

# The Pulse of Your Network

## AI-Powered Community Health Scoring for Viva Engage

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# Introduction

## Problem Statement:

Enterprise leaders lack visibility into the health of internal communities. There is no standardized, automated way to surface early warning signs like disengagement, silos, or declining thread activity.

## Goal:

Build a Community Health Score (CHS) framework using public data (Reddit) to simulate Yammer-style behavior — and visualize risks and strengths in community engagement.

# What Does “Healthy” Mean in Enterprise Communities?

Prompt replies (low latency)

Diverse voices (not just same users)

Content relevance (no off-topic drift)

Supportive tone (civility, empathy)

Dynamic interaction (depth & back-and-forth)

*(Based on research from Lithium’s CHI model +  
enterprise social network literature)*

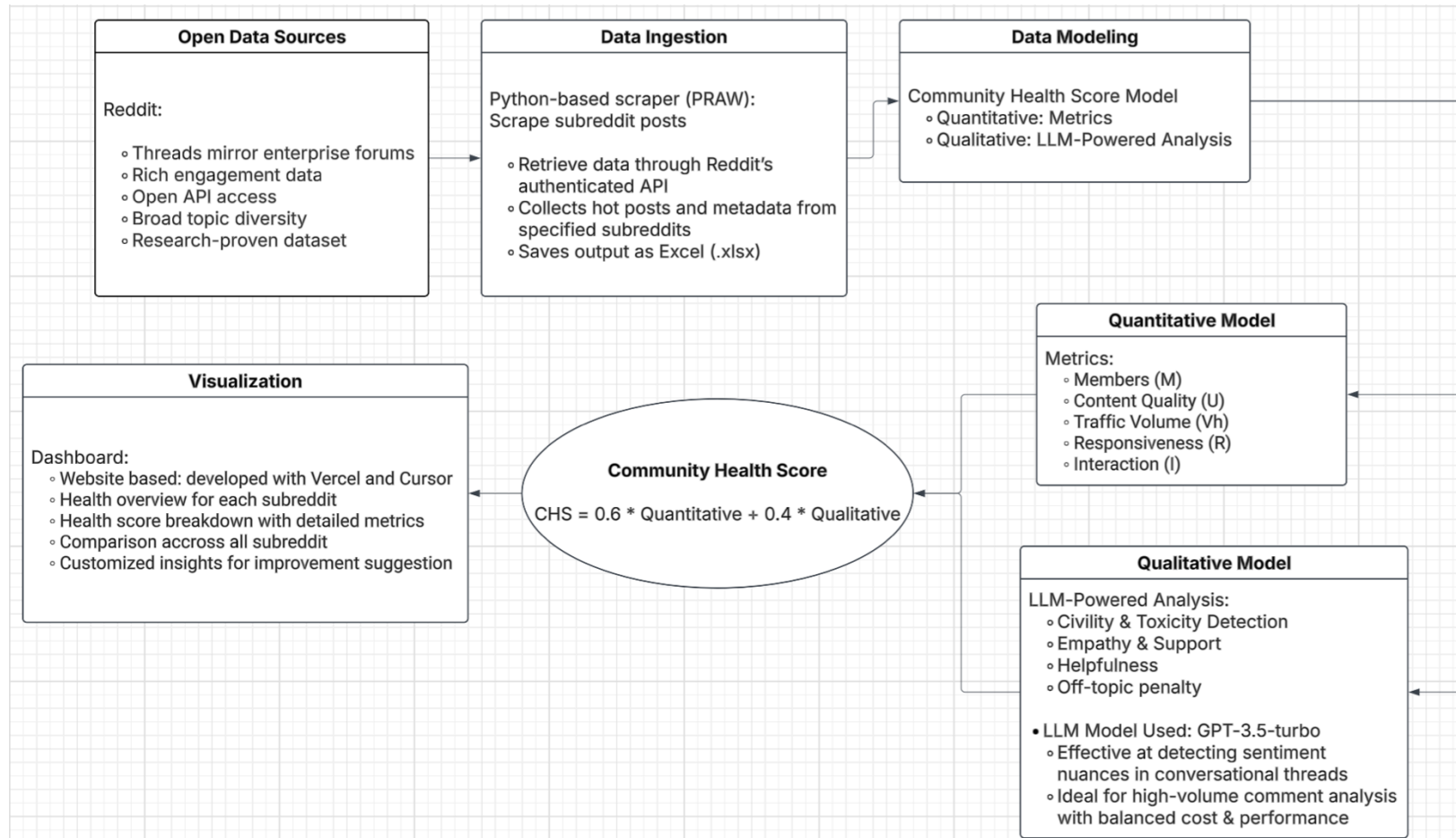


# Our Approach

Step	Description
Subreddit Selection	15 subreddits mapped to Viva-like use cases (support, feedback, team spaces, ERGs)
Quantitative Analysis	Metrics: responsiveness, volume, interaction
Qualitative Analysis	LLM-powered post-level evaluation (tone, civility, helpfulness)
Dashboard	Power BI dashboard highlighting high/low CHS areas
Outcome	A modular scoring model + prototype dashboard usable for Viva Engage



# Architecture Overview



# Subreddit Selection

- To simulate the structure and dynamics of Microsoft Viva Engage communities, subreddit selection can be categorized into three core communication types.
  - Department-based (e.g., r/marketing, r/sysadmin)
  - Peer support (e.g., r/lgbt, r/depression)
  - Knowledge spaces (e.g., r/datascience, r/productmanagement)

# Quantitative Model

Health Factor	Formula Component	Meaning (Reddit context)
