Concentration Risk, the Credit Cycle and Better Lending Decisions
How to Maintain Credit Portfolio Health During Uncertain Economic Times

Written by Rick Buczynski, Ph.D.
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The following is based in part on two articles published in the RMA Journal: “Concentration Risk is Real and Deadly” (Feb 2014), by IBISWorld’s Rick Buczynski and Robert Kennedy, a retired Atlanta Fed official, and “All in the Family: Mapping industry families can help when measuring concentration risk in credit portfolios” (April 2010), by IBISWorld’s Gavin Smith. This white paper also utilizes a third RMA Journal piece: “Concentration Risk in a Loan Portfolio—Notes from an RMA Conference Session” (April 2011).

Concentration risk has been the bane of banks since the onslaught of the financial crisis and has drawn the attention of regulators and a bank’s internal auditors. This white paper discusses best practices in identifying, mapping, measuring and monitoring concentration risk along the Enterprise Risk Management (ERM) chain. How? By incorporating concentration risk mappings into early warning systems, banks can design a practical system for stress testing and scenario analysis, all with the aim of more effective risk management and profitable business development.
Few systems adequately address concentrations, especially in the mapping of latent risks across lines of business and in developing meaningful early warning systems (EWS) and stress testing and scenario analysis tools.

Stress testing and scenario analysis tools are not being linked with early warning systems to better manage concentrations. Instead, stress testing and scenario analysis are focused on assessing the probable damage of the next crisis rather than preventing it. There is more to the world than capital planning and liquidity risk management.

Few banks place these tools and the management of concentration risk within an Enterprise Risk Management (ERM) function. Doing so would provide a better understanding of the complexity of concentration risk across the enterprise to ensure that risks are communicated quickly to senior management. Thus, managing concentration limits and a bank’s risk appetite statement suffer.

Benchmarking, including peer-to-peer analysis, are oft-neglected.

Many banks trivialize regulations and interagency guidance on prudent risk management practices.

Few applications use concentration risk, EWS and scenario analysis tools to find new business opportunities.

During the recent financial crisis, banks of all sizes suffered losses because of real estate concentrations that were not captured with traditional asset-quality metrics. All segments — commercial and industrial, commercial real estate and consumer lending — were affected. More recently, there is growing concern that complacency may be settling in regarding monitoring and managing concentration risk as the economy appears to be roaring ahead.

Banks’ current methods for managing concentrations suffer from six primary deficiencies:

1. Few systems adequately address concentrations, especially in the mapping of latent risks across lines of business and in developing meaningful early warning systems (EWS) and stress testing and scenario analysis tools.

2. Stress testing and scenario analysis tools are not being linked with early warning systems to better manage concentrations. Instead, stress testing and scenario analysis are focused on assessing the probable damage of the next crisis rather than preventing it. There is more to the world than capital planning and liquidity risk management.

3. Few banks place these tools and the management of concentration risk within an Enterprise Risk Management (ERM) function. Doing so would provide a better understanding of the complexity of concentration risk across the enterprise to ensure that risks are communicated quickly to senior management. Thus, managing concentration limits and a bank’s risk appetite statement suffer.

4. Benchmarking, including peer-to-peer analysis, are oft-neglected.

5. Many banks trivialize regulations and interagency guidance on prudent risk management practices.

6. Few applications use concentration risk, EWS and scenario analysis tools to find new business opportunities.
So where should we focus? Data collection, risk identification and stress testing should support early warning systems, while providing a resource for business development. The below figure illustrates how to connect the dots between these functionalities. The blue arrows link the four pillars of bank functionality, while the red arrows are feedback links, which are basic iterative learning loops that are based on both quantitative and qualitative exchanges of information and data. Right-brained readers might call this “collective intelligence,” while left-brained readers might prefer “artificial intelligence.” It’s both. In the background are backroom credit MIS/loan accounting systems employed to facilitate the process.

