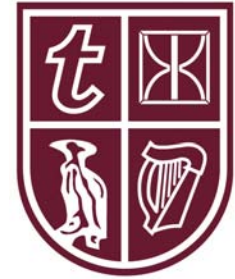


Society of Actuaries in Ireland

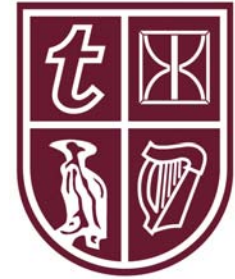


Financial Regulator's Discussion Paper on Capital Requirements for Variable Annuities

12th October 2009

Alexander Hotel

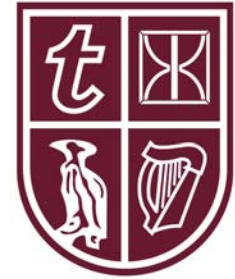
Agenda



- Background
- Discussion Paper (**Tony Jeffery**)
- Main Issues (**Mike Frazer**)
- Further Elaboration:
 - **James Maher**
 - **Dermot Corry**
 - **Colin Murray**
- Discussion

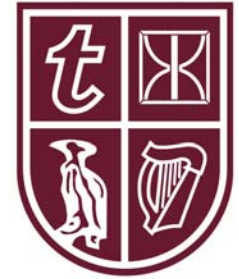
Members of Variable Annuities Working Party
Financial Regulator

Background



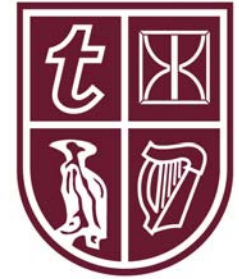
- Financial Regulator has produced a Discussion Paper on the Capital Requirements for VAs
- Society has been invited to respond
- Working Party established, has met 3 times
- Very much at the exploratory stage
- A draft submission will be presented to Council
- FR has given time for the submission to be brought to the Life Forum in November

The Financial Regulator's Discussion Paper



Tony Jeffery

Basic Formula



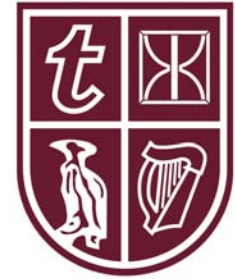
$$\begin{aligned} &\text{Total Prudential Provision} \\ &= \text{BGL} - \text{FTO} * \text{POC} \end{aligned}$$

Questions to Consider for tonight's discussion



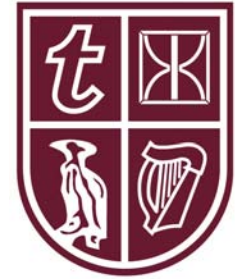
Mike Frazer

Questions to Consider for tonight's discussion



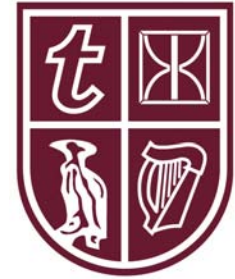
- VA Working Party has identified 9 key questions to be considered

1. Is additional regulation / regulatory guidance required in this area?



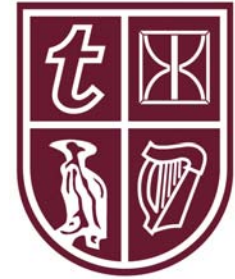
- VA business written from Ireland for last 5 years
- Less than 3 years to Solvency II
- Lack of transparency
- Possible inconsistencies

2. What scope should new requirements cover?



- Need a clear definition of the products / risks any new requirements apply to
- Should various familiar products be included in the scope (for example):
 - Guaranteed Annuity Options
 - With-profit guarantees
 - CPPI
 - Unit-linked with return of premium death benefit

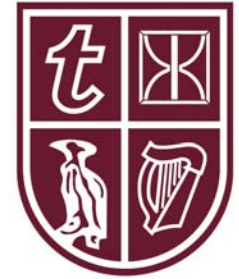
3. What is the best high-level approach to VA reserving/capital? – CTE vs. VaR