<b>Members (M)</b>	$\log_{10}(\max(\text{subscriber\_count}, 1))$	Captures community size
<b>Content Quality (U)</b>	$\text{post\_count} * \log_{10}(\max(\text{total\_upvotes}, 1))$	High-quality, highly-upvoted content
<b>Traffic Volume (Vh)</b>	$\log_{10}(\max(\text{engagement\_score} + \text{total\_comments} * 0.5, 1))$	Measures active participation, comments as proxies
<b>Responsiveness (R)</b>	$\min(\text{expected\_response\_time} / \text{avg\_response\_time}, 10.0)$	Faster replies = better community responsiveness
<b>Interaction (I)</b>	$\min(\sqrt{\text{avg\_contributors\_per\_thread} * \text{avg\_comments\_per\_thread}}, 10.0)$	Captures thread depth and diversity of contributors

# Quantitative Score Calculation (CHS)

Calculation Step	Formula	Theoretical Foundation	Practical Justification
Health Function	$\text{sqrt}(M * U * V_h * R * I)$	<b>Geometric Mean Principle:</b> Multiplicative combination ensures balanced health across all dimensions. No single factor can compensate for complete failure in another.	Communities need strength across all areas. High membership with zero responsiveness indicates unhealthy community dynamics.
Age Normalization	$\text{log\_health} * (1 + 0.1 * \text{age\_factor})$	<b>Community Lifecycle Theory:</b> Mature communities may have different growth patterns than new ones. Age adjustment provides fair comparison.	Older communities may have slower growth but higher stability. New communities may show rapid growth that stabilizes over time.
Final Scaling	$\text{max}(0, \text{min}(1000, \text{normalized\_health} * 200))$	<b>Bounded Score Interpretation:</b> 1000-point scale provides intuitive interpretation similar to credit scores or standardized tests.	Stakeholders understand percentage-based and bounded scoring systems better than unbounded mathematical outputs.