What are the key areas of concentration risk?

From an Enterprise Risk Management (ERM) perspective there are several well-known types of concentration risk, the most important being:

- **Credit Risk**
  - Single-Name Concentration
  - Industry Concentration
  - Common Factor Concentration
  - Supply Chain Concentration
  - Special Factor Concentration

- **Operational Risk**
  - Example: Concentration of Vendors

- **Market Risk**
  - Example: Concentration in Currencies

- **Liquidity Risk**
  - Example: Concentration in Funding Sources
Although this paper will center on credit risk concentrations, there are correlations between these four elements:

Several examples are noteworthy so be alert!

Credit and Operational Risk:

A simple example is where one of a bank’s vendors is also a borrower. Think of vendor financing programs offered by many banks to equipment and vehicle dealers and lessors. Here, a bank provides the funding vehicle for a dealer/lessor to help finance its customer’s purchases/leases of their equipment. The bank may also have a commercial and industrial (C&I) loan to the same customer. This is third-party risk on steroids!

Credit and Market Risk:

Rapid, unforeseen interest rate movements are an ongoing concern. From a market risk standpoint, interest rate risk is germane to holders of fixed-income securities as an increase in market interest rates undermines the value of fixed-income securities. Banks can both be holders of fixed-income assets and lenders to clients that are also holders. Plus, as we mentioned in our previous white papers “Are you ready for the next recession?” Parts 1 and 2, many small businesses with thin margins that are debt-heavy and have little control of their operational costs or the prices of what they sell, are vulnerable as they face increasing credit costs. Many banks have substantial exposures in such oft-dubbed “mom and pop shops,” that are C&I loans.

Credit and Liquidity Risk:

During the financial crisis, financial markets froze. It wasn’t just a question of banks being under-capitalized; rather it was about liquidity that can evaporate in days, if not hours, in times of extreme financial stress. To paraphrase comedian Rodney Dangerfield in the film “Caddyshack”: “If they’re all buying, sell, sell, sell! If they’re all selling, buy, buy, buy!” Unfortunately, during the financial crisis, everyone wanted to sell, sell, sell and few wanted to buy, buy. According to the May 2012 Federal Reserve Board of San Francisco Economic Letter “Liquidity Risk and Credit in the Financial Crisis,” by Philip Strahan: “The 2007-08 financial crisis was the biggest shock to the banking system since the 1930s, raising fundamental questions about liquidity risk. The global financial system experienced urgent demands for cash from various sources, including counterparties, short-term creditors and, especially, existing borrowers. Credit fell, with banks hit hardest by liquidity pressures cutting back most sharply.” As such, the funding sources of a bank’s retail and wholesale borrowers dependent on short-term lines of credit dried up, their credit risk increased dramatically, virtually overnight!

The salient feature of these interrelated risks is that they are difficult to code and track as they often reside in different lines of business (LOB) silos. Hence the importance of strong ERM function, which can provide a central place for comprehensive data collection, helping to establish bank-wide standards and oversight. ERM can also provide the process for aggregating concentrations across business lines and even risk types such as interest rate and operational risk. Most importantly, ERM can provide the communication channels for timely reporting of concentration risk and give early warning signs to all relevant business lines, risk managers and senior management.
What are the sources of credit risk concentrations and how can they be managed?

There are multiple levels of concentration risk and associated correlations in the credit risk space.

The most basic are:
- Single-Name Concentration
- Industry Concentration
- Common Factor Concentration
- Supply Chain Concentration
- Special Factors

Single-Name Concentration: Are you lending too much to a single obligor?

Very tricky stuff here. Imagine if your bank’s lines of business (LOB) segments include a dentist’s practice (C&I), the same dentist’s ownership of the strip mall where she operates her practice (owner occupied commercial real estate or CRE), her husband’s financial advisory LLC (perhaps defined as a mezzanine LOB), a HELOC (home equity line of credit) and, their two auto loans. What a morass of linked risks that are often neglected given bank LOB reporting silos!