4. How should volatility be taken into account?

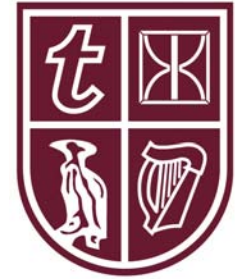
To be covered by James Maher

5. Is it appropriate to take credit for Dynamic Hedging? How much?



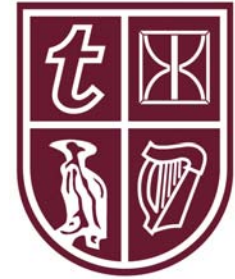
To be covered by Dermot Corry

6. Should there be prior regulatory approval of parameters within the actuarial basis?



- Discussion Paper suggests that any reserve credit for dynamic hedging would only be “ ... to an extent to be agreed in advance with the Financial Regulator”
- No precedent for advance approval of a parameter within the actuarial basis?
- Preview of removal of reserved roles under Solvency II?

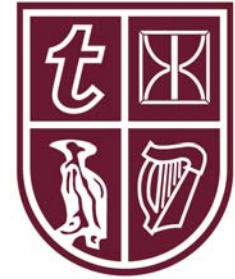
7. How can any new requirements integrate with existing Solvency I constraints?



8. What is the glidepath into Solvency II?

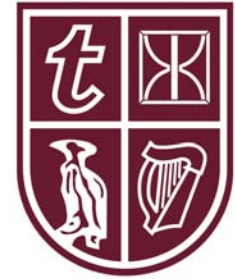
To be covered by Colin Murray

9. Should the same requirements be applied to direct writers and reinsurers?



- Current regulatory regime endorses differing treatment
 - Wholesale vs. Retail
 - Consumer Protection
- Solvency II does not differentiate
 - Implications for reinsurance models
- If differing requirements, how to articulate?
 - e.g. differing percentiles

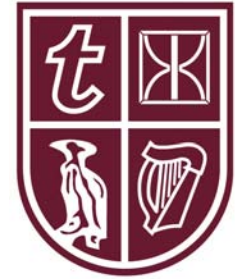
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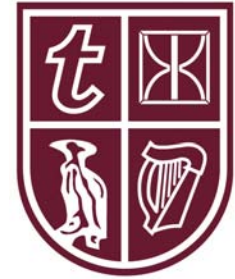
James Maher

What is the best high-level approach to VA reserving/capital?



1. No unique answer
 1. Accounting Framework/Policy objectives
 2. Economic Deficit or Insolvency V Regulatory Insolvency
2. Start with Technical Provisions/Asset Values
 1. Market Consistent/Exit Values
 2. Hold to Maturity/Cost of Fulfilment
3. Implications for Solvency
 1. Market Consistent/Exit Values = Short Horizon
 2. Hold to Maturity/Cost of Fulfilment = Long Horizon
4. Considerations
 1. Implications for Risk Management
 2. Internally consistent framework
 3. More than one system

How should volatility be taken into account?



1. What do we mean by Volatility ?

- Economic Scenario Generation looks to replicate the diffusion process for stock and bond returns to allow either a “Real World” representation of future outcomes or “Risk Neutral” price of derivative
- Perturbation to the price - standard deviation, mean reversion, stochastic volatility, jumps etc

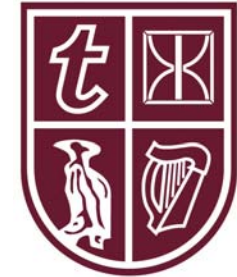
2. Real World – Statistical Volatility

- Parameterisation of ESG => model dependent
- Capital for volatility = Δ in Expectations + Model & Parameter Error