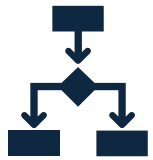


# Quantitative Score Results

Subreddit	CHI Score	Subscribers	Posts	Members Factor	Content Factor	Traffic Factor	Responsiveness	Interaction	Health Grade
r/TwoXChromosomes	729.30	13,623,750	100	7.1	559.8	3.8	10.00	10.00	B
r/lgbt	725.00	1,193,730	100	6.1	584.2	4.0	10.00	10.00	B
r/personalfinance	717.33	21,290,077	100	7.3	472.1	3.5	10.00	10.00	B
r/Parenting	716.52	8,161,533	100	6.9	492.0	3.5	10.00	10.00	B
r/seattle	715.62	727,472	100	5.9	536.8	3.7	10.00	10.00	B
r/sysadmin	709.68	1,130,219	100	6.1	476.2	3.5	10.00	10.00	B
r/depression	680.79	1,094,517	100	6.0	434.8	2.9	10.00	7.22	B
r/consulting	668.53	326,764	100	5.5	424.6	2.8	10.00	6.53	B
r/productmanagement	660.03	217,726	100	5.3	386.7	2.7	10.00	6.38	B
r/AskHR	655.56	1,807,804	100	6.3	350.0	2.6	10.00	5.76	B
r/Entrepreneurship	609.81	94,898	100	5.0	306.5	2.2	10.00	3.69	B
r/datascience	594.49	2,685,203	94	6.4	386.4	2.7	2.59	5.50	C
r/farming	539.58	192,340	100	5.3	394.5	2.5	1.35	4.12	C
r/MLQuestions	527.65	81,243	100	4.9	302.3	2.1	2.26	3.26	C
r/iCheckMovies	0.00	634	1	2.8	0.8	1.0	0.56	1.73	F
r/True_Anarchy	0.00	21	1	1.3	0.0	0.0	1.00	0.00	F



# Qualitative Model Overview



## **LLMs used to assess:**

Civility / Toxicity  
Empathy & Support  
Helpfulness  
Off-topic penalty



**Each post scored  
on 0–100**



**Top 5 comments  
used per post**



**LLM: GPT-3.5-  
turbo**

# Qualitative Score Calculation ( $CHS_{qual}$ )

$Post\ Score(i) = w1S + w2C + w3E + w4H + w5T$ , where

Component	Meaning	Scoring Approach
<b>S</b> = Sentiment	Overall tone (positive/neutral/negative)	e.g., OpenAI sentiment classifier
<b>C</b> = Civility	Toxicity, politeness, no personal attacks	e.g., OpenAI moderation or Perspective API
<b>E</b> = Empathy	Presence of supportive/emotional content	LLM prompt-based score
<b>H</b> = Helpfulness	Does it answer or add value?	LLM prompt-based score
<b>T</b> = Topic Relevance	Is it relevant to the community's theme?	LLM or keyword-matching prompt

# Combined Health Score Calculation

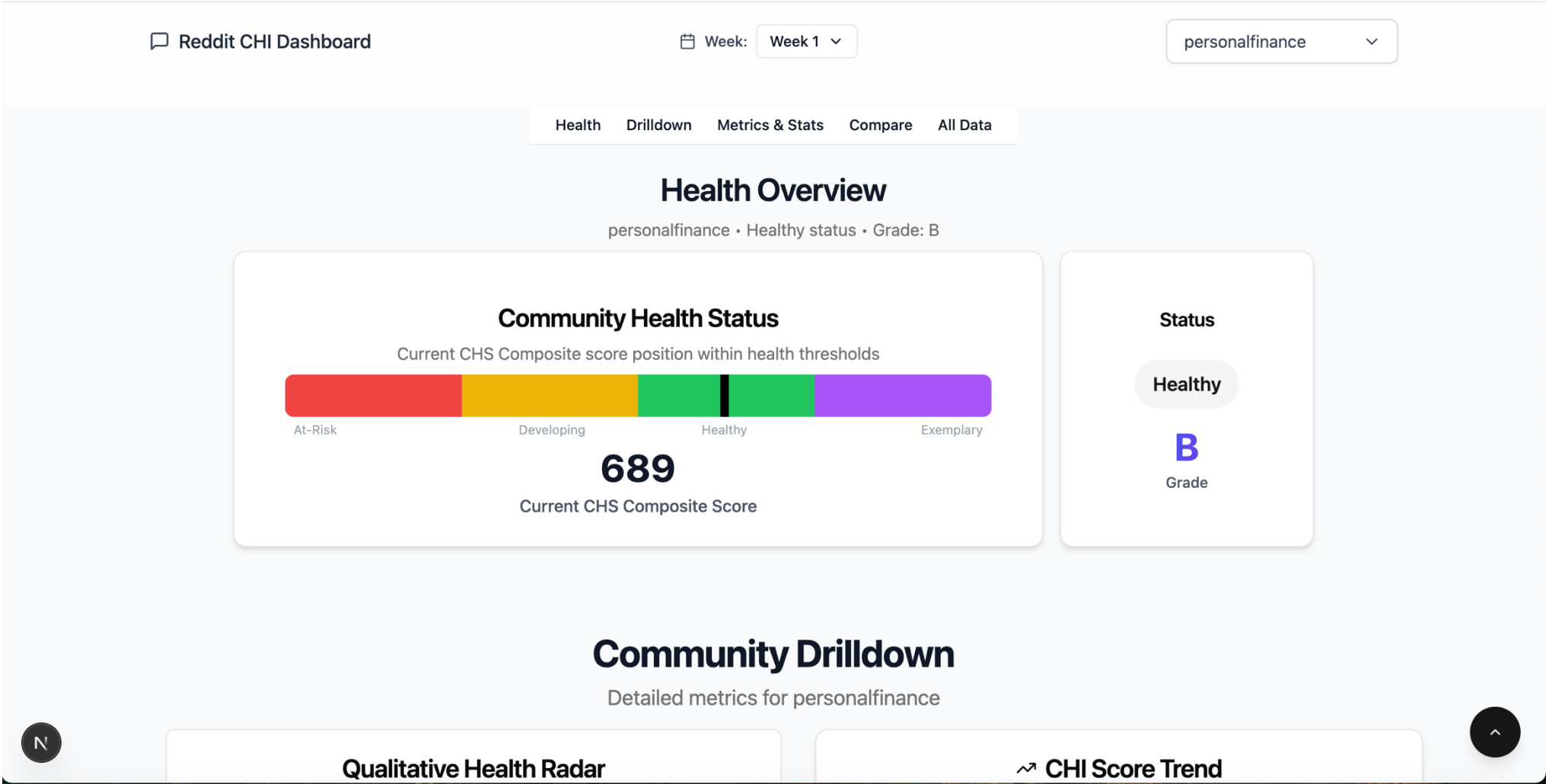
$$CHS_{combined} = CHS_{quan}^{\beta} \cdot CHS_{qual}^{1-\beta}$$