How are you coping with this challenge? Do you have someone in charge of monitoring single-name risks and cross-selling opportunities across LOBs?
Industry Concentration: Are you lending too much to a particular industry or industry group?

In this category the monitoring of exposures, according to the North American Industry Classification System (NAICS), industries should be straightforward if data collection and coding systems are up to par. An example of this for the NAICS two-digit sector 62 (Health Care and Social Assistance) appears in the accompanying chart drilling down to four-digit granularity; although banks should maintain data coding and collection at five- and perhaps six-digit levels. However, banks don’t commonly link industry codes across loan segments. For example, when a tobacco plant in the South went under, its lender didn’t realize that it held many mortgages and car loans of the plant’s workers. Talk about latent risks! Moreover, NAICS is based on a production-oriented concept, which means that it groups establishments into industries according to similarities in the processes used to produce goods or services. For example, plastic bottles are not in the same industry classification as glass bottles, even if the end user is the same. This can hinder the process of identifying correlated risk pools.

Have you identified latent industry risks using NAICS? If so, how? Have your systems “red-flagged” overexposure in lending segments that are approaching their limits?
62 Health Care & Social Assistance

621 Ambulatory Health Care Services
- 62113 Offices of Physicians, Dentists & Other Health Practitioners
- 6214 Outpatient Care Centers
- 62159 Medical & Diagnostic Laboratories and Home and Other Ambulatory Health Care Services

622-3 Hospitals, Nursing & Residential Care Facilities
- 62213 General Medical Hospitals, Psychiatric, Substance Abuse and Other Specialty Hospitals
- 62219 Nursing & Residential Care Facilities

624 Social Assistance
- 62413 Social Assistance
- 6244 Child Day Care Services
Common Factor Concentration: Do you understand what economic drivers are most critical to the health of your portfolio?

The third credit risk category is common factors (factor analysis). For example, certain borrowers and loans are more sensitive to interest rates than others. Energy prices and trade policies are other timely factors. These relationships must be analyzed and mapped (a notion that will be discussed further in the context of appropriately designing early warning systems and stress testing). Consider the example of the impact of an increase in 30-year mortgage rates on industry performance as per the associated chart.

Have you identified the key risk indicators (KRIs), the external factors that you can't control, that impact your business and associated risks? What's your plan going forward as the credit cycle fatigues?
Additional risk factors that need to be considered are those associated with supply chains, which can lead to a morass of problems in a C&I book. The supply chain concept is an expansion (relevant assessment) of industry risk. The associated figure depicts a hypothetical book of C&I business for a bank’s auto parts segment with its upstream (i.e. suppliers) and downstream (i.e. buyers).

Supply Chain Concentration: Are you unknowingly exposed to suppliers and or end-markets of a particular group of borrowers?

Do you fully embrace the environment in which your borrowers operate? Who they buy from? Who they sell to? Are you exposed upstream/downstream or in both directions resulting in unintended concentrations? Worse yet, are you neglecting solid/safe lending opportunities given your bank’s institutional knowledge in a particular segment (i.e. not lending enough to a segment’s suppliers/end markets)?

Key Supplying Industries:
- Aluminum Manufacturing
- Inorganic Chemical Manufacturing
- Iron & Steel Manufacturing
- Screw, Nut & Bolt Manufacturing
- Paint Manufacturing
- Textile Mills

Key Buying Industries:
- Car/Auto Manufacturing
- SUV Manufacturing
- Light-Duty Vehicle Manufacturing
- Heavy-Duty Truck Manufacturing
- Bus Manufacturing
- Auto Parts Wholesaling
This is a hodgepodge of factors that are relevant to a bank’s specific business profile and footprint. The most obvious examples are the geographic concentration of obligors, product concentration and the collateral clusters (especially real estate). These, like the above, can subtly exhibit their own clandestine correlations.