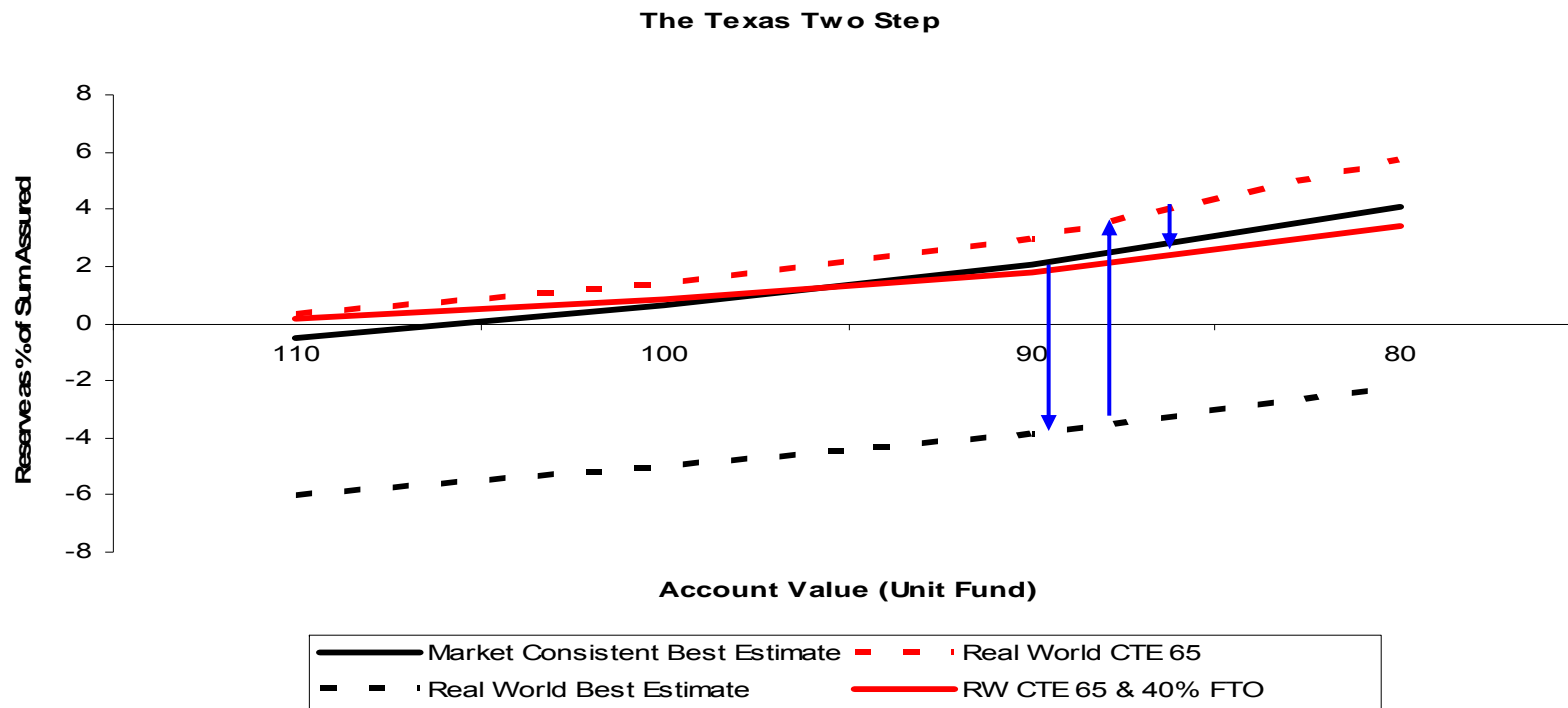
3. Risk Neutral - Implied Volatility

- Parameter for Volatility that solves the Black Scholes equation
- Capital for volatility = Δ in Volatility surface => Δ in {Expectation, Liquidity, Replication Costs}

