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QoE-aware OTT-ISP collaboration in service management

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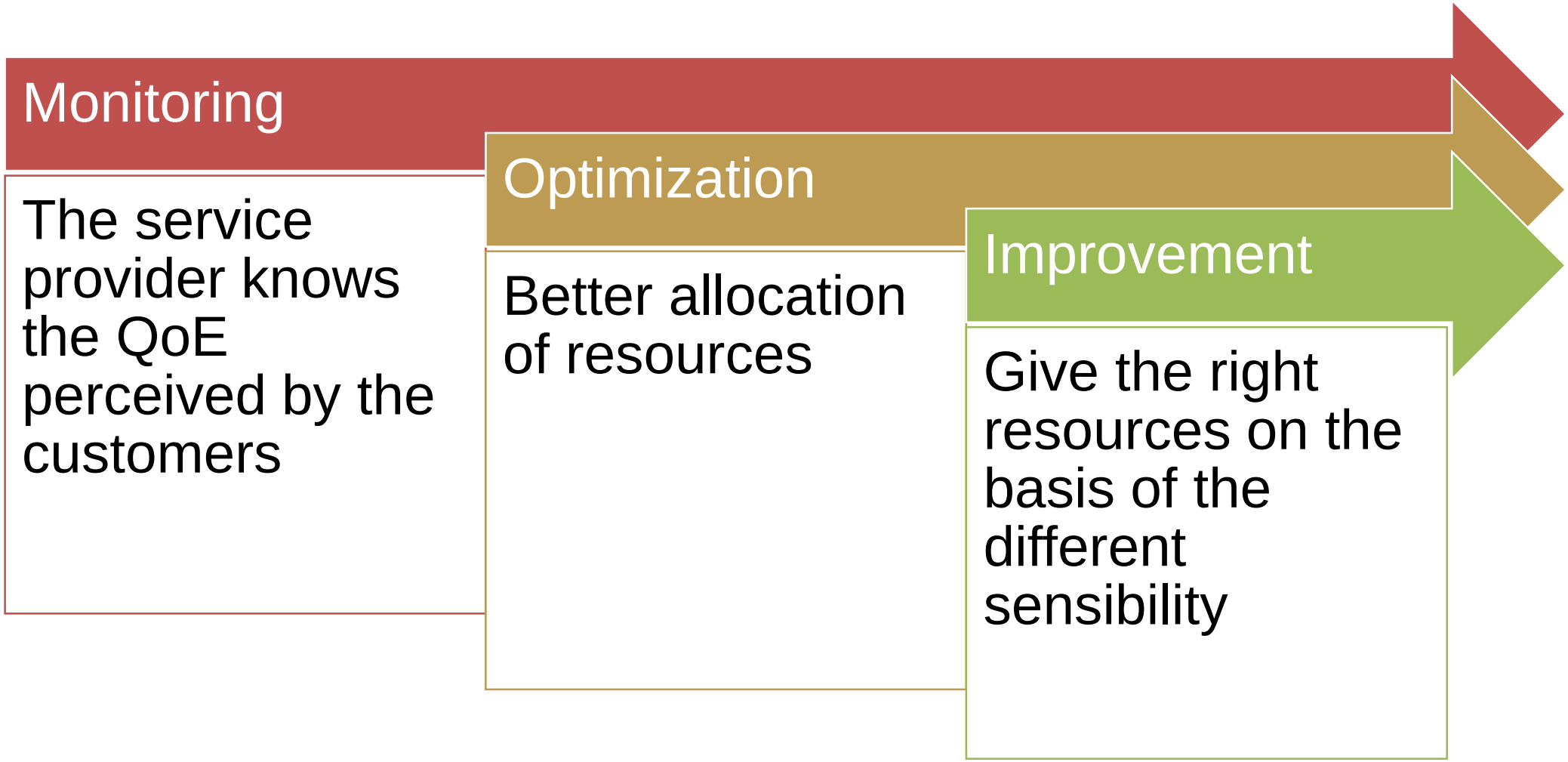
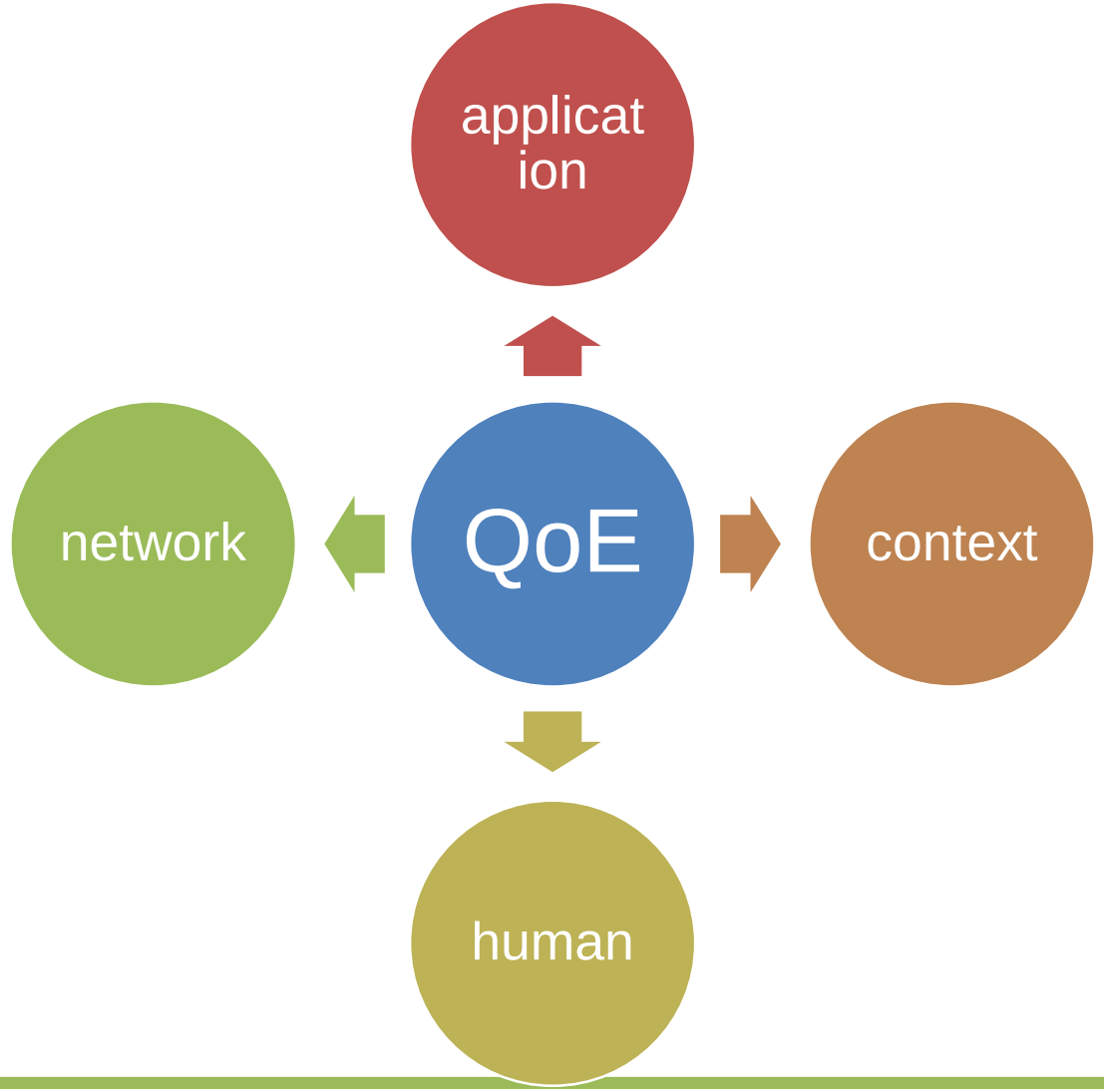
Benefits of QoE management