Clearly, without a good handle on concentration risk, a bank simply does not understand its business and becomes vulnerable to vagaries beyond its control. Risk management and business development should go hand in hand.

The table below illustrates a simple mapping scheme of the four concentration risk categories across three segments of credit: consumer, CRE and commercial and C&I loans. Again, consider the trickiest category: single-name concentration. In this example, a bank has an exposure to ABC Corporation through a C&I line of credit and a CRE loan on the business property. The bank also holds a home mortgage for the owners of ABC Corporation. As long as the bank monitors this concentration and the risks associated with it, this would be a sound piece of business.
How should banks design early warning systems/heat maps connected with concentration risk parameters?

Banks commonly employ early warning systems (EWS), but they are often housed in silos. Yet, an EWS, in conjunction with stress testing, can help a bank develop more effective concentration limits. There are two types of indicators: key risk indicators (KRIs) and key performance indicators (KPIs). KRIs refer to external (i.e. macro) factors that are outside of a bank’s control. They include such variables as interest rates, economic growth, commodity prices, foreign exchange rates and government policy parameters; think of Fed, fiscal and trade policies. KRIs also include structural factors such as the rapid introduction of new technologies.

KPIs represent internal bank indicators such as delinquencies, loan-to-value ratios, margins and loan exceptions. Managed (or mismanaged) by the banks themselves, KPIs provide a high-level overview of the institution’s performance. Organizations use KPI metrics to obtain an early signal of emerging risks and increasing risk exposures in various areas of the enterprise. Here’s a more comprehensive list of KPIs:

- Loan underwriting and policy exceptions
- Loan-to-value (LTV) ratio
- Debt-to-income ratio
- Cash down-payment or cash equity
- Margins and fees
- Delinquencies
- Charge-offs
- Growth of exposure against concentration and other imposed limits
Ideally, the performance indicators are compiled with data on each business segment (consumer, small business, CRE and C&I) and with as much data granularity as possible. The higher the degree of granularity by segment, region and perhaps even loan vintage, the more germane the analysis. Some things to keep in mind:

- Loan policy exceptions are extremely significant. Banks develop credit policies based on experience in the hope they will be able to avoid previous errors and make profitable, prudent loans. Deviations from those policies generally lead to increased risk that can turn into problem loans and losses.

- LTV and debt-to-income ratios are commonly used metrics, as are cash down-payments (consumer) or cash equity (CRE and C&I). Margins and fees are traditional gauges of performance, although astute bankers will track the waiver of fees on loans, deposits and other services as a way to ensure a degree of discipline among the branch managers and to aid in earnings forecasts.

- Tracking delinquencies over time provides predictive power. Charge-off data is postmortem; the train is already off the tracks and has crashed.

Further, the last bullet inextricably links EWSs with concentration risk pools. By comparing the movement of actual exposures to limits imposed by concentration and/or other bank policies, banks would have another solid signal of whether rules were being followed. We believe EWS indicators can help in developing more precise concentration limits and in monitoring those limits.
Ensure that your historical KPI data is “clean” and coded properly. Your regulators will help you comply!

Make sure that the KRIs are linked to KPIs, through mappings and, if possible, statistical analysis.

Be careful when “rolling up” (i.e. aggregating) segments. There is a fine line between aggregation and granularity, which we’ll address below.

As for roll-ups, we suggest banks employ the Office of the Comptroller of the Currency’s (OCC) taxonomy as a guidance that was revised in March 2017 and is based on “Concentrations of Credit,” OCC Bulletin 2011-48 (December 13, 2011). The 21 OCC industry groups are often employed (even by non-OCC member banks) as a starting point for roll-ups used for defining concentration pools.

Many of IBISWorld’s banking clients integrate our risk data as KRIs with their KPIs. An example of a bank’s risk spreadsheet or “heat map” is below where bold entries define roll-ups (We did not populate the spreadsheet with data). This data integration is used to set limits and establish risk-based capital.