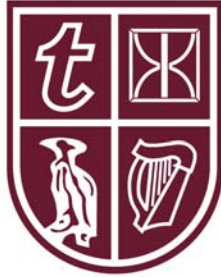
Alternative Policies for Reserving



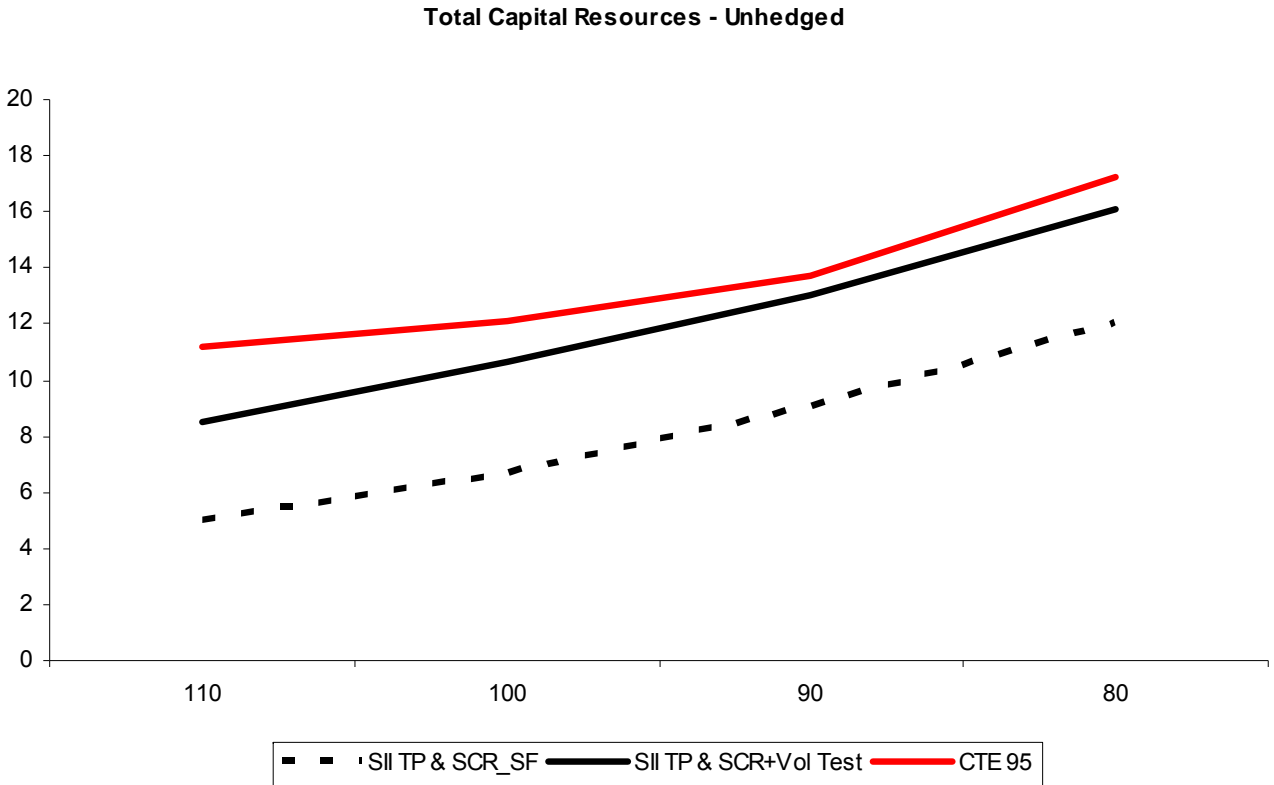
- Alternative Reserve Approaches ?
 - Exit Cost = Market Consistent Best Estimate
 - Cost of Fulfilment = Real World CTE + Future Trading Offset (if hedging)
 - How do they relate to each other ?
- Example of the “Texas Two Step



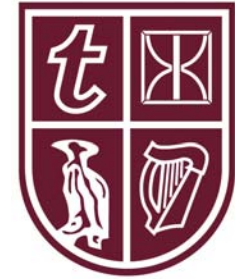
Implications for Total Capital Requirement



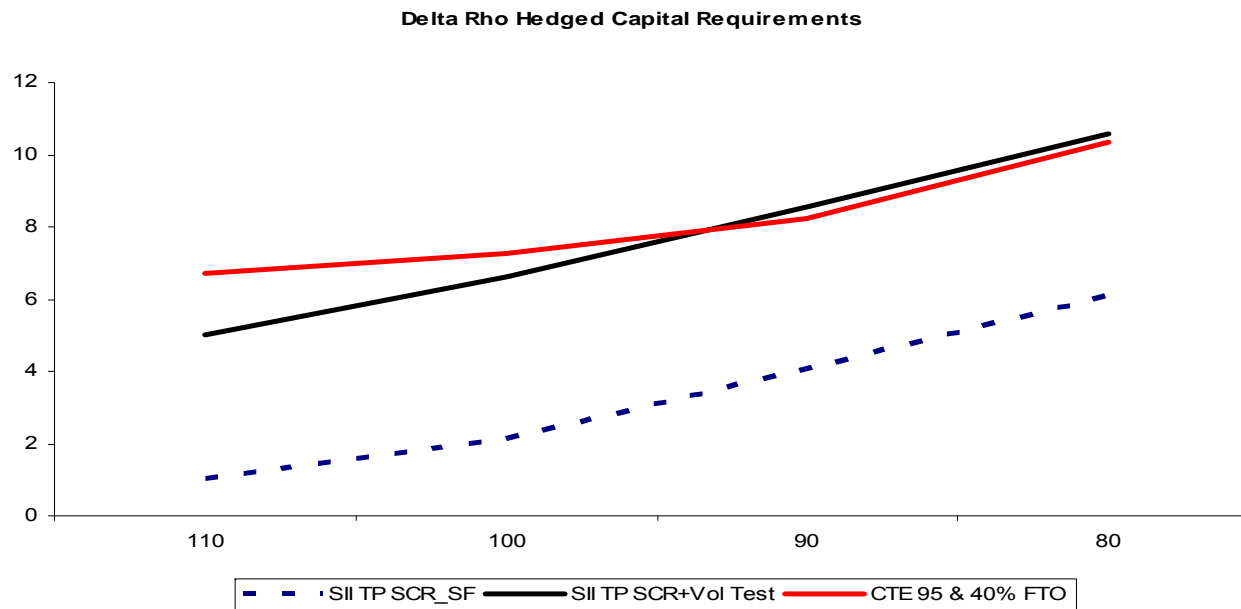
- Total Capital Requirements
 - CTE 95
 - SII Technical Provision + Standard Formula SCR
 - SII Technical Provision + ORSA (SF extension for volatility risk)