The influencing factors



- Need for models

$$Q.I. = a_1 \cdot Rate + a_2 \cdot PD + a_3 \cdot Over + a_4 \cdot PLR + K$$

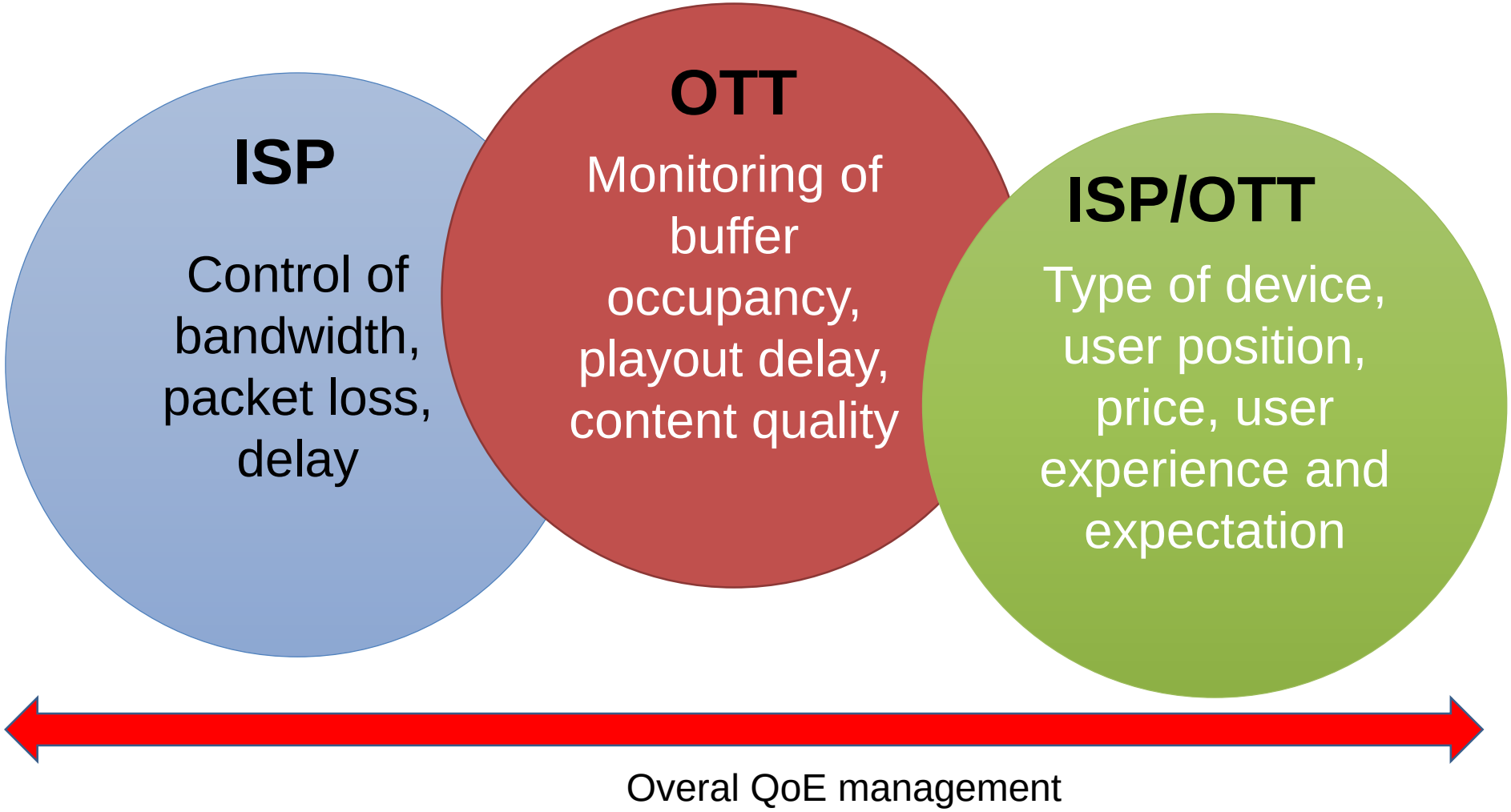
$$MOS = \alpha \cdot e^{-\beta(L)\cdot N} + \gamma$$