- Why Geometric Mean?
  - Penalizes imbalance: a community strong in one area but weak in another will not rank highly overall.
  - Better aligns with Lithium's "No single factor can compensate for failure elsewhere" philosophy.

# Qualitative Score Results

Subreddit	Normalized_Sentiment	Normalized_Civility	Normalized_Empathy	Normalized_Helpfulness	Normalized_Relevance	CHS_qual
AskHR	225.00	425.00	550.00	500.00	800.00	500.00
Entrepreneurship	425.00	500.00	500.00	125.00	300.00	370.00
MLQuestions	550.00	725.00	600.00	550.00	650.00	615.00
Parenting	700.00	750.00	750.00	625.00	725.00	710.00
ProductManagement	400.00	500.00	475.00	300.00	525.00	440.00
Seattle	500.00	575.00	500.00	75.00	200.00	370.00
True_Anarchy	444.44	527.78	361.11	111.11	333.33	355.56
TwoXChromosomes	600.00	650.00	675.00	625.00	825.00	675.00
consulting	475.00	500.00	500.00	100.00	225.00	360.00
datascience	550.00	525.00	500.00	175.00	275.00	405.00
depression	350.00	475.00	625.00	400.00	600.00	490.00
farming	375.00	550.00	475.00	250.00	425.00	415.00
iCheckMovies	575.00	600.00	475.00	225.00	450.00	465.00
lgbt	600.00	650.00	525.00	250.00	275.00	460.00
personalfinance	500.00	725.00	625.00	700.00	800.00	670.00
sysadmin	350.00	500.00	425.00	575.00	750.00	520.00

# Dashboard



# Macro Insights

- **1. Community health can be measured**  
→ Use data (activity, civility, empathy) to build dashboards—no more relying on gut feel.
- **2. Low engagement ≠ low risk**  
→ “Ghost posts” (no replies) signal decline even when post volume looks fine.
- **3. AI scales tone and safety**  
→ GPT can detect toxicity and support moderators across large communities.
- **4. One-size metrics don’t fit all**  
→ Support groups, work teams, and learning hubs need different scoring priorities.
- **5. Reddit is a good proxy—if adapted**  
→ Public data gives great signals, but needs tuning for enterprise context.
- **6. Community health drives business KPIs**  
→ Stronger communities boost onboarding, retention, and internal mobility.
- **7. Decline is predictable—and fixable**  
→ Watch for reply delays and fading voices—intervene early with smart signals.