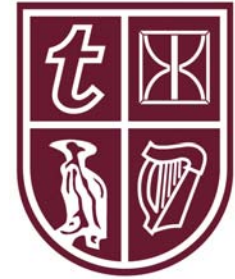
Implications for Total Capital Requirement



- Implications of Delta Hedging
 - CTE reduction based on FTO/POC
 - Delta Hedge reduces SCR 70-80%
 - Delta Hedge reduces ORSA 40-50%
- Volatility/Vega Risk Management
 - Vega Risk for Market pricing > Volatility Risk for Cost of Fulfilment
 - SCR Mitigation/Cost benefit analysis different



**5. Is it appropriate to take credit for
Dynamic Hedging? How much?**



Dermot Corry

Dynamic Hedging



- **Background**
 - Assess “greeks” on a frequent basis
 - Hedge using range of different hedge instruments
 - Rebalance frequently to reflect movements in markets and non-financial experience
- **Issues**
 - Many hedge instruments are short term
 - If no allowance for rebalancing, then longer term projections will be very negative
 - Even with longer term hedge assets, quantities will need to be rebalanced frequently

VAR vs CTE



- VAR generally calculated using an immediate shock
 - E.g. 32% fall in equity markets
 - 55% increase in interest rates
- Therefore impact of future trading is relatively limited
 - Limited to the convexity impact of the change
 - Reflects immediate nature of shock
 - Get very different results if shock happens in say four even incidents (with rebalancing each time)
- CTE projects cashflows over the life of the policy
 - Therefore rebalancing is much more important
 - Especially if reserves are calculated using different assumptions to hedging (e.g. no lapses in reserving)
 - Requires very complex calculations to project the hedge profits and losses



Projecting hedge profits and losses

- Need nested stochastic projections
- Produce a series of “outer loop” economic scenarios
- For each outer loop scenario
 - Project account value at all future points in the policy lifetime (say monthly)
 - Calculate movement in hedge assets
 - Calculate all policy cashflows
 - Produce range of “inner loop” scenarios at each point in time – both for base and with shocks
 - Using inner loop scenarios calculate revised greeks and rebalance the portfolio
- Must have clear basis for the rebalancing approach – e.g. Clearly Defined Hedging Strategy

Some Issues (1)



- **Vast number of scenarios**
 - E.g. assume 40 year policy term = 480 months
 - Assume 1,000 inner and 1,000 outer scenarios
 - To calculate greeks typically requires approx 30 sets of scenarios
 - Requires 1,240,000 sets of 1,000 scenarios
 - Simply generating the scenarios requires enormous computer time
 - Then have to do the cashflow projections
- **So simplifications are needed**
 - Reduce number of scenarios – does this invalidate the results
 - Use replicating portfolio solutions?
 - Less frequent rebalancing
 - Simplify hedging – e.g. use fewer interest rate buckets
 - Inevitably need to limit to a small number of model points

Some Issues (2)