- Need for tools to gather data
- Need for tools to control the quality

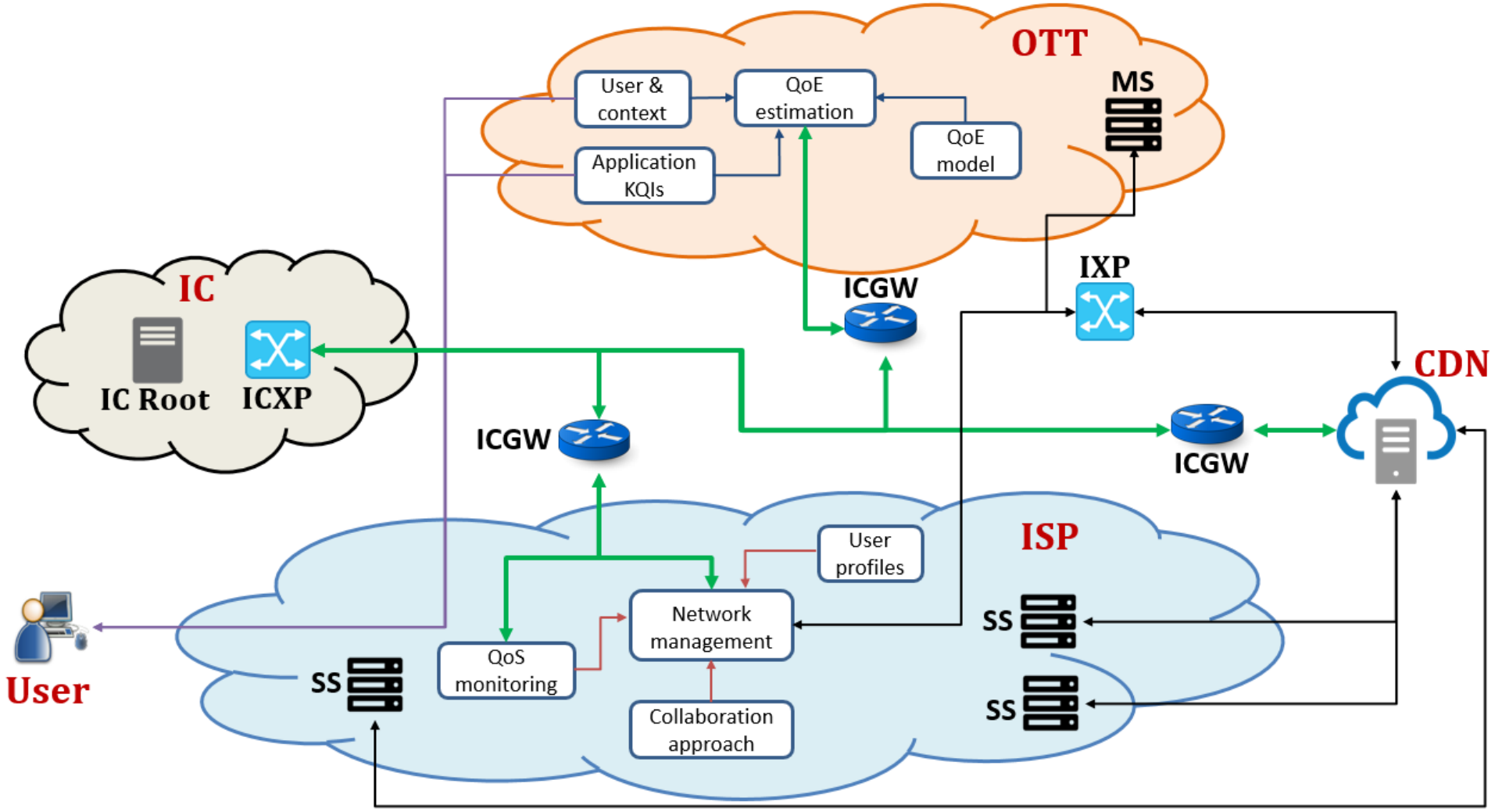
Issue:

