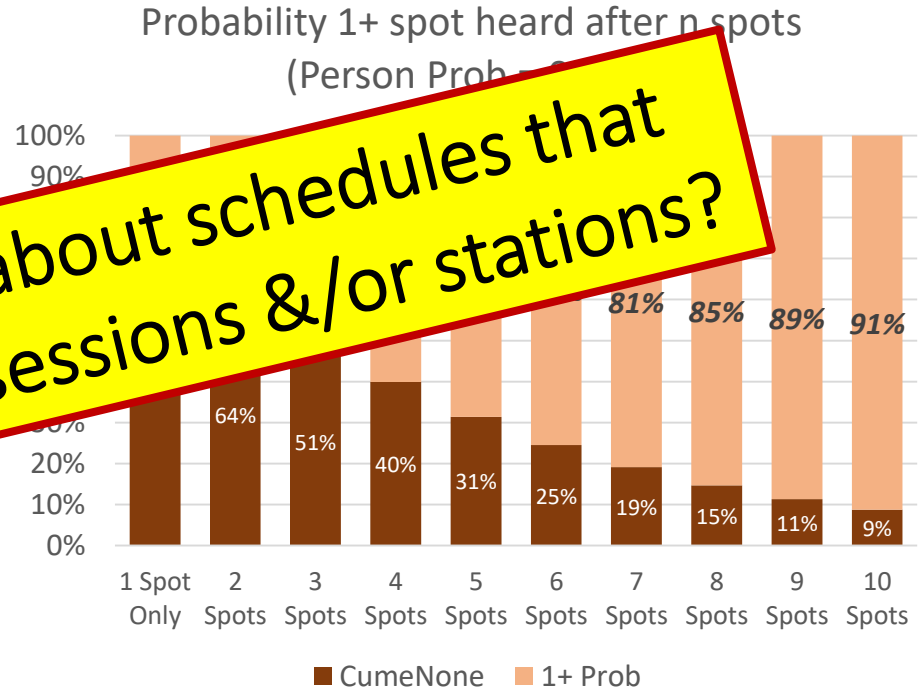
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Reach Estimate (1+ Session Exposure)

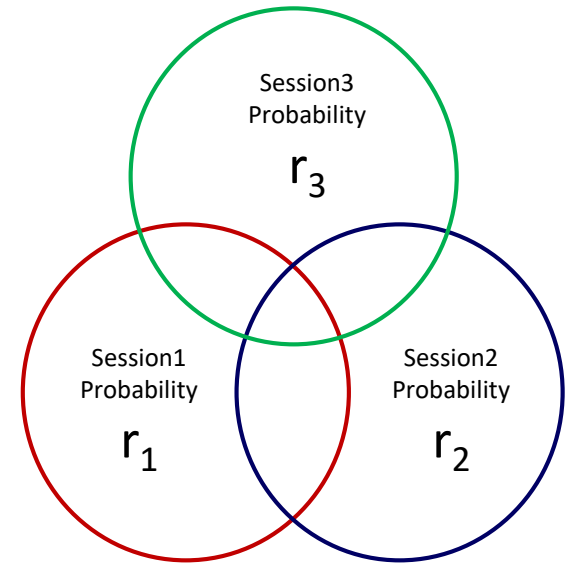
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- A “random spot” on the station has a 20% chance of being heard
- Probability says chance the person will hear at least one spot in ten
- **91% chance they will hear at least one spot in ten**

But what about schedules that use other sessions &/or stations?



Regional RF: Personal Reach De-Duplicated

- Known as the Sainsbury formula
 - Based on set theory
 - Unduplicated exposure e estimated using random allocation in proportion to size
- Can be extended to multiple sessions



Frequency Distribution Modelling

- Process has generated reach estimate for schedule
- Can create Tarp (GRP) estimate from aggregation of personal probabilities
- Distribution modelled using Metro Gold Standard method