- Very difficult to project impact of basis risk
- Can projections allow for impact of extreme scenarios
 - Rising Costs
 - Reduced Liquidity
 - Changes in underlying volatility
- Implications for credit taken for hedging (FTO/POC)
 - Does Future Trading Offset (FTO) need to be reduced to compensate for shortcomings?
 - How do we adjust for the fact that FTO may be calculated in different ways by different actuaries/companies?
 - What will the process be for approval of the model for FTO/POC calculation – FR indicates Solvency II internal model standards. Is this the appropriate standard?
 - How do we arrive at a “reasonable” Percentage Offset Credit?
 - AG43 in the US sets some guidance on this issue in a US context
 - Are requirements listed in the discussion paper appropriate?
 - Should this be agreed in advance by the FR or determined by the AA following guidance and then submitted to the FR
 - How do we get consistency of FTO/POC



Policyholder Behaviour

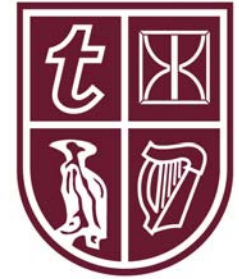
- Additional dimension to projections
 - Lapse rates
 - Election rates
 - Withdrawal rates
- Generally prudent assumptions in reserving
- Hedging decisions normally based on best estimate assumptions
- Any projections must allow for mismatch between hedge and reserving assumptions
- Approach described earlier should lead to a steady stream of hedge losses:
 - As lapses fail to materialise (zero lapse assumption)
 - As mortality is worse than expected (light or heavy as appropriate)
 - As bad scenarios materialise
- These losses will then be reflected in the Future Trading Offset

Summary



- FTO/POC is important for CTE type calculations
- Not as important for Solvency II/VAR
- Heavy calculation load to produce reliable figures
- Issues
 - Consistency of approach - predictability
 - Approval by FR in advance or review AA calcs
 - Standard of model

7. How can any new requirements integrate with existing Solvency I constraints?



8. What is the glidepath into Solvency II?

Colin Murray



Solvency I Constraints

- **Basic Principles of Solvency I in relation to guarantees/options**
 - Prudent allowance for guarantees and options
 - No future lapses where prudent
 - Policy by policy calculations
 - No negative reserves
- **Supplemented by ASP LA 3**
 - Allowance for derivatives in setting valuation rate of interest
 - Future charges
 - Stochastic allowance for options and guarantees and matching assets
 - Allowance for future withdrawals
- **Resilience reserving**
 - Instantaneous shock
 - No allowance for rebalancing

Solvency I Constraints



- A mixed bag of standards
 - Prudence
 - Market values for stochastic calculations (time value)
 - No lapses
- Prudent assessment of policyholder actions (take up rates etc.)
- Principle of no rebalancing under the resilience tests?
- How does allowance for hedging fit in with the Solvency I principles?
- Can we apply this to other areas such as With Profits or CPPI?



Glide Path to Solvency II

- Solvency II is now “setting”
- Some details to be resolved but clear principles are emerging
- Summary of Standard Model allowances
 - Embedding a one year VAR approach
 - Existing hedges only taken into account in SCR....
 -But only if the basis risk is not significant (not yet defined)
 - No allowance for future dynamic hedging in SCR
 - Missing stress tests for equity volatility
 - Correlations appropriate for complex products?
- For simpler VA products may be resolved by partial internal models to fill the gap

Glide Path to Solvency II



- For more complex products, internal models may have to be used
- However very high “burden of proof”
- Not clear yet as to how any credit for dynamic hedging will be allowed for
- Particular areas of contention
 - Statistical quality/expert judgement for policyholder behaviour
 - Quantification of longer term options where data is sparse
 - Reconciliation with standard model VAR (if CTE or other tests being used)
 - Correlations used for basis risk



Glide Path to Solvency II

- The principles for Solvency II are emerging
- However details need to be resolved.
- In particular a coherent framework for measuring and managing Guarantees and Options is necessary

- Is it appropriate to discuss standards now while Solvency II standards have yet to be bottomed out?
- Will this become a “moving target” while Solvency II develops?
- Will this be a glide path or a bump?

Questions to Consider for tonight's discussion



- 1. Is additional regulation / regulatory guidance required in this area?**
2. What scope should new requirements cover?
- 3. What is the best high-level approach to VA reserving/capital? – CTE vs. VaR**
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