Many operators with different partial views and control of the user QoE

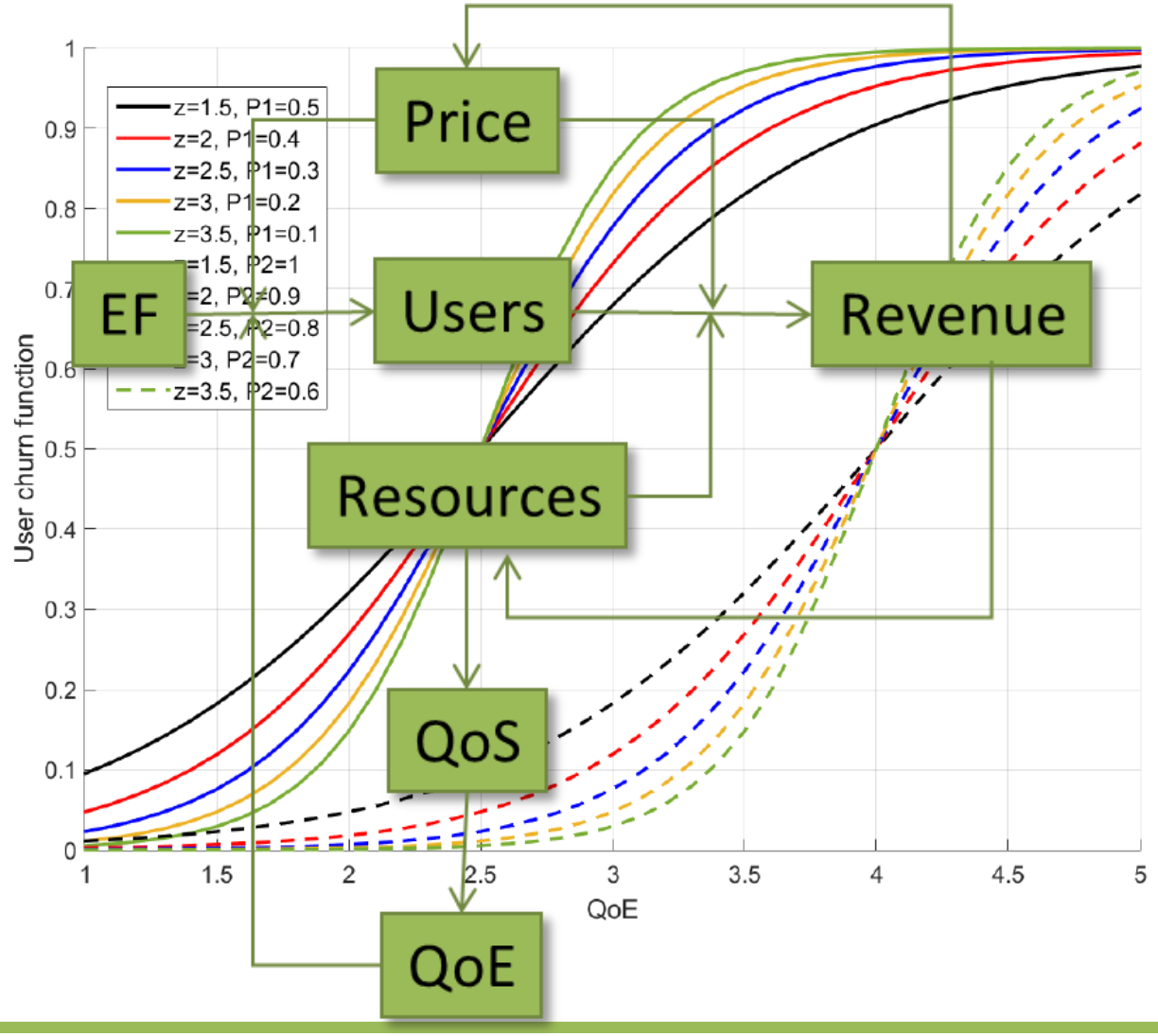
They must collaborate



The architectural solution



User churn: revenue maximization



Different collaborative approaches

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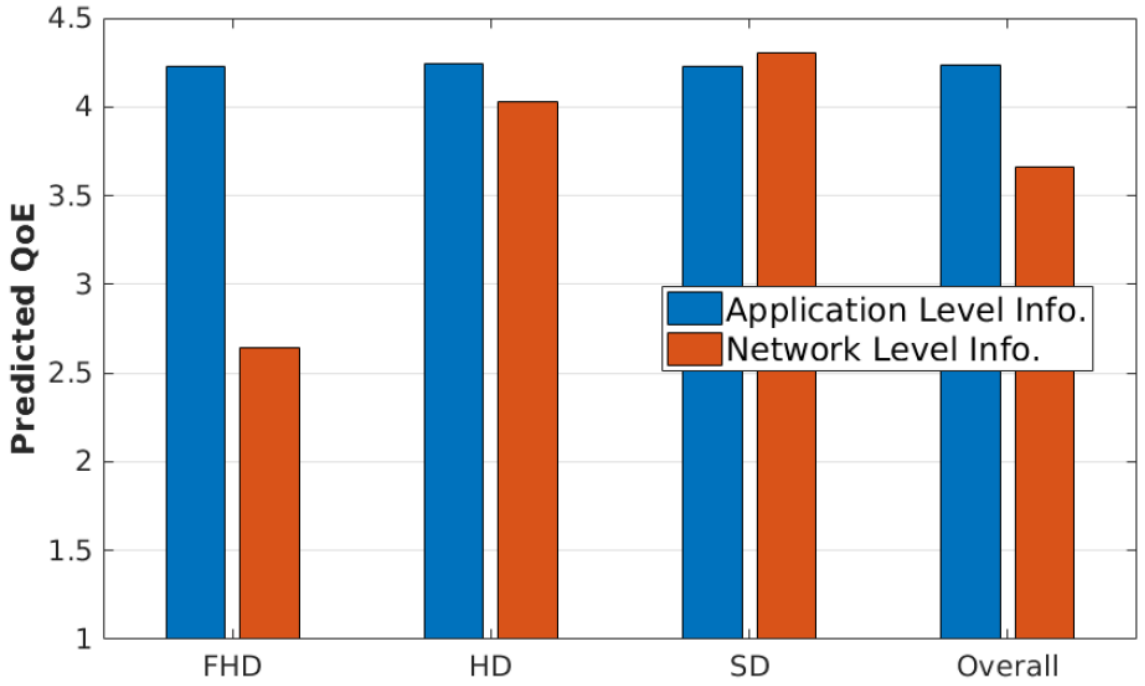
- Joint venture
  - The providers offer a bundle approach
  - They target the maximization of the revenue
- Customer Lifetime Value

