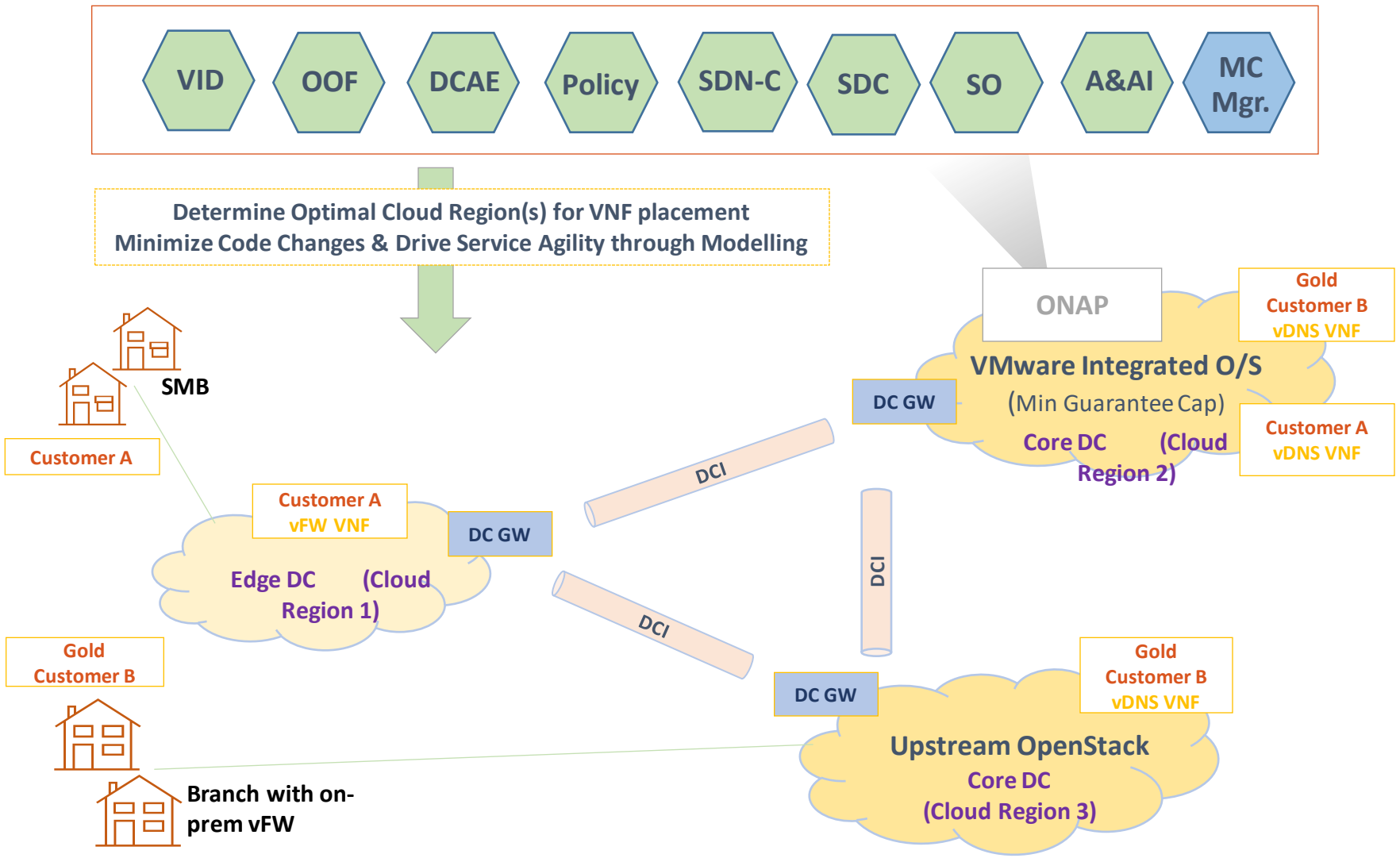
Policy & Model Driven Adaptive Workload Placement
Enterprise vDNS Service Deployment Architecture



Cloud Region Capabilities – from MC Mgr.