• Frequency Inputs

- Schedule Reach%
- GRP

• Outputs

- Modelled NBD distribution
- Poisson distribution in pathological cases

```

9.2 Spot Frequency Distribution Algorithm
The following algorithm is used to calculate the full spot frequency distribution:

Inputs
n = number of spots in schedule
sr = estimated schedule % reach (from previous algorithm)
st = sum of schedule spot ratings

Algorithm          Comment
sr = sr/100        Convert to proportions
if sr = 0 go to 30  Special case: No reach
sr = sr*log(1-sr)  Estimate NBD parameters
if (sr > .1) go to 40  Special case: NBD fails to use Poisson
n = n*(1-sr)       Iterate until valid a parameter found
b = n
a = n*(sr*(1-sr)*log(1-sr))/(1-sr)
if abs(b-a) < 0.0001 then go to 40
go to 30

40 b = n*a
    E0 = 100*(1-sr)    Spot Frequency distribution.
    sum = E0
    for p=1 to n-1
        E1 = (sr*(1-sr)*E0)/((1-sr)+p)
        sum = sum + E1
    next
    E(n) = 100-sum
    END                Spot Frequency from NBD fit

50 E0 = 100
    for p=1 to n
        E1 = 0
        next
    END                Reach = 0 so no spots watched

60 a = n*log(1-sr)
    E0 = 100*(1-sr)    Poisson default.
    sum = E0
    for p=1 to n-1
        E1 = n*(E1-1)
        sum = sum+E1
    next
    E(n) = 100-sum
    END                Spot Frequency from Poisson fit

The output from this algorithm is:
f(i) = % of people listening to i spots in the schedule for i = 0, ..., n.

Note that for a single week schedule, this estimated spot frequency distribution will be different to the actual spot frequency distribution. However, for consistency in schedule build analysis, the Gold Standard is the estimated frequency distribution which must be used.

Prepared by Ian Striland, Milton Data Pty Ltd for Commercial Radio Australia
    
```

Regional RF Results & Comparisons



Analysed 15 Markets by sessions/stations

- Testing Basics
 - Analysed 10 age/gender & grocery buyer (shopper) demos
 - Samples sizes ranged from 200-1,200 respondents
- Testing Details
 - Solo & combined sessions (dayparts)
 - Solo and combined stations
 - Eight spot weights (1, 2, 3, 4, 5, 10, 15 & 20 spots)

Sessions Analysed
BREAKFAST Only
DRIVE Only
MORNING Only
WEEKEND Only
BREAKFAST + MORNING
BREAKFAST + DRIVE

Analysed 15 Markets by sessions/stations

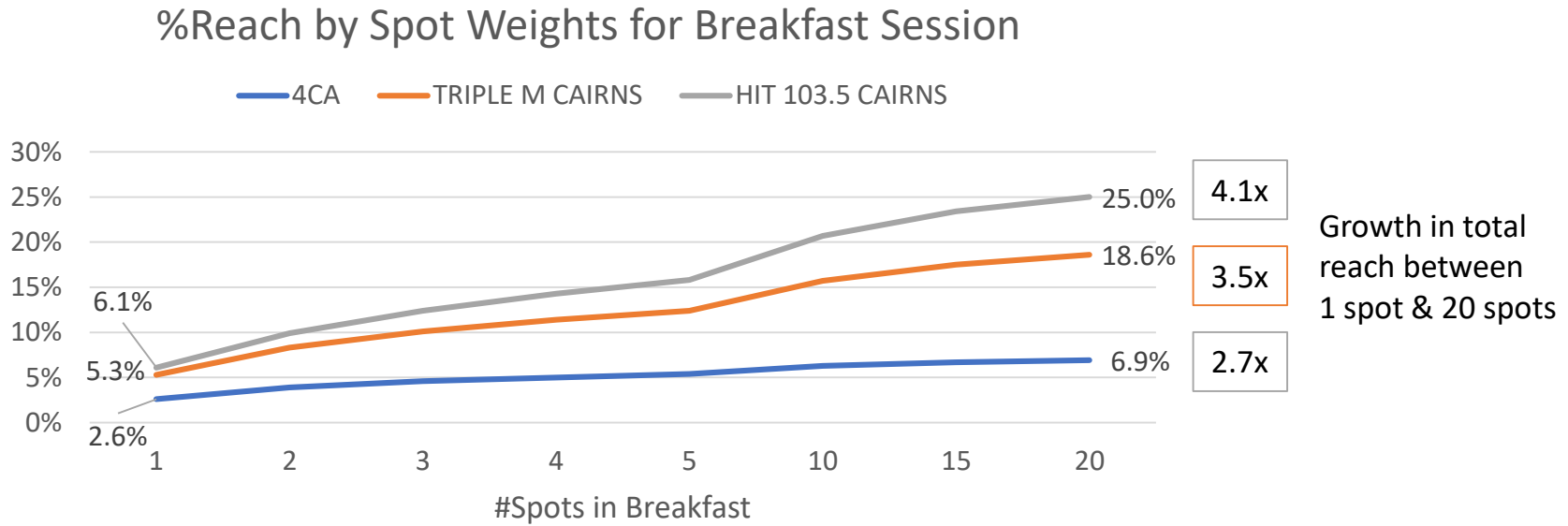
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 - Solo & combined sessions (dayparts)
 - Solo and combined stations
 - Eight spot weights (1, 2, 3, 4, 5, 10, 15 & 20 spots)
- Cairns Example
 - Used 6 sessions
 - Used 9 single stations
 - Used 2 combined stations
 - Used 8 spot weights
 - Used 10 demographic groups
- **~9,000 schedules for each market**