$$CLV = (TotalCustomerRevenue) \times (NumberOfLoyalYears) \times (CompanyProfitMargin)$$

- QoE fairness maximization
- Zero-rated QoE approach
  - Data traffic is not counted if the user accept to have a threshold in the QoE so that the operator may limit the users throughput

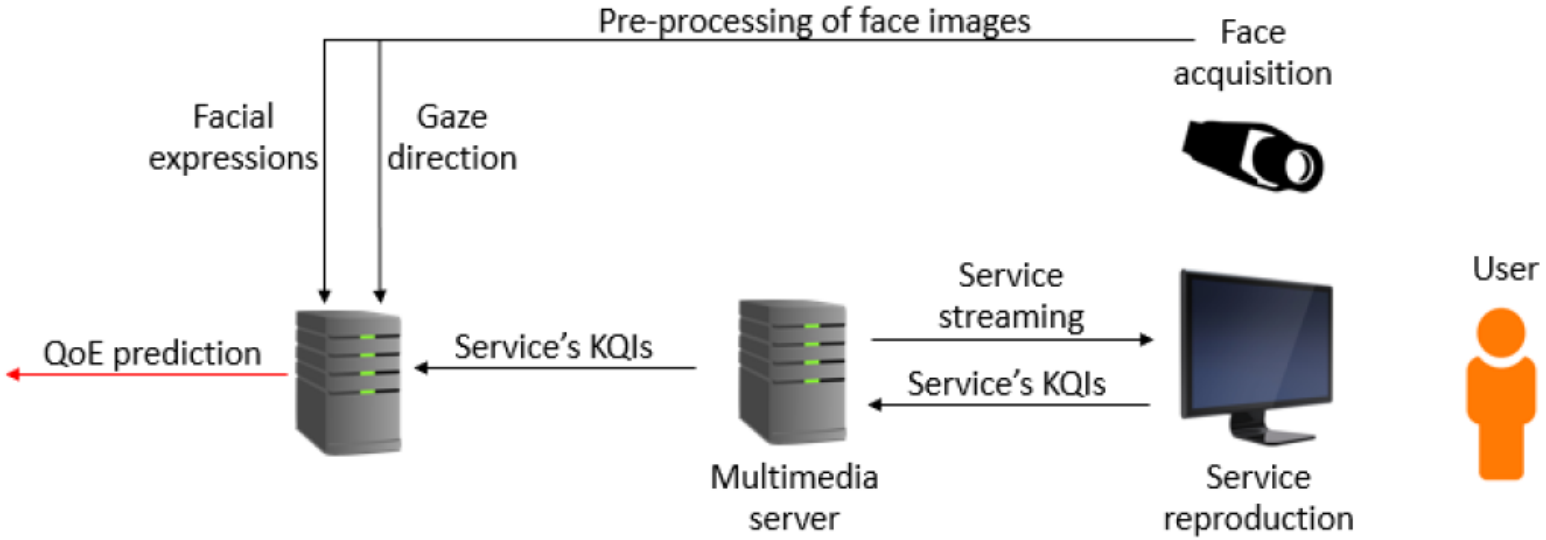
Some results

- Joint revenue approach
- Application level info
  - The OTT share information about the user device and content format
  - The ISP allocate resources according to the perceived QoE (in case of congestion)



Enhancement in QoE prediction

- Prediction of QoE from face expression, gaze direction and service KPI
  - Machine learning classifier (Fine KNN)
- Learning performed with crowdsourced and lab data



Approach	Accuracy	PCC
AU&GAZE&KPItoQoE with Fine KNN	94.8%	0.95
Tao *et al.* [2]	40%	0.82
Amour *et al.* [3]	-	0.79
QoE_D^p [22]	-	0.61
QoE_B^p	-	0.67

Conclusions: collaborative QoE mngt