The industry groups column defines clusters of correlated industries reflecting concentration pools; see the OCC reference above. Often critical lines of business are broken out from roll-ups. In this example, soybean farming has a separate entry from all other agribusiness since this hypothetical bank has a significant exposure in this subsegment, so it demands separate consideration.

NOTE: IBISWorld’s Industry Risk Rating data methodology and validation studies are available in the white paper: “Measuring & Tracking Industry Risk,” written by IBISWorld’s Rick Buczynski and colleagues. This document also includes how industry risk rating data is calculated.
## Industry “heat map” spreadsheet

<table>
<thead>
<tr>
<th>Industry Groups (Based on NAICS)</th>
<th>Key Risk Indicators</th>
<th>Key Performance Indicators</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>IBISWorld Risk Rating</td>
<td>IBISWorld Risk Trend</td>
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<tr>
<td>Agribusiness</td>
<td></td>
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<tr>
<td>Soybean Farming</td>
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<td>CRE</td>
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<td>Single Family</td>
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<td>Land Development</td>
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<td>REIT</td>
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<td>Owner Occupied</td>
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<td>Auto</td>
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<td>Indirect Auto</td>
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<td>Commercial Services</td>
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<td>Consumer Services</td>
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<td>Transportation</td>
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<td>Healthcare</td>
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<td>Hospitals</td>
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<td>Energy</td>
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<td>Pipelines</td>
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<td>Manufacturing</td>
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<td>Textiles</td>
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<td>Utilities</td>
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<td>High Tech</td>
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<td>Biotech</td>
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<tr>
<td>Gov’t/Education</td>
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<tr>
<td>Private Schools</td>
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</tbody>
</table>

**NOTE:** Often there are notes associated with the “heat map” spreadsheet that include credit limit/pricing directives, capital ratios by segment, and various other “flags.”
How can your bank apply early warning systems?

The level of sophistication in applying EWSs can vary widely from bank to bank, depending on the institution's asset size and credit culture. For the quantitatively inclined, such systems have been used to drive C&I obligor scorecards and/or pricing models. Qualitative applications are more commonplace because many banks build large matrices that integrate numerous KRIs and KPIs appropriate to their LOBs. They can review that collage of data on a regular basis to monitor risk and uncover opportunities for business development. Real world examples? Industries with medium but increasing risk might be put on hold if exposure limits are being reached. Conversely, segments with high but decreasing risk might be targeted for expansion if the risk can be assessed and priced accordingly.

But perhaps the most powerful role of EWSs is serving as a central amalgamation and repository of KRIs and KPIs used for major policy decisions as well as managing and mitigating risk.

How do we bring this all together? Scenario analysis and stress testing

Stress testing has never been the exclusive of the Comprehensive Capital Analysis Review (CCAR) or Dodd-Frank Banks. For many years, community banks have conducted stress tests for interest rate and liquidity risks. A few years ago, the OCC suggested that community banks use scenario analysis to evaluate risks. Similarly, in the summer of 2012, the Federal Deposit Insurance Corporation (FDIC) emphasized the value of stress testing credit portfolios in community banks and provided a detailed methodology for doing so.

Let’s not forget that stress testing is a subset of scenario analysis. We need not be confined to the narrow perspective that analyzing various scenarios is the exclusive purview of risk management. It’s about business development as well. And, it doesn’t require an army of PhDs in physics or statistics who have no experience in banking! Just some simple systems and common sense. Thus, despite the apparent easing of regulatory stress testing requirements as of this writing, scenario analysis remains an important tool for policymaking. It’s just a worry that it largely goes unappreciated.
How underappreciated? IBISWorld ran two sessions on concentration risk at the 2010 annual RMA Risk Conference. One panelist, Robert Walker of the Federal Reserve Board in Washington, DC, emphasized the importance stress testing. Walker visited many banks in 2009 and while revisiting those banks the following year he inquired what had been done with their portfolio/credit policies in light of the stress tests of 12 months ago. Unfortunately, many of the banks had done absolutely nothing. Our point? Too often stress tests are conducted simply to comply with regulatory requirements and are not incorporated into bank policy or risk management. Clearly, there is a gap in the expectations of regulators and those of banks.