Sessions Analysed
BREAKFAST Only
DRIVE Only
MORNING Only
WEEKEND Only
BREAKFAST + MORNING
BREAKFAST + DRIVE

Stations Analysed
Cairns
4CA Only
ABC CLASSIC FM Only
ABC FAR NORTH Only
ABC NEWS RADIO Only
ABC RN (RADIO NATIONAL) Only
HIT 103.5 CAIRNS Only
STAR 102.7 Only
TRIPLE J Only
TRIPLE M CAIRNS Only
HIT 103.5 CAIRNS & TRIPLE M CAIRNS
STAR 102.7 & 4CA

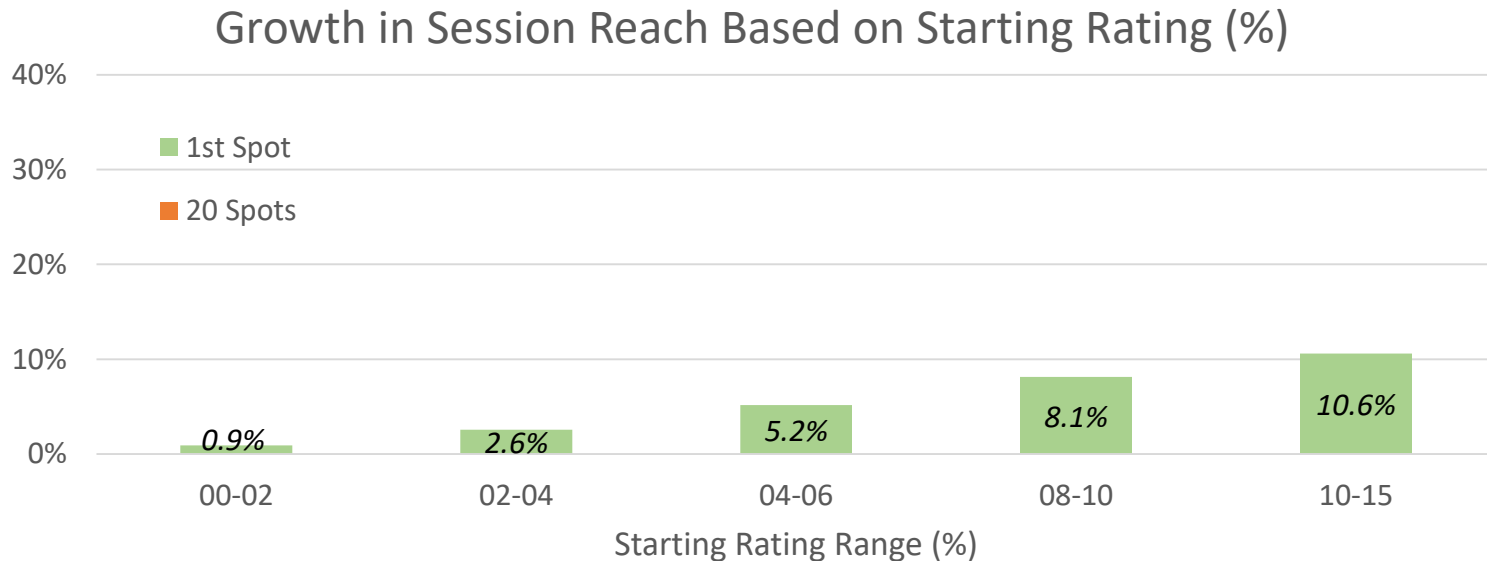
Topline results appear consistent - Cairns

- Modelled R&F show reach expected increases
- Change by station not uniform – reflects different station listening profiles