- Min Guarantee Capability - Min, Max per resource (CPU, Memory) for Resource Pool and VM

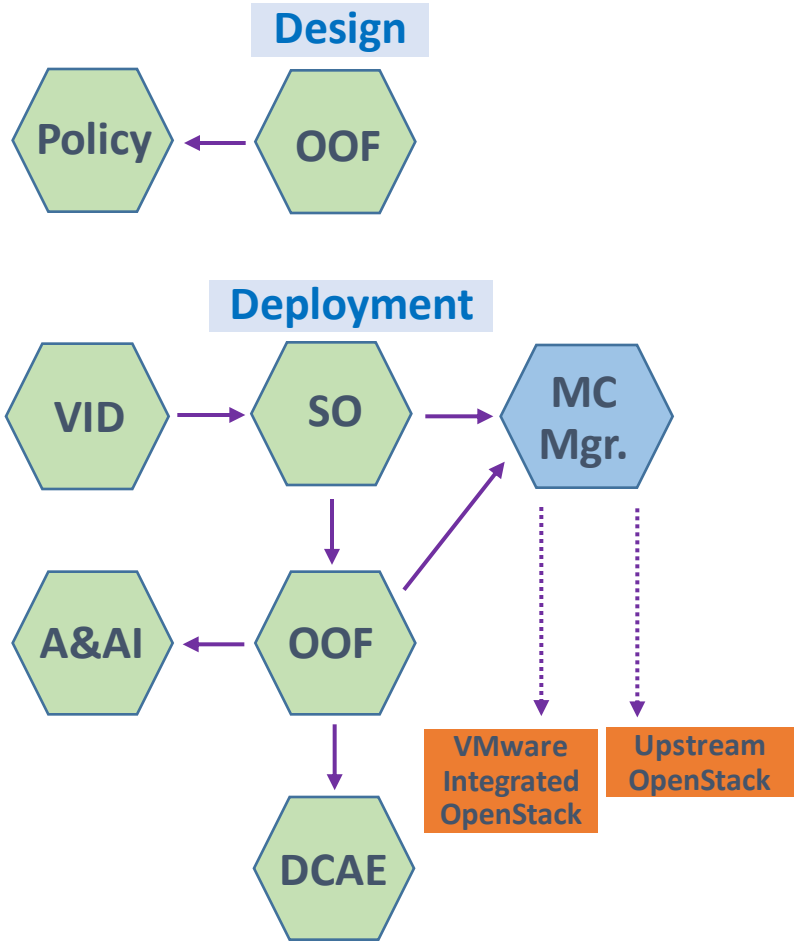
Policies used by OOF for vDNS Service placement

- **Must not** place vDNS VNF in Cloud Region 1 (Edge DC)
- **Prefer** Cloud Region with direct customer connection
- **Prefer** Cloud Region with Min Guarantee Capability for Gold Customer
- **Prefer** Cloud Region with least average/peak utilization at a Cloud Region, Tenant and Resource Pool level

vDNS Service Placement decision for Gold Customer B

- **Desired** location – Cloud Region 3
- **Less** preferred location – Cloud Region 2

Policy & Model Driven Adaptive Workload Placement
vDNS Service Design/Deployment Workflow



OOF Minizinc Constraint Model
(Approx. 50 lines of model for vDNS service)

```
int: N_CLOUD_REGIONS;  % number of cloud regions
array[1..N_ATTRIBUTES] of float: W_ATTRIBUTES; % weights
of each attribute
var int: s;  % target cloud region (solution to the
problem)
…
% custom constraints
constraint capabilities[s, CORE_DC] = 1;    % hard
constraint: has to be placed in CORE DC
constraint utilization[s, AVG_UTILIZATION] <= 0.85;
% hard constraint: need some capacity available
% custom soft constraint for gold customers -- give
a large weight to direct connection
var float: additional_obj = bool2int(CUST_TYPE =
GOLD) * capabilities[s, DIRECT_CONN] * 1000;
…
% Overall objective function
% Objective for utilization
var float: obj_utilization = sum(k in 1..N_METRICS)
( W_METRICS[k] * (1 - utilization[s, k]) );
var float: obj = obj_utilization + obj_capabilities
+ additional_obj;  % can later add weights to
each...
solve maximize obj;
…
output ["Cloud Region: ", show(s), "\n", "Objective
function value: ", show(obj), "\n", "Customer type:
", show(CUST_TYPE), "\n"];
```

vDNS Service Design
- Policy

Define vDNS Service Placement Policies based on hard/soft constraints

- OOF

Translate Policies to Constraint Models

Minimize Code Changes & Drive Service Agility through Modelling

vDNS Service Deployment
- VID Portal

Customer id

- SO

Contact OOF to determine Optimized Cloud Region(s)/Endpoint(s) for VNF placement

- OOF

Inputs: Infra resource (CPU/Memory) metrics (Average/Peak Utilization) from MC; Application metrics from DCAE; Infra Capability/Capacity from A&AI

Outputs: **Optimal Cloud Region(s) for VNF placement**