The figure below offers a basic schematic of a credit stress testing. Remember, at its core this must involve concentration risk analysis, including potential correlations between business segments. Other KRI factors could have been added to this example.

We recommend enveloping stress tests and scenario analysis around the most important EWS drivers to gain an understanding of the thresholds where management needs to act, especially for levels of concentration, risk appetite, capital planning and business development; especially now as we head toward the end of the credit cycle.
What are the summary steps involved in building a credit portfolio management system? Here’s a breakdown:

The below steps should be sequential, transparent and not requiring rocket scientists. This is all about common sense, so mix these ingredients carefully.

1. Insure that your KPI data is clean and coded properly. This is nontrivial and often the source of a regulator’s MRA (matters requiring attention). There’s no choice here. The below steps are unattainable without data integrity. For example, for commercial lending NAICS must be used. Many banks are still struggling with the obsolete/arcane standard industry data (SIC) structure. There are crosswalk data mappings, including those provided by IBISWorld, that are useful.

2. For each LOB and subsegment, select KRIIs based on expert judgment (institutional knowledge) and statistical testing, if possible. Often simple scatter diagrams plotting KRIIs vs KPIs suffice.

3. Determine appropriate concentration pools (roll-ups) for consumer, C&I, CRE and other lending segments. Suggestions provided above. Test for outliers within lending segments. Do they behave differently?

4. Integrate the appropriate KPI/KRI data, and concentration pool roll-ups into EWS (“heat maps”) spreadsheets. Make sure that there is action-oriented commentary devoted to policy initiatives like: lending limits, pricing rules and sales initiatives. Define your own “best practices.”

5. Link, though mapping/coding, KRIIs with scenario analysis.

6. Document this stepwise process for regulators, internal audit and, last but not least, your senior bank managers whose feedback will be invaluable.
Final thoughts

Many of IBISWorld’s commercial banking clients utilize both our Industry Early Warning System and Common Factor and Supply Chain Concentration Risk tools as plug-ins to help build or refine in-house procedures. Below are some “best practice” applications of IBISWorld's Early Warning System commonly used in tandem with our concentration risk tools:

- **Quantify Lending Risks and Opportunities:**
  Use the EWS to identify opportunities and monitor risks across the economy at the industry level. Often used as a key input to senior credit/risk committee meetings.

- **Drive Risk Grading Systems:**
  Include an industry perspective from the EWS to internal grading models.

- **Identify Volatility:**
  Recognize industry risk volatility, which is a predictor of the probability of default and charge-offs.

- **Establish Exposure Limits and Risk-Based Pricing:**
  Help create and reinforce bank policy by promoting risk-adverse pricing at the industry level and understand risk appetite.

- **Map and Analyze Concentration Risk Pools:**
  IBISWorld’s industry code mappings are used to connect our risk data to your internal credit rating systems and integrate our key risk indicators with your key performance indicators.

- **Analyze Concentration Risk:**
  Identify supply chain risk and common factor risk for both risk mitigation and business development.

- **Develop Internal Risk Dashboards:**
  Integrate IBISWorld’s industry risk metrics with internal key performance indicators for a holistic view of loan segment risk and lending opportunities.

- **Calibrate C&I Obligor Scorecards:**
  Quantify a client’s industry risk to help determine credit-worthiness.

- **Support Industry Stress Testing and Scenario Analysis:**
  Gauge the impact of stress scenarios on capital requirements by correlating IBISWorld’s historical risk scores with your internal credit loss data.
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