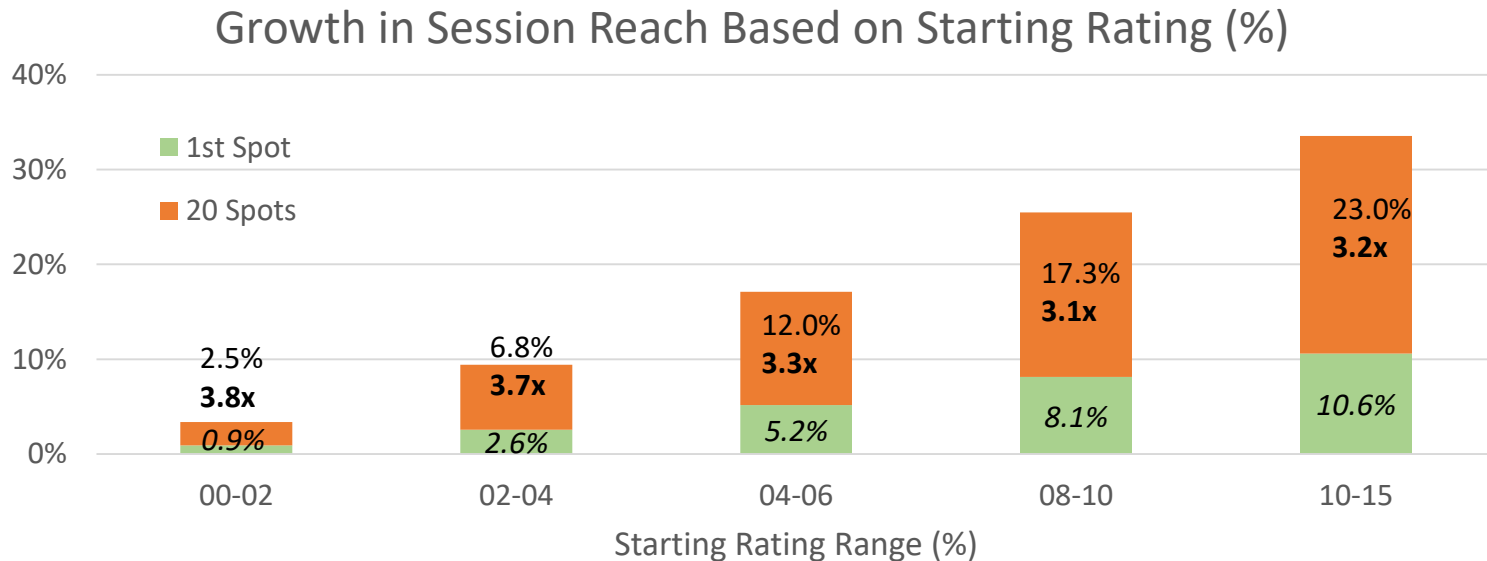
Compare to Diary R&F Schedules – 15 Markets

- Benchmarked survey R&F model against similar weight diary schedules
- Broke into groups based on station average rating



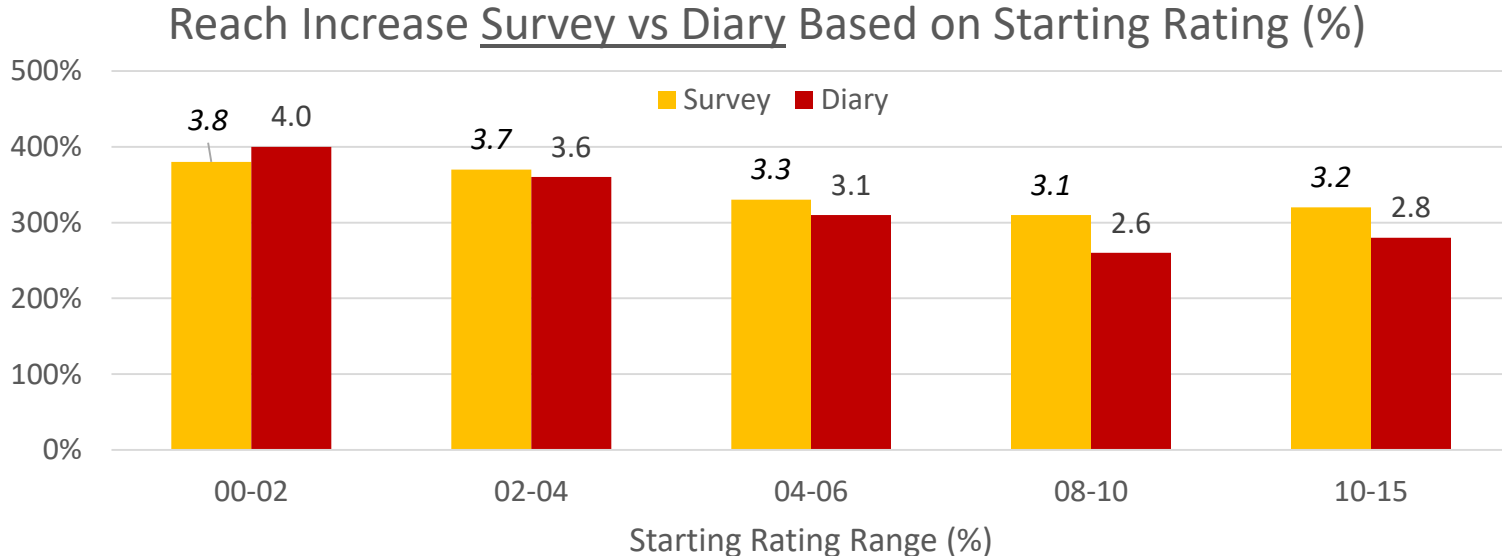
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Compare to Diary R&F Schedules – 15 Markets