# Data Insights 1

## ✓ **Content Quality Drives Health**

Semantic depth and post utility have greater impact on subreddit health than activity volume alone.

- CHI gains correlate closely with **Content Factor** increases.
- *r/AskHR*: +7.64 CHI gain from +4.60 in Content Factor → More structured, actionable posts (e.g., resume, interview advice).
- *r/personalfinance*: +0.66 CHI from +2.96 in Content Factor → Shift toward long-form financial planning tips.

- ✓ CHS Tier Movement (7/17 vs 7/25)
- ✓ CHI Tier Movement (7/17 vs 7/25)
- ✓ Engagement Saturation
- ✓ Identifying “Pseudo-Active” Communities



## Data Insights 2

✓ Content Quality Drives Health

✓ **CHS Tier Movement (7/17 vs 7/25)**

Some subreddits improved civility and relevance enough to advance tiers.

✓ CHI Tier Movement (7/17 vs 7/25)

✓ Engagement Saturation

✓ Identifying “Pseudo-Active” Communities

Subreddit	CHS (7/17)	CHS (7/25)	Health Status
r/Entrepreneurship	512.5	370.0	Health → Developing

subreddit	Normalized Sentiment	Normalized Civility	Normalized Empathy	Normalized Helpfulness	Normalized Relevance	CHS qual
R/Entrepreneurship '17 → 25	-62.5	-50	175	-437.5	-337.5	-142.5

# Data Insights 3

Subreddit	CHI Change	Subscribers Change	Member Factor Change	Content Factor Change	Post Change	Health Grade Change
r/datascience	-11.40	+1203	+0.0002	-31.83	-6	B → C

- ✓ Content Quality Drives Health
- ✓ CHS Tier Movement (7/17 vs 7/25)
- ✓ **CHI Tier Movement (7/17 vs 7/25)**

CHI framework successfully flags value loss even with surface-level engagement growth.

- ✓ Engagement Saturation
- ✓ Identifying “Pseudo-Active” Communities

# Data Insights 4

- ✓ Content Quality Drives Health
- ✓ CHS Tier Movement (7/17 vs 7/25)
- ✓ CHI Tier Movement (7/17 vs 7/25)

## ✓ Engagement Saturation

here is a ceiling to participation-based growth. Next-stage improvement depends on empathy and semantic value.

Some subreddits hit 100 in both **Responsiveness** and **Interaction**, yet remain non-healthy.

*r/lgbt*: Maintains high activity, but **Content Factor dropped** (-2.5), indicating reactive but not constructive participation.

- ✓ Identifying “Pseudo-Active” Communities

# Data Insights 5

- ✓ Content Quality Drives Health
- ✓ CHS Tier Movement (7/17 vs 7/25)
- ✓ CHI Tier Movement (7/17 vs 7/25)
- ✓ Engagement Saturation
- ✓ **Identifying “Pseudo-Active” Communities**

CHS model effectively detects low-quality or emotionally disconnected communities, even when surface metrics are high.

Subreddits with **high post volume** received **low CHS** due to toxic tone or poor topic alignment.

*r/depression*: High activity, but harsh or non-supportive language → Low empathy and civility.

# Recommendations



## 1. AI-Powered Tone Coaching

Use GPT to provide real-time civility and empathy suggestions as users write posts.

Encourages respectful, constructive conversations.



## 2. Community Health Tiers & Playbooks

Label communities as At Risk / Developing / Healthy / Exemplar.

Offer tier-specific nudges, onboarding kits, and content templates.



## 3. Early Warning System

Detect drops in civility, engagement quality, or helpfulness.

Trigger moderator alerts and auto-suggested interventions.



## 4. Adaptive Scoring by Community Type

Customize CHI/CHS weights by group focus:

Product Teams → Relevance, Responsiveness

ERGs (e.g., r/lgbt) → Empathy, Civility

Knowledge Hubs → Helpfulness, Clarity

# Thank You