- Benchmarked survey R&F model against similar weight diary schedules
- Broke into groups based on station average rating



Demographics show discrimination - Cairns

- Reach increases reflect expected demo profiles
- Hit 103.5 (Cairns) shows expected skew towards younger demos

MarketDesc	Cairns	▼
SessionDesc	BREAKFAST Only	▼
ShortStn	HIT 103.5 CAIRNS	▼



Rch%	Spots Per Session ▼								
Station(s) ▼	1	2	3	4	5	10	15	20	
P10+	6%	10%	12%	14%	16%	21%	23%	25%	
M10+	5%	8%	10%	12%	13%	17%	19%	21%	
F10+	7%	12%	15%	17%	19%	24%	27%	29%	
GB(No)	6%	10%	13%	15%	17%	23%	27%	29%	
GB(Yes)	6%	10%	12%	13%	15%	19%	21%	22%	
P10-17	6%	10%	14%	18%	21%	32%	38%	43%	
P18-24	12%	20%	25%	28%	31%	38%	41%	43%	
P25-39	10%	16%	20%	22%	24%	30%	34%	35%	
P40-54	5%	8%	10%	11%	13%	17%	19%	20%	
P55+	2%	3%	3%	4%	4%	5%	6%	6%	

Demographics show discrimination - Cairns

- Reach increases reflect expected demo profiles
- 4CA (Cairns) Classic Hits shows expected skew towards older demos

MarketDesc	Cairns	▼
SessionDesc	BREAKFAST Only	▼
ShortStn	4CA	▼



Rch%	Station(s)	Spots Per Session							
		1	2	3	4	5	10	15	20
	P10+	3%	4%	5%	5%	5%	6%	7%	7%
	M10+	3%	5%	5%	6%	6%	7%	8%	8%
	F10+	2%	3%	4%	4%	4%	5%	6%	6%
	GB(No)	3%	4%	4%	5%	5%	6%	6%	6%
	GB(Yes)	3%	4%	5%	5%	6%	7%	7%	7%
	P10-17	0%	0%	0%	0%	1%	1%	1%	1%
	P18-24	0%	0%	0%	0%	0%	1%	1%	1%
	P25-39	0%	0%	0%	0%	0%	0%	0%	1%
	P40-54	2%	3%	3%	4%	4%	5%	5%	5%
	P55+	7%	11%	13%	14%	15%	17%	18%	18%

RegionalRF: Other Validations

- Multiple dayparts
 - Change in reach with new sessions
- Multiple stations
 - Change in reach with new stations
- Demographics
- All showed similar trends to diary



RegionalRF: Enhancements Considered

- RegionalRF currently requires same number of spots station/session in schedule
- RegionalRF is reach for one week only
- No Total station (all daypart) data

UPGRADE

RegionalRF: Enhancements Considered

- RegionalRF currently requires same number of spots station/session in schedule
- RegionalRF is reach for one week only
- No Total station (all daypart) data

Calculating station shares
not permitted

UPGRADE

Next Steps

- Regional Gold Standard R&F certification
 - Gold Standard creates open market for software
 - Implemented with main regional software supplier
- Market release
 - Main regional broadcasters now using the system
 - Testing in live environment
 - Eventual plan for agency access to estimates
- Looking for further enhancements to model in 2019



[MILTON